

## Supplemental Digital Content

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## eSection 1. Algorithm for Assignment of Patients to Surgeons

1. First, pull qualifying index admissions by ICD-9 principal procedure code (ICD\_PRCDR\_CD\_1).
2. Bariatric Surgery Screen: Select admissions with ICD-9 principal procedure codes 4382, 4389, 443, 4431, 4438, 4439, 4468, 4469, 4495.
  - a. In the inpatient bill, check Diagnosis Related Group (DRG) field for a bariatric surgery DRG (619, 620, or 621), or an ICD-9 diagnosis code related to obesity. If either exists, the admission is classified as bariatric.
  - b. If neither of these conditions are met, re-assign the ICD-9 admissions as follows:
    - i. 4382: Exclude from the study
    - ii. 4389: reassign to stomach partial gastrectomy
    - iii. 443, 4438, 4439: reassign to stomach gastric bypass (non-bariatric)
    - iv. 4431: Exclude from the study
    - v. 4468: reassign to stomach other
    - vi. 4469: reassign to stomach other
    - vii. 4495: Exclude from the study
3. For all other refined PPX categories, link them to a qualifying CPT code from the same ICD-9 category:
  - a. First, look for a CPT bill from the exact same narrow PPX category, as follows:
    - i. If a single qualifying CPT bill from the same narrow category as the ICD-9 PPX appeared on the same day, assign the admission to that Physician.
    - ii. If multiple CPT bills from the same narrow category as the ICD-9 PPX appear on the same day, assign the patient to the Physician who submitted the highest-revenue bill.
    - iii. If one or more qualifying CPT bill from the same narrow category did not occur on the same day, but were submitted on a different day, assign the patient to the Physician who submitted the first CPT bill during the hospitalization, and reassign the patient to that bill's CPT-based narrow category.
  - b. If no qualifying bills from the same narrow category appear, revert to checking for any CPT bill from the same broad CPT category, as follows:
    - i. If a single CPT bill from the same broad category as the ICD-9 PPX occurred on the same day as the ICD-9 PPX, assign the patient to that Physician, and reassign the patient to that bill's CPT-based narrow category.
    - ii. If multiple CPT bills from the same broad category as the ICD-9 PPX occurred on the same day as the ICD-9 PPX, then assign the patient to the Physician who submitted the highest-revenue bill, and reassign the patient to that bill's CPT-based narrow category.
    - iii. If one or more qualifying CPT bills from the same broad category as the ICD-9 PPX did not occur on the same day, but were submitted on a different day than the ICD-9 PPX, assign the patient to the Physician who submitted the first such bill during the hospitalization, and reassign the patient to that bill's CPT-based narrow category.

## **eSection 2. Description of Matching Algorithm**

### **The Surgeon Match**

We first formed surgeon pairs practicing in the same hospital using a distance function. The function only included the procedures performed. Using the 10 randomly sampled patients for each new surgeon, new surgeons were optimally paired to the experienced surgeon who performed at least as many of the same procedures.

### **The Year Match**

After pairing new and experienced surgeons, we then matched their patients based only on the year of admission and a propensity score for admission to a new surgeon. The propensity score included only covariates being matched. This match serves as the baseline for comparing new and experienced surgeons.

### **The Operation Match**

We then matched the new surgeon patients to those of their experienced counterpart on year, procedure category, and propensity for admission by a new surgeon. The propensity score included only covariates being matched.

### **The Emergent Status Match**

In addition to the covariates in the procedure match, we further added an indicator for emergent admission to the matching algorithm. The propensity score was revised to include emergent status.

### **The Risk Factor Match**

In addition to all covariates in the emergent status match, we added the following variables to the risk factor match:

- Demographic Variables
  - Age on admission, in years
  - Age 65-69
  - Age 70-74
  - Age 75-79
  - Age 80-84
  - Age 85+
  - Sex
- Admission Characteristics
  - Transfer-in
  - Hospitalization in 6 months prior to admission
- Secondary Procedures on Same Day
  - Major therapeutic
- Comorbidities
  - Congestive heart failure
  - Past myocardial infarction
  - Past arrhythmia
  - Angina
  - Valvular disease
  - Unstable angina
  - Hypertension
  - Diabetes
  - Renal dysfunction
  - Renal failure
  - Liver disease
  - Cancer
  - Specific abdominal cancer
  - Chronic obstructive pulmonary disease

- Asthma
- Post-inflammatory pulmonary fibrosis
- Dementia
- Stroke
- Seizure
- Paraplegia
- Hypothyroidism
- Collagen vascular disease
- Hemoglobinopathy
- AIDS
- Chronic peptic ulcer
- Coagulopathy
- Other coagulopathy
- Cushing's disease
- Graves' disease
- Thrombocytopenia
- Scores
  - Propensity score for treatment by a new physician (revised at each match to include all matching covariates)
  - Risk of 30-day mortality (using all patient risk factors)
  - Risk of 30-day mortality (using comorbidities only)
  - Comorbidity count

**eSection 3. 30-day Resource Cost Algorithm.**

**A. Exclusions for Non-Acute Care**

1. Inpatient Hospital (Part A) File

- a. Exclude claim for hospitalizations in non-acute settings using 6-digit Medicare hospital ID (A if the 3<sup>rd</sup> position of the ID is not equal to “0” or if the 3<sup>rd</sup> and 4<sup>th</sup> positions are not equal to “13”
  - i. Exclude if 4<sup>th</sup>, 5<sup>th</sup>, or 6<sup>th</sup> position in identifier is not a number
- b. Exclude claim if DRG = 945 or 946 (Rehabilitation)

2. Outpatient File

- a. Exclude claim for encounters in non-acute settings using 6-digit Medicare hospital ID (hospital identified as other than “Short-term (General and Specialty) Hospital” or “Critical Access Hospital”)
  - i. Exclude if the 3<sup>rd</sup> position of the ID is not equal to “0” or if the 3<sup>rd</sup> and 4<sup>th</sup> positions are not equal to “13”
  - ii. Exclude if 4<sup>th</sup>, 5<sup>th</sup>, or 6<sup>th</sup> position in identifier is not a number
- b. Exclude claim if principal diagnosis = V57 or subterms (Care involving use of rehabilitation procedures)

3. Surgeon/Carrier (Part B) File

- a. Exclude any claim if the from and through dates fall on or between the admission and discharge dates of a non-acute hospitalization (as defined above) or between the from and through dates of a claim for outpatient care in a non-acute hospital
- b. Exclude claim if no line item place of service codes from the following list appear:

11 = Office	15 = Mobile Unit
20 = Urgent Care Facility	21 = Inpatient hospital
22 = Outpatient hospital	23 = Emergency room - hospital
24 = Ambulatory surgical center	41 = Ambulance - land
42 = Ambulance - air or water	50 = Federally qualified health centers
65 = End stage renal disease treatment facility	71 = State or local public health clinic
81 Independent laboratory	

- c. Exclude claim if principal diagnosis = V57 or subterms (Care involving use of rehabilitation procedures)

**B. Resource Utilization-Based Cost Accounting**

1. Facility and Accommodation Costs from the Inpatient File:

a. Accommodations:

- i. Determine number of inpatient critical care and non-critical care days from revenue centers in the Inpatient file.
- ii. Multiply number of critical care/non-critical care days by average daily cost for each type (adjust to 2013 values using the Bureau of Labor & Statistics inflation factor, hospital component - CCM: \$4,627.52; Int-CCM: \$3,072.08; Non-CCM: \$1,516.64)

Non-Critical Care Revenue Centers	Intermediate Care Revenue Centers	Critical Care Revenue Centers
0100-0101 All-inclusive rate-room and board	0206 Intermediate care	0200-0205 Intensive care
0110-0119 Private medical or general		0207-0209 Intensive care
0120-0129 Semi-private 2 bed (medical or general)		0210-0213, Coronary care
0130-0139 Semi-private 3 and 4 beds		0219 Coronary care
0140-0149 Private (deluxe)		
0150-0159 Room & Board ward (medical or general)		
0160, 0164, 0167 Other Room & Board		

b. Operating Room Time Cost (index admission only)

- i. Determine operating room time using “best anesthesia chart time,” if available; If best anesthesia time missing, use claim anesthesia time from Surgeon/Carrier (Part B) file; if

- both best chart time and claim time missing, assign each patient median best anesthesia time by procedure
    - ii. Multiply anesthesia time by mean of OR time cost range and inflate to 2013 dollars (\$21.20/minute)
  - b. Emergency Room Visit Fixed Costs (post-discharge only)
    - i. For post-discharge Part B records only, separate records into line items and locate place of service code 23 (“Emergency Room – Hospital”)
    - ii. Treat each unique ER date as separate visit, sum visits per patient
  - c. Multiply by average ER visit cost, inflated to 2013 dollars (\$526.90)
- 2. Service Costs from Carrier/Part B and Outpatient Files: (Note: Office visits, Home Care, SNF, and non-ER Outpatient use only section 2 methods)
  - a. Separate line items from Part B (each includes patient ID, CPT code, units count, place of service)
  - b. Anesthesia - if first two digits of CPT code are 00 or 01, code indicates anesthesia billing
    - i. Apply standard CMS base units (2013 list) to each CPT code; if applicable, anesthesia modifier AD reduces base units to 3 per procedure for medical supervision
    - ii. Since time units count reflects anesthesia time in minutes divided by 1.5, divide reported time by 10 to determine number of 15-minute anesthesia time units
    - iii. Add base and time units for each line item, multiply by \$21.92 (un-weighted mean of locality conversion factors, number needs to be revised once national CF available); If applicable, anesthesia modifier QK reduces total AVUs by 50% of allowed rate for medical direction of multiple procedures
    - iv. Sum anesthesia line item costs by patient
  - c. Other Services - apply method to all non-anesthesia Part B line items
    - i. Merge line item CPT with AMA CPT/RVU list (2013 file) to determine RVU for each
    - ii. Using place of service codes, determine whether facility or non-facility RVU is appropriate – for this cost estimate, treat outpatient hospitals as “non-facility” sites of care to adjust for facility component of service costs
    - iii. Multiply RVUs by line item service count (=1 in 99% of non-anesthesia cases)
    - iv. Multiply total RVUs by conversion factor (\$34.02 in 2013)
    - v. Sum line item costs by patient
- 3. Time Frame Under Assessment for Resource Utilization-based Cost Accounting:
  - a. In-hospital costs account for all patient claims during the time period of the index hospitalization
  - b. 30-day costs account for all in-hospital costs, plus any other bills (ER visits, and any bills in the Outpatient and Carrier/Part B files) that occurred within 30 days of admission, and any bills accrued during the entirety of any readmission that began within 30 days of admission.
- 4. Summary Equation:

$$C_{i,30} = (D_{inp}^{CC} * 4,627.52 + D_{inp}^{Int-C} * 3,072.08 + D_{inp}^{NCC} * 1,516.64) + (T_{OR} * 21.20) + AU * 21.92 + ER * 526.90 + \sum RVU_j * 34.02 + RC$$

$D_{inp}^{CC}$  = Number of days in critical care

$D_{inp}^{Int-C}$  = Number of days in intermediate care

$D_{inp}^{NCC}$  = Number of days on hospital floor

$T_{OR}$  = Number of minutes in operating room

AU = Number of anesthesia units

ER = Number of emergency room days

$RVU_j$  = Number of all j RVUs from all bills over defined time period that includes all outpatient and office visits

RC = Readmission costs—all costs associated with hospitalization that began within 30 days of readmission

**eTable 1. List of ICD-9 Principal Procedure Codes and Categories**

<b>Surgical Group</b>	<b>ICD-9 Code</b>	<b>ICD-9 Label</b>	<b>Procedure Category</b>	<b>Broad Category</b>
General Surgery	0722	Unilateral adrenalectomy	Adrenalectomy	adrenal
General Surgery	0729	Other partial adrenalectomy	Adrenalectomy	adrenal
General Surgery	073	Bilateral adrenalectomy	Adrenalectomy	adrenal
General Surgery	4701	Laparoscopic appendectomy	Appendectomy	bowel
General Surgery	4709	Other appendectomy	Appendectomy	bowel
General Surgery	4382	Laparoscopic vertical (sleeve) gastrectomy	Bariatric	bariatric
General Surgery	4389	Other partial gastrectomy, other	Bariatric	bariatric
General Surgery	443	Gastroenterostomy without gastrectomy	Bariatric	bariatric
General Surgery	4431	High gastric bypass	Bariatric	bariatric
General Surgery	4438	Laparoscopic gastroenterostomy	Bariatric	bariatric
General Surgery	4439	Other gastroenterostomy	Bariatric	bariatric
General Surgery	4468	Laparoscopic gastroplasty	Bariatric	bariatric
General Surgery	4469	Other repair of stomach, other	Bariatric	bariatric
General Surgery	4495	Laparoscopic gastric restrictive procedure	Bariatric	bariatric
General Surgery	5141	Common duct exploration for removal of calculus	Biliary common duct	HPB
General Surgery	5151	Exploration of common duct	Biliary common duct	HPB
General Surgery	5132	Anastomosis of gallbladder to intestine	Biliary other	HPB
General Surgery	5136	Choledochoenterostomy	Biliary other	HPB
General Surgery	5137	Anastomosis of hepatic duct to gastrointestinal tract	Biliary other	HPB
General Surgery	5122	Cholecystectomy	Cholecystectomy	HPB
General Surgery	5123	Laparoscopic cholecystectomy	Cholecystectomy	HPB
General Surgery	5124	Laparoscopic partial cholecystectomy	Cholecystectomy	HPB
General Surgery	1731	Laparoscopic multiple segmental resection of large intestine	Colectomy Partial - Lap	bowel
General Surgery	1732	Laparoscopic cecectomy	Colectomy Partial - Lap	bowel
General Surgery	1733	Laparoscopic right hemicolectomy	Colectomy Partial - Lap	bowel
General Surgery	1734	Laparoscopic resection of transverse colon	Colectomy Partial - Lap	bowel
General Surgery	1735	Laparoscopic left hemicolectomy	Colectomy Partial - Lap	bowel
General Surgery	1736	Laparoscopic sigmoidectomy	Colectomy Partial - Lap	bowel
General Surgery	1739	Other laparoscopic partial excision of large intestine	Colectomy Partial - Lap	bowel
General Surgery	4571	Open and other multiple segmental resection of large intestine	Colectomy Partial – Open	bowel
General Surgery	4572	Open and other cecectomy	Colectomy Partial – Open	bowel
General Surgery	4573	Open and other right hemicolectomy	Colectomy Partial – Open	bowel
General Surgery	4574	Open and other resection of transverse colon	Colectomy Partial – Open	bowel
General Surgery	4575	Open and other left hemicolectomy	Colectomy Partial – Open	bowel
General Surgery	4576	Open and other sigmoidectomy	Colectomy Partial – Open	bowel
General Surgery	4579	Other and unspecified partial excision of large intestine	Colectomy Partial – Open	bowel
General Surgery	4581	Laparoscopic total intra-abdominal colectomy	Colectomy Total - Lap	bowel
General Surgery	458	Total intra-abdominal colectomy	Colectomy Total - Open	bowel
General Surgery	4582	Open total intra-abdominal colectomy	Colectomy Total - Open	bowel
General Surgery	4583	Other and unspecified total intra-abdominal colectomy	Colectomy Total - Open	bowel
General Surgery	4240	Esophagectomy, not otherwise specified	Esophagectomy	UGI
General Surgery	4241	Partial esophagectomy	Esophagectomy	UGI
General Surgery	4242	Total esophagectomy	Esophagectomy	UGI
General Surgery	427	Esophagomyotomy	Esophagomyotomy	UGI
General Surgery	5342	Laparoscopic repair of umbilical hernia with graft or prosthesis	Hernia Abdominal – Lap	Hernia
General Surgery	5343	Other laparoscopic umbilical herniorrhaphy	Hernia Abdominal – Lap	Hernia
General Surgery	5362	Laparoscopic incisional hernia repair with graft or prosthesis	Hernia Abdominal – Lap	Hernia
General Surgery	5363	Other laparoscopic repair of other hernia of anterior abdominal wall with graft or prosthesis	Hernia Abdominal – Lap	Hernia
General Surgery	5341	Other and open repair of umbilical hernia with graft or prosthesis	Hernia Abdominal – Open	Hernia
General Surgery	5349	Other open umbilical herniorrhaphy	Hernia Abdominal – Open	Hernia
General Surgery	5351	Incisional hernia repair	Hernia Abdominal – Open	Hernia
General Surgery	5359	Repair of other hernia of anterior abdominal wall	Hernia Abdominal – Open	Hernia
General Surgery	5361	Other open incisional hernia repair with graft or prosthesis	Hernia Abdominal – Open	Hernia

<b>Surgical Group</b>	<b>ICD-9 Code</b>	<b>ICD-9 Label</b>	<b>Procedure Category</b>	<b>Broad Category</b>
General Surgery	5369	Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis	Hernia Abdominal – Open	Hernia
General Surgery	1711	Laparoscopic repair of direct inguinal hernia with graft or prosthesis	Hernia Groin – Lap	Hernia
General Surgery	1712	Laparoscopic repair of indirect inguinal hernia with graft or prosthesis	Hernia Groin – Lap	Hernia
General Surgery	1713	Laparoscopic repair of inguinal hernia with graft or prosthesis, not otherwise specified	Hernia Groin – Lap	Hernia
General Surgery	1721	Laparoscopic bilateral repair of direct inguinal hernia with graft or prosthesis	Hernia Groin – Lap	Hernia
General Surgery	1722	Laparoscopic bilateral repair of indirect inguinal hernia with graft or prosthesis	Hernia Groin – Lap	Hernia
General Surgery	1723	Laparoscopic bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis	Hernia Groin – Lap	Hernia
General Surgery	1724	Laparoscopic bilateral repair of inguinal hernia with graft or prosthesis, not otherwise specified	Hernia Groin – Lap	Hernia
General Surgery	5300	Unilateral repair of inguinal hernia, not otherwise specified	Hernia Groin – Open	Hernia
General Surgery	5301	Other and open repair of direct inguinal hernia	Hernia Groin – Open	Hernia
General Surgery	5302	Other and open repair of indirect inguinal hernia	Hernia Groin – Open	Hernia
General Surgery	5303	Other and open repair of direct inguinal hernia with graft or prosthesis	Hernia Groin – Open	Hernia
General Surgery	5304	Other and open repair of indirect inguinal hernia with graft or prosthesis	Hernia Groin – Open	Hernia
General Surgery	5305	Repair of inguinal hernia with graft or prosthesis, not otherwise specified	Hernia Groin – Open	Hernia
General Surgery	5310	Bilateral repair of inguinal hernia, not otherwise specified	Hernia Groin – Open	Hernia
General Surgery	5311	Other and open bilateral repair of direct inguinal hernia	Hernia Groin – Open	Hernia
General Surgery	5312	Other and open bilateral repair of indirect inguinal hernia	Hernia Groin – Open	Hernia
General Surgery	5313	Other and open bilateral repair of inguinal hernia, one direct and one indirect	Hernia Groin – Open	Hernia
General Surgery	5314	Other and open bilateral repair of direct inguinal hernia with graft or prosthesis	Hernia Groin – Open	Hernia
General Surgery	5315	Other and open bilateral repair of indirect inguinal hernia with graft or prosthesis	Hernia Groin – Open	Hernia
General Surgery	5316	Other and open bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis	Hernia Groin – Open	Hernia
General Surgery	5317	Bilateral inguinal hernia repair with graft or prosthesis, not otherwise specified	Hernia Groin – Open	Hernia
General Surgery	5321	Unilateral repair of femoral hernia with graft or prosthesis	Hernia Groin – Open	Hernia
General Surgery	5329	Other unilateral femoral herniorrhaphy	Hernia Groin – Open	Hernia
General Surgery	459	Intestinal anastomosis	Large Bowel Other	bowel
General Surgery	4590	Intestinal anastomosis, not otherwise specified	Large Bowel Other	bowel
General Surgery	4592	Anastomosis of small intestine to rectal stump	Large Bowel Other	bowel
General Surgery	4593	Other small-to-large intestinal anastomosis	Large Bowel Other	bowel
General Surgery	4594	Large-to-large intestinal anastomosis	Large Bowel Other	bowel
General Surgery	4595	Anastomosis to anus	Large Bowel Other	bowel
General Surgery	4675	Suture of laceration of large intestine	Large Bowel Other	bowel
General Surgery	4679	Other repair of intestine	Large Bowel Other	bowel
General Surgery	5029	Other destruction of lesion of liver	Liver Other	HPB
General Surgery	5022	Partial hepatectomy	Liver Partial Hepatectomy	HPB
General Surgery	503	Lobectomy of liver	Liver Partial Hepatectomy	HPB
General Surgery	5451	Laparoscopic lysis of peritoneal adhesions	Lysis of Adhesions	bowel
General Surgery	5459	Other lysis of peritoneal adhesions	Lysis of Adhesions	bowel
General Surgery	8541	Unilateral simple mastectomy	Mastectomy	Breast
General Surgery	8542	Unilateral simple mastectomy	Mastectomy	Breast
General Surgery	8543	Unilateral extended simple mastectomy	Mastectomy	Breast
General Surgery	8544	Bilateral extended simple mastectomy	Mastectomy	Breast
General Surgery	8545	Unilateral radical mastectomy	Mastectomy	Breast



Surgical Group	ICD-9 Code	ICD-9 Label	Procedure Category	Broad Category
General Surgery	8546	Bilateral radical mastectomy	Mastectomy	Breast
General Surgery	8547	Unilateral extended radical mastectomy	Mastectomy	Breast
General Surgery	8548	Bilateral extended radical mastectomy	Mastectomy	Breast
General Surgery	5251	Proximal pancreatectomy	Pancreatectomy	HPB
General Surgery	5252	Distal pancreatectomy	Pancreatectomy	HPB
General Surgery	5253	Radical subtotal pancreatectomy	Pancreatectomy	HPB
General Surgery	5259	Other partial pancreatectomy	Pancreatectomy	HPB
General Surgery	526	Total pancreatectomy	Pancreatectomy	HPB
General Surgery	527	Radical pancreaticoduodenectomy	Pancreatectomy	HPB
General Surgery	0681	Complete parathyroidectomy	Parathyroidectomy	Endocrine
General Surgery	0689	Other parathyroidectomy	Parathyroidectomy	Endocrine
General Surgery	5493	Creation of cutaneoperitoneal fistula	PD Access Procedure	Bowel
General Surgery	4849	Other pull-through resection of rectum	Proctectomy	Bowel
General Surgery	485	Abdominoperineal resection of rectum	Proctectomy	Bowel
General Surgery	4850	Abdominoperineal resection of the rectum, not otherwise specified	Proctectomy	Bowel
General Surgery	4851	Laparoscopic abdominoperineal resection of the rectum	Proctectomy	Bowel
General Surgery	4852	Open abdominoperineal resection of the rectum	Proctectomy	Bowel
General Surgery	4859	Other abdominoperineal resection of the rectum	Proctectomy	Bowel
General Surgery	4862	Anterior resection of rectum with synchronous colostomy	Proctectomy	Bowel
General Surgery	4863	Other anterior resection of rectum	Proctectomy	Bowel
General Surgery	4869	Other resection of rectum	Proctectomy	Bowel
General Surgery	4875	Abdominal proctopexy	Proctopexy	Bowel
General Surgery	4429	Other pyloroplasty	Pyloroplasty	Bowel
General Surgery	4591	Small-to-small intestinal anastomosis	Small Bowel Other	Bowel
General Surgery	4673	Suture of laceration of small intestine, except duodenum	Small Bowel Other	Bowel
General Surgery	4674	Closure of fistula of small intestine, except duodenum	Small Bowel Other	Bowel
General Surgery	4679	Other repair of intestine	Small Bowel Other	Bowel
General Surgery	4551	Isolation of segment of small intestine	Small Bowel Resection	Bowel
General Surgery	4561	Multiple segmental resection of small intestine	Small Bowel Resection	Bowel
General Surgery	4562	Other partial resection of small intestine	Small Bowel Resection	Bowel
General Surgery	415	Total splenectomy	Splenectomy	HPB
General Surgery	4466	Other procedures for creation of esophagogastric sphincteric competence	Stomach Anti-Reflux	UGI
General Surgery	4467	Laparoscopic procedures for creation of esophagogastric sphincteric competence	Stomach Anti-Reflux	UGI
General Surgery	443	Gastroenterostomy without gastrectomy	Stomach Gastric Bypass (non-bariatric)	UGI
General Surgery	4438	Laparoscopic gastroenterostomy	Stomach Gastric Bypass (non-bariatric)	UGI
General Surgery	4439	Other gastroenterostomy	Stomach Gastric Bypass (non-bariatric)	UGI
General Surgery	4342	Local excision of other lesion or tissue of stomach	Stomach Other	UGI
General Surgery	4469	Other repair of stomach, other	Stomach Other	UGI
General Surgery	435	Partial gastrectomy with anastomosis to esophagus	Stomach Partial Gastrectomy	UGI
General Surgery	436	Partial gastrectomy with anastomosis to duodenum	Stomach Partial Gastrectomy	UGI
General Surgery	437	Partial gastrectomy with anastomosis to jejunum	Stomach Partial Gastrectomy	UGI
General Surgery	4389	Other partial gastrectomy, other	Stomach Partial Gastrectomy	UGI
General Surgery	4399	Other total gastrectomy	Stomach Total Gastrectomy	UGI
General Surgery	062	Unilateral thyroid lobectomy	Thyroidectomy Partial	Endocrine
General Surgery	0631	Excision of lesion of thyroid	Thyroidectomy Partial	Endocrine
General Surgery	0639	Other partial thyroidectomy	Thyroidectomy Partial	Endocrine
General Surgery	0650	Substernal thyroidectomy, not otherwise specified	Thyroidectomy Substernal	Endocrine

<b>Surgical Group</b>	<b>ICD-9 Code</b>	<b>ICD-9 Label</b>	<b>Procedure Category</b>	<b>Broad Category</b>
General Surgery	0651	Partial substernal thyroidectomy	Thyroidectomy Substernal	Endocrine
General Surgery	0652	Complete substernal thyroidectomy	Thyroidectomy Substernal	Endocrine
General Surgery	064	Complete thyroidectomy	Thyroidectomy Total	Endocrine
General Surgery	4441	Suture of gastric ulcer site	Ulcer	bowel
General Surgery	4442	Suture of duodenal ulcer site	Ulcer	bowel
Orthopedic Surgery	7935	Open reduction with internal fixation, femur	Hip Repair	ortho
Orthopedic Surgery	8140	Repair of hip, not elsewhere classified	Hip Repair	ortho
Orthopedic Surgery	8151	Total hip arthroplasty	Hip Replacement	ortho
Orthopedic Surgery	8152	Partial hip arthroplasty	Hip Replacement	ortho
Orthopedic Surgery	0070	Revision of hip replacement, both acetabular and femoral components	Hip Replacement Revision	ortho
Orthopedic Surgery	0071	Revision of hip replacement, acetabular component	Hip Replacement Revision	ortho
Orthopedic Surgery	0072	Revision of hip replacement, femoral component	Hip Replacement Revision	ortho
Orthopedic Surgery	0073	Revision of hip replacement, acetabular liner and/or femoral head only	Hip Replacement Revision	ortho
Orthopedic Surgery	8153	Revision of hip replacement, not otherwise specified	Hip Replacement Revision	ortho
Orthopedic Surgery	8154	Total knee replacement	Knee Replacement	ortho
Orthopedic Surgery	0080	Revision of knee replacement, total (all components)	Knee Replacement Revision	ortho
Orthopedic Surgery	0081	Revision of knee replacement, tibial component	Knee Replacement Revision	ortho
Orthopedic Surgery	0082	Revision of knee replacement, femoral component	Knee Replacement Revision	ortho
Orthopedic Surgery	0083	Revision of knee replacement, patellar component	Knee Replacement Revision	ortho
Orthopedic Surgery	0084	Revision of total knee replacement, tibial insert (liner)	Knee Replacement Revision	ortho
Orthopedic Surgery	8155	Revision of knee replacement, not otherwise specified	Knee Replacement Revision	ortho

**eTable 2. List of Current Procedure Terminology (CPT) Procedure Codes and Categories**

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Adrenalectomy	44950	Appendectomy	Adrenal
General Surgery	Adrenalectomy	44960	Appendectomy for ruptured appendix	Adrenal
General Surgery	Adrenalectomy	44970	Laparoscopy, surgical, appendectomy	Adrenal
General Surgery	Adrenalectomy	56315	Laparoscopy, surgical; appendectomy	Adrenal
General Surgery	Adrenalectomy	56321	Laparoscopy, surgical; with adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy, transabdominal, lumbar or dorsal	Adrenal
General Surgery	Adrenalectomy	60540	Adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy	Adrenal
General Surgery	Adrenalectomy	60545	Adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy; with excision of adjacent retroperitoneal tumor	Adrenal
General Surgery	Adrenalectomy	60550	Laparoscopy, surgical, with adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy	Adrenal
General Surgery	Adrenalectomy	60650	Laparoscopy, surgical, with adrenalectomy, partial or complete, or exploration of adrenal gland with or without biopsy, transabdominal, lumbar or dorsal	Adrenal
General Surgery	Bariatric	43631	Gastrectomy, partial, distal; with gastroduodenostomy	Bariatric
General Surgery	Bariatric	43632	Gastrectomy, partial, distal; with gastrojejunostomy	Bariatric
General Surgery	Bariatric	43633	Gastrectomy, partial, distal; with Roux-en-Y reconstruction	Bariatric
General Surgery	Bariatric	43634	Gastrectomy, partial, distal; with formation of intestinal pouch	Bariatric
General Surgery	Bariatric	43644	Laparoscopy, surgical, gastric restrictive procedure; with gastric bypass and Roux-en-Y gastroenterostomy (roux limb 150 cm or less)	Bariatric
General Surgery	Bariatric	43645	Laparoscopy, surgical, gastric restrictive procedure; with gastric bypass and small intestine reconstruction to limit absorption	Bariatric
General Surgery	Bariatric	43770	Laparoscopy, surgical, gastric restrictive procedure; placement of adjustable gastric restrictive device (eg, gastric band and subcutaneous port components)	Bariatric
General Surgery	Bariatric	43775	Laparoscopy, surgical, gastric restrictive procedure; longitudinal gastrectomy (ie, sleeve gastrectomy)	Bariatric
General Surgery	Bariatric	43842	Gastric restrictive procedure, without gastric bypass, for morbid obesity; vertical-banded gastroplasty	Bariatric
General Surgery	Bariatric	43843	Gastric restrictive procedure, without gastric bypass, for morbid obesity; other than vertical-banded gastroplasty	Bariatric
General Surgery	Bariatric	43844	Gastric bypass, other than with Roux-en-Y gastroenterostomy, for morbid obesity	Bariatric
General Surgery	Bariatric	43845	Gastric restrictive procedure with partial gastrectomy, pylorus-preserving duodenoileostomy and ileoileostomy (50 to 100 cm common channel) to limit absorption (biliopancreatic diversion with duodenal switch)	Bariatric
General Surgery	Bariatric	43846	Gastric restrictive procedure, with gastric bypass for morbid obesity; with short limb (150 cm or less) Roux-en-Y gastroenterostomy	Bariatric
General Surgery	Bariatric	43847	Gastric restrictive procedure, with gastric bypass for morbid obesity; with small intestine reconstruction to limit absorption	Bariatric
General Surgery	Biliary Common Duct	47420	Choledochotomy or choledochostomy with exploration, drainage, or removal of calculus, with or without cholecystotomy; without transduodenal sphincterotomy or sphincteroplasty	HPB
General Surgery	Biliary Common Duct	47425	Choledochotomy or choledochostomy with exploration, drainage, or removal of calculus, with or without cholecystotomy; with transduodenal sphincterotomy or sphincteroplasty	HPB
General Surgery	Biliary Common Duct	47564	Laparoscopy, surgical; cholecystectomy with exploration of common duct	HPB

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Biliary Common Duct	47610	Cholecystectomy with exploration of common duct	HPB
General Surgery	Biliary Common Duct	47612	Cholecystectomy with exploration of common duct; with choledochoenterostomy	HPB
General Surgery	Biliary Common Duct	47620	Cholecystectomy with exploration of common duct; with with transduodenal sphincterotomy or sphincteroplasty, with or without cholangiography	HPB
General Surgery	Biliary Common Duct	56342	Laparoscopy, cholecystectomy with exploration of common duct	HPB
General Surgery	Biliary Other	46324	Laparoscopy, surgical; cholecystoenterostomy	HPB
General Surgery	Biliary Other	47570	Laparoscopy, surgical; cholecystoenterostomy	HPB
General Surgery	Biliary Other	47612	Cholecystectomy with exploration of common duct; with choledochoenterostomy	HPB
General Surgery	Biliary Other	47720	Cholecystoenterostomy; direct	HPB
General Surgery	Biliary Other	47721	Cholecystoenterostomy; with gastroenterostomy	HPB
General Surgery	Biliary Other	47740	Cholecystoenterostomy; roux-en-y	HPB
General Surgery	Biliary Other	47741	Cholecystoenterostomy; roux-en-y with gastroenterostomy	HPB
General Surgery	Biliary Other	47760	Anastomosis, of extrahepatic biliary ducts and gastrointestinal tract	HPB
General Surgery	Biliary Other	47765	Anastomosis, of intrahepatic biliary ducts and gastrointestinal tract	HPB
General Surgery	Biliary Other	47780	Anastomosis, roux-en-y, of extrahepatic biliary ducts and gastrointestinal tract	HPB
General Surgery	Biliary Other	47785	Anastomosis, roux-en-y, of intrahepatic biliary ducts and gastrointestinal tract	HPB
General Surgery	Biliary Other	56324	Laparoscopy, surgical; with cholecystoenterostomy	HPB
General Surgery	Cholecystectomy	47562	Laparoscopy, surgical; cholecystectomy	HPB
General Surgery	Cholecystectomy	47563	Laparoscopy, surgical; cholecystectomy with cholangiography	HPB
General Surgery	Cholecystectomy	47600	Cholecystectomy	HPB
General Surgery	Cholecystectomy	47605	Cholecystectomy with cholangiography	HPB
General Surgery	Cholecystectomy	56340	Laparoscopy, cholecystectomy (any method)	HPB
General Surgery	Cholecystectomy	56341	Laparoscopy, cholecystectomy with cholangiography	HPB
General Surgery	Cholecystectomy	56342	Laparoscopy, cholecystectomy with exploration of common duct	HPB
General Surgery	Colectomy Partial - Lap	44204	Laparoscopy, surgical; colectomy, partial, with anastomosis	Bowel
General Surgery	Colectomy Partial - Lap	44205	Laparoscopy, surgical; colectomy, partial, with removal of terminal ileum with ileocolostomy	Bowel
General Surgery	Colectomy Partial - Lap	44206	Laparoscopy, surgical; colectomy, partial with end colostomy and closure of distal segment (Hartmann)	Bowel
General Surgery	Colectomy Partial - Lap	44207	Laparoscopy, surgical; colectomy, partial, with anastomosis, with coloproctostomy (low pelvic anastomosis)	Bowel
General Surgery	Colectomy Partial - Lap	44208	Laparoscopy, surgical; colectomy, partial, with anastomosis, with coloproctostomy (low pelvic anastomosis) with colostomy	Bowel
General Surgery	Colectomy Partial - Open	44130	Enteroenterostomy, anastomosis of intestine, with or without cutaneous enterostomy (separate procedure)	Bowel

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Colectomy Partial - Open	44140	Colectomy, partial; with anastomosis	Bowel
General Surgery	Colectomy Partial - Open	44141	Colectomy, partial; with skin level cecostomy or colostomy	Bowel
General Surgery	Colectomy Partial - Open	44143	Colectomy, partial; with end colostomy and closure of distal segment	Bowel
General Surgery	Colectomy Partial - Open	44144	Colectomy, partial; with colostomy or ileostomy and creation of mucofistula	Bowel
General Surgery	Colectomy Partial - Open	44145	Colectomy, partial; with coloproctostomy (low pelvic anastomosis)	Bowel
General Surgery	Colectomy Partial - Open	44146	Colectomy, partial; with coloproctostomy (low pelvic anastomosis) with colostomy	Bowel
General Surgery	Colectomy Partial - Open	44147	Colectomy, partial; abdominal and transanal approach	Bowel
General Surgery	Colectomy Partial - Open	44160	Colectomy, partial, with removal of terminal ileum with ileocolostomy	Bowel
General Surgery	Colectomy Partial - Open	44625	Closure of enterostomy, large or small intestine; with resection and anastomosis other than colorectal	Bowel
General Surgery	Colectomy Partial - Open	44626	Closure of enterostomy, large or small intestine; with resection and colorectal anastomosis (eg, closure of Hartmann type procedure)	Bowel
General Surgery	Colectomy Total - Lap	44210	Laparoscopy, surgical; colectomy, total, abdominal, without proctectomy, with ileostomy or ileoproctostomy	Bowel
General Surgery	Colectomy Total - Lap	44211	Laparoscopy, surgical; colectomy, total, abdominal, with proctectomy, with ileoanal anastomosis, creation of ileal reservoir	Bowel
General Surgery	Colectomy Total - Lap	44212	Laparoscopy, surgical; colectomy, total, abdominal, with proctectomy, with ileostomy	Bowel
General Surgery	Colectomy Total - Open	44150	Colectomy, total, abdominal, without proctectomy; with ileostomy or ileoproctostomy	Bowel
General Surgery	Colectomy Total - Open	44151	Colectomy, total, abdominal without proctectomy; with continent ileostomy	Bowel
General Surgery	Colectomy Total - Open	44152	Colectomy, total, abdominal, without proctectomy; with rectal mucosectomy, ileoanal anastomosis, with or without loop ileostomy	Bowel
General Surgery	Colectomy Total - Open	44153	Colectomy, total, abdominal, without proctectomy; with rectal mucosectomy, ileoanal anastomosis, creation of ileal reservoir (S or J), with or without loop ileostomy	Bowel
General Surgery	Colectomy Total - Open	44155	Colectomy, total, abdominal, with proctectomy; with ileostomy	Bowel
General Surgery	Colectomy Total - Open	44156	Colectomy, total, abdominal, with proctectomy; with continent ileostomy	Bowel
General Surgery	Colectomy Total - Open	44157	Colectomy, total, abdominal, with proctectomy; with ileoanal anastomosis	Bowel
General Surgery	Colectomy Total - Open	44158	Colectomy, total, abdominal, with proctectomy; with ileoanal anastomosis, creation of ileal reservoir	Bowel
General Surgery	Esophagectomy	43107	Total or near total esophagectomy	UGI
General Surgery	Esophagectomy	43108	Esophagectomy with colon interposition	UGI
General Surgery	Esophagectomy	43112	Esophagectomy with thoracotomy	UGI
General Surgery	Esophagectomy	43113	Esophagectomy with thoracotomy and colon interposition	UGI
General Surgery	Esophagectomy	43116	Partial esophagectomy, cervical	UGI
General Surgery	Esophagectomy	43117	Partial esophagectomy (Ivor Lewis)	UGI
General Surgery	Esophagectomy	43118	Partial esophagectomy (Ivor Lewis) with colon interposition	UGI
General Surgery	Esophagectomy	43121	Partial esophagectomy, distal two-thirds, with thoracotomy only	UGI

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Esophagectomy	43122	Partial esophagectomy, thoracoabdominal or abdominal approach	UGI
General Surgery	Esophagectomy	43123	Partial esophagectomy, thoracoabdominal or abdominal approach, with colon interposition	UGI
General Surgery	Esophagectomy	43124	Total or partial esophagectomy with cervical esophagostomy	UGI
General Surgery	Esophagomyotomy	32665	Thoracoscopy, surgical; with esophagomyotomy (Heller type)	UGI
General Surgery	Esophagomyotomy	43279	Laparoscopic esophagomyotomy	UGI
General Surgery	Esophagomyotomy	43279	Laparoscopy, surgical, esophagomyotomy (Heller type), with fundoplasty, when performed	UGI
General Surgery	Esophagomyotomy	43330	Esophagomyotomy; abdominal approach	UGI
General Surgery	Esophagomyotomy	43331	Esophagomyotomy; thoracic approach	UGI
General Surgery	Hernia Abdominal – Lap	49652	Laparoscopy, surgical, repair, ventral, umbilical, spigelian or epigastric hernia (includes mesh insertion, when performed); reducible	Hernia
General Surgery	Hernia Abdominal – Lap	49653	Laparoscopy, surgical, repair, ventral, umbilical, spigelian or epigastric hernia (includes mesh insertion, when performed); incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Lap	49654	Laparoscopy, surgical, repair, incisional hernia; reducible	Hernia
General Surgery	Hernia Abdominal – Lap	49655	Laparoscopy, surgical, repair, incisional hernia (includes mesh insertion, when performed); incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Lap	49656	Laparoscopy, surgical, repair, recurrent incisional hernia (includes mesh insertion, when performed); reducible	Hernia
General Surgery	Hernia Abdominal – Lap	49657	Laparoscopy, surgical, repair, recurrent incisional hernia (includes mesh insertion, when performed); incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Open	49560	Repair initial incisional or ventral hernia; reducible	Hernia
General Surgery	Hernia Abdominal – Open	49561	Repair initial incisional or ventral hernia; incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Open	49565	Repair recurrent incisional or ventral hernia; reducible	Hernia
General Surgery	Hernia Abdominal – Open	49566	Repair recurrent incisional or ventral hernia; incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Open	49570	Repair epigastric hernia (eg, preperitoneal fat); reducible (separate procedure)	Hernia
General Surgery	Hernia Abdominal – Open	49572	Repair epigastric hernia (eg, preperitoneal fat); incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Open	49585	Repair umbilical hernia, age 5 years or over; reducible	Hernia
General Surgery	Hernia Abdominal – Open	49587	Repair umbilical hernia, age 5 years or older; incarcerated or strangulated	Hernia
General Surgery	Hernia Abdominal – Open	49590	Repair spigelian hernia	Hernia
General Surgery	Hernia Groin – Lap	49650	Laparoscopy, surgical; repair initial inguinal hernia	hernia
General Surgery	Hernia Groin – Lap	49651	Laparoscopy, surgical; repair recurrent inguinal hernia	hernia
General Surgery	Hernia Groin – Lap	56316	Laparoscopy, surgical; repair of initial inguinal hernia	hernia
General Surgery	Hernia Groin – Lap	56317	Laparoscopy, surgical; repair of recurrent inguinal hernia	hernia
General Surgery	Hernia Groin – Open	49505	Repair initial inguinal hernia, age 5 years or over; reducible	Hernia
General Surgery	Hernia Groin – Open	49507	Repair initial inguinal hernia, age 5 years or older; incarcerated or strangulated	Hernia

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Hernia Groin – Open	49520	Repair recurrent inguinal hernia, any age; reducible	Hernia
General Surgery	Hernia Groin – Open	49521	Repair recurrent inguinal hernia, any age; incarcerated or strangulated	Hernia
General Surgery	Hernia Groin – Open	49525	Repair inguinal hernia, sliding, any age	Hernia
General Surgery	Hernia Groin – Open	49550	Repair initial femoral hernia, any age; reducible	Hernia
General Surgery	Hernia Groin – Open	49553	Repair initial femoral hernia, any age; incarcerated or strangulated	Hernia
General Surgery	Hernia Groin – Open	49555	Repair recurrent femoral hernia; reducible	Hernia
General Surgery	Hernia Groin – Open	49557	Repair recurrent femoral hernia; incarcerated or strangulated	Hernia
General Surgery	Large Bowel Other	44025	Colotomy, for exploration, biopsy(s), or foreign body removal	Bowel
General Surgery	Large Bowel Other	44130	Enterointerostomy, anastomosis of intestine, with or without cutaneous enterostomy (separate procedure)	Bowel
General Surgery	Large Bowel Other	44140	Colectomy, partial; with anastomosis	Bowel
General Surgery	Large Bowel Other	44145	Colectomy, partial; with coloproctostomy (low pelvic anastomosis)	Bowel
General Surgery	Large Bowel Other	44160	Colectomy, partial, with removal of terminal ileum with ileocolostomy	Bowel
General Surgery	Large Bowel Other	44205	Laparoscopy, surgical; colectomy, partial, with removal of terminal ileum with ileocolostomy	Bowel
General Surgery	Large Bowel Other	44320	Colostomy or skin level cecostomy;	Bowel
General Surgery	Large Bowel Other	44604	Suture of large intestine (colorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture (single or multiple perforations); without colostomy	Bowel
General Surgery	Large Bowel Other	44605	Suture of large intestine for perforated ulcer, diverticulu, wound, injury, or rupture; with colostomy	Bowel
General Surgery	Large Bowel Other	44620	Closure of enterostomy, large or small intestine;	Bowel
General Surgery	Large Bowel Other	44625	Closure of enterostomy, large or small intestine; with resection and anastomosis other than colorectal	Bowel
General Surgery	Large Bowel Other	44626	Closure of enterostomy, large or small intestine; with resection and colorectal anastomosis (eg, closure of Hartmann type procedure)	Bowel
General Surgery	Large Bowel Other	45130	Excision of rectal procidentia, with anastomosis; perineal approach	Bowel
General Surgery	Large Bowel Other	45135	Excision of rectal procidentia, with anastomosis; abdominal and perineal approach	Bowel
General Surgery	Liver Other	47010	Hepatotomy; for open drainage of abscess or cyst, 1 or 2 stages	HPB
General Surgery	Liver Other	47015	Laparotomy, with aspiration and/or injection of hepatic parasitic (eg, amoebic or echinococcal) cyst(s) or abscess(es)	HPB
General Surgery	Liver Other	47300	Marsupialization of cyst or abscess of liver	HPB
General Surgery	Liver Other	47370	Laparoscopy, surgical, ablation of 1 or more liver tumor(s); radiofrequency	HPB
General Surgery	Liver Other	47371	Laparoscopy, surgical, ablation of 1 or more liver tumor(s); cryosurgical	HPB
General Surgery	Liver Other	47380	Ablation, open, of 1 or more liver tumor(s); radiofrequency	HPB
General Surgery	Liver Other	47381	Ablation, open, of one or more liver tumor(s); cryosurgical	HPB
General Surgery	Liver Other	49200	Excision or destruction, open, intra-abdominal or retroperitoneal tumors or cysts or endometriomas;	HPB

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Liver Other	49201	Excision or destruction, open, intra-abdominal or retroperitoneal tumors or cysts or endometriomas; extensive	HPB
General Surgery	Liver Partial Hepatectomy	47100	Biopsy of liver, wedge	HPB
General Surgery	Liver Partial Hepatectomy	47120	Hepatectomy, resection of liver; partial lobectomy	HPB
General Surgery	Liver Partial Hepatectomy	47122	Hepatectomy, resection of liver; trisegmentectomy	HPB
General Surgery	Liver Partial Hepatectomy	47125	Hepatectomy, resection of liver; total left lobectomy	HPB
General Surgery	Liver Partial Hepatectomy	47130	Hepatectomy, resection of liver; total right lobectomy	HPB
General Surgery	Lysis of Adhesions	44005	Enterolysis (freeing of intestinal adhesion) (separate procedure)	Bowel
General Surgery	Lysis of Adhesions	44180	Laparoscopy, surgical, enterolysis (freeing of intestinal adhesion) (separate procedure)	Bowel
General Surgery	Lysis of Adhesions	44200	Laparoscopy, surgical; enterolysis (freeing of intestinal adhesion) (separate procedure)	Bowel
General Surgery	Lysis of Adhesions	56304	Laparoscopy, surgical; with lysis of adhesions (salpingolysis, ovariolysis) (separate procedure)	Bowel
General Surgery	Lysis of Adhesions	56310	Laparoscopy, surgical; enterolysis (freeing of intestinal adhesion) (separate procedure)	Bowel
General Surgery	Lysis of Adhesions	58660	Laparoscopy, surgical; with lysis of adhesions (salpingolysis, ovariolysis) (separate procedure)	Bowel
General Surgery	Lysis of Adhesions	58740	Lysis of adhesions (salpingolysis, ovariolysis)	Bowel
General Surgery	Lysis of Adhesions	58985	Laparoscopy, surgical; with lysis of adhesions	Bowel
General Surgery	Mastectomy	19180	Mastectomy, simple, complete	Breast
General Surgery	Mastectomy	19182	Mastectomy, subcutaneous	Breast
General Surgery	Mastectomy	19200	Mastectomy, radical, including pectoral muscles, axillary lymph nodes	Breast
General Surgery	Mastectomy	19220	Mastectomy, radical, including pectoral muscles, axillary and internal mammary lymph nodes (urban type operation)	Breast
General Surgery	Mastectomy	19240	Mastectomy, modified radical, including axillary lymph nodes, with or without pectoralis minor muscle, but excluding pectoralis major muscle	Breast
General Surgery	Mastectomy	19303	Mastectomy, simple	Breast
General Surgery	Mastectomy	19304	Mastectomy, subcutaneous	Breast
General Surgery	Mastectomy	19305	Mastectomy, radical, including axillary lymph nodes	Breast
General Surgery	Mastectomy	19306	Mastectomy, radical, including axillary and internal mammary lymph nodes	Breast
General Surgery	Mastectomy	19307	Mastectomy, modified radical	Breast
General Surgery	Pancreatectomy	48005	Resection or debridement of pancreas and peripancreatic tissue for acute necrotizing pancreatitis	HPB
General Surgery	Pancreatectomy	48105	Resection or debridement of pancreas and peripancreatic tissue for acute necrotizing pancreatitis	HPB
General Surgery	Pancreatectomy	48120	Excision of lesion of pancreas	HPB
General Surgery	Pancreatectomy	48140	Pancreatectomy, distal subtotal, with or without splenectomy; without pancreaticojejunostomy	HPB
General Surgery	Pancreatectomy	48145	Pancreatectomy, distal subtotal, with or without splenectomy; with pancreaticojejunostomy	HPB



<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Pancreatectomy	48146	Pancreatectomy, dista, near-total with preservation of duodenum	HPB
General Surgery	Pancreatectomy	48150	Pancreatectomy, proximal subtotal (Whipple-type procedure); with pancreatojejunostomy	HPB
General Surgery	Pancreatectomy	48152	Pancreatectomy, proximal subtotal (Whipple-type procedure); without pancreatojejunostomy	HPB
General Surgery	Pancreatectomy	48153	Pancreatectomy, proximal subtotal (pylorus-sparing, Whipple-type procedure); with pancreatojejunostomy	HPB
General Surgery	Pancreatectomy	48154	Pancreatectomy, proximal subtotal (Whipple-type procedure); without pancreatojejunostomy	HPB
General Surgery	Pancreatectomy	48155	Pancreatectomy, total	HPB
General Surgery	Pancreatectomy	48160	Pancreatectomy, total or subtotal, with autologous transplantation of pancreas or pancreatic islet cells	HPB
General Surgery	Parathyroidectomy	60500	Parathyroidectomy or exploration of parathyroids	Endocrine
General Surgery	Parathyroidectomy	60502	Parathyroidectomy or exploration of parathyroids; reexploration	Endocrine
General Surgery	Parathyroidectomy	60505	Parathyroidectomy or exploration of parathyroids; with mediastinal exploration, sternal split or transthoracic approach	Endocrine
General Surgery	PD Access Procedure	49324	Laparoscopy, surgical; with insertion of tunneled intraperitoneal catheter	Bowel
General Surgery	PD Access Procedure	49419	Insertion of tunneled intraperitoneal catheter, with subcutaneous port	Bowel
General Surgery	PD Access Procedure	49420	Insertion of intraperitoneal cannula or catheter for drainage or dialysis; temporary	Bowel
General Surgery	PD Access Procedure	49421	Insertion of tunneled intraperitoneal catheter for dialysis, open	Bowel
General Surgery	Proctectomy	44143	Colectomy, partial; with end colostomy and closure of distal segment (Hartmann type procedure)	Bowel
General Surgery	Proctectomy	44145	Colectomy, partial; with coloproctostomy (low pelvic anastomosis)	Bowel
General Surgery	Proctectomy	44146	Colectomy, partial; with coloproctostomy (low pelvic anastomosis), with colostomy	Bowel
General Surgery	Proctectomy	44147	Colectomy, partial; abdominal and transanal approach	Bowel
General Surgery	Proctectomy	44155	Colectomy, total, abdominal, with proctectomy; with ileostomy	Bowel
General Surgery	Proctectomy	44207	Laparoscopy, surgical; colectomy, partial, with anastomosis, with coloproctostomy (low pelvic anastomosis)	Bowel
General Surgery	Proctectomy	45110	Proctectomy; complete, combined abdominoperineal, with colostomy	Bowel
General Surgery	Proctectomy	45111	Proctectomy; partial resection of rectum, transabdominal approach	Bowel
General Surgery	Proctectomy	45112	Proctectomy, combined abdominoperineal, pull-through procedure (eg, colo-anal anastomosis)	Bowel
General Surgery	Proctectomy	45113	Proctectomy, partial, with rectal mucosectomy, ileoanal anastomosis, creation of ileal reservoir (S or J), with or without loop ileostomy	Bowel
General Surgery	Proctectomy	45119	Proctectomy, combined abdominoperineal pull-through procedure (eg, colo-anal anastomosis), with creation of colonic reservoir (eg, J-pouch), with diverting enterostomy when performed	Bowel
General Surgery	Proctectomy	45120	Proctectomy, complete, abdominal and perineal approach; with pull-through procedure and anastomosis	Bowel
General Surgery	Proctectomy	45121	Proctectomy, complete, abdominal and perineal approach; with subtotal or total colectomy	Bowel
General Surgery	Proctectomy	45123	Proctectomy, partial, without anastomosis, perineal approach	Bowel
General Surgery	Proctectomy	45130	Excision of rectal procidentia, with anastomosis; perineal approach	Bowel

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Proctectomy	45395	Laparoscopy, surgical; proctectomy, complete, combined abdominoperineal, with colostomy	Bowel
General Surgery	Proctectomy	45397	Laparoscopy, surgical; proctectomy, combined abdominoperineal pull-through procedure, with colonic reservoir	Bowel
General Surgery	Proctopexy	45400	Laparoscopy, surgical; proctopexy (for prolapse)	Bowel
General Surgery	Proctopexy	45402	Laparoscopy, surgical; proctopexy (for prolapse), with sigmoid resection	Bowel
General Surgery	Proctopexy	45505	Proctoplasty; for prolapse of mucous membrane	Bowel
General Surgery	Proctopexy	45540	Proctopexy (eg, for prolapse); abdominal approach	Bowel
General Surgery	Proctopexy	45541	Proctopexy (eg, for prolapse); perineal approach	Bowel
General Surgery	Proctopexy	45550	Proctopexy with sigmoid resection, abdominal approach	Bowel
General Surgery	Pyloroplasty	43640	Vagotomy including pyloroplasty, with or without gastrostomy; truncal or selective	Bowel
General Surgery	Pyloroplasty	43641	Vagotomy including pyloroplasty, with or without gastrostomy; parietal cell (highly selective)	Bowel
General Surgery	Pyloroplasty	43800	Pyloroplasty	Bowel
General Surgery	Small Bowel Other	44020	Enterotomy, small intestine, other than duodenum; for exploration, biopsy(s), or foreign body removal	Bowel
General Surgery	Small Bowel Other	44021	Enterotomy, small intestine, other than duodenum; for decompression (eg, Baker tube)	Bowel
General Surgery	Small Bowel Other	44120	Enterectomy, resection of small intestine; single resection and anastomosis	Bowel
General Surgery	Small Bowel Other	44125	Enterectomy, resection of small intestine; with enterostomy	Bowel
General Surgery	Small Bowel Other	44130	Enteroenterostomy, anastomosis of intestine, with or without cutaneous enterostomy (separate procedure)	Bowel
General Surgery	Small Bowel Other	44602	Suture of small intestine (enterorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture; single perforation	Bowel
General Surgery	Small Bowel Other	44603	Suture of small intestine (enterorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture; multiple perforations	Bowel
General Surgery	Small Bowel Other	44615	Intestinal stricturoplasty (enterotomy and enterorrhaphy) with or without dilation, for intestinal obstruction	Bowel
General Surgery	Small Bowel Other	44620	Closure of enterostomy, large or small intestine;	Bowel
General Surgery	Small Bowel Other	44625	Closure of enterostomy, large or small intestine; with resection and anastomosis other than colorectal	Bowel
General Surgery	Small Bowel Other	44626	Closure of enterostomy, large or small intestine; with resection and colorectal anastomosis (eg, closure of Hartmann type procedure)	Bowel
General Surgery	Small Bowel Other	44640	Closure of intestinal cutaneous fistula	Bowel
General Surgery	Small Bowel Other	44661	Closure of enterovesical fistula; with intestine and/or bladder resection	Bowel
General Surgery	Small Bowel Other	45136	Excision of ileoanal reservoir with ileostomy	Bowel
General Surgery	Small Bowel Resection	44120	Enterectomy, resection of small intestine; single resection and anastomosis	Bowel
General Surgery	Small Bowel Resection	44125	Enterectomy, resection of small intestine; with enterostomy	Bowel
General Surgery	Small Bowel Resection	44130	Enteroenterostomy, anastomosis of intestine, with or without cutaneous enterostomy (separate procedure)	Bowel
General Surgery	Small Bowel Resection	44202	Laparoscopy, surgical; enterectomy, resection of small intestine, single resection and anastomosis	Bowel

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Small Bowel Resection	44314	Revision of ileostomy; complicated (reconstruction in-depth) (separate procedure)	Bowel
General Surgery	Small Bowel Resection	44620	Closure of enterostomy, large or small intestine;	Bowel
General Surgery	Small Bowel Resection	44625	Closure of enterostomy, large or small intestine; with resection and anastomosis other than colorectal	Bowel
General Surgery	Small Bowel Resection	56348	Laparoscopy, surgical; intestinal resection, with anastomosis (intra or extracorporeal)	Bowel
General Surgery	Splenectomy	38100	Splenectomy; total (separate procedure)	HPB
General Surgery	Splenectomy	38120	Laparoscopy, surgical, splenectomy	HPB
General Surgery	Splenectomy	56345	Laparoscopy, surgical; splenectomy	HPB
General Surgery	Stomach Anti-Reflux	43280	Laparoscopy, surgical, esophagogastric fundoplasty (eg, Nissen, Toupet procedures)	UGI
General Surgery	Stomach Anti-Reflux	43324	Esophagogastric fundoplasty (eg, Nissen, Belsey IV, Hill procedures)	UGI
General Surgery	Stomach Anti-Reflux	43325	Esophagogastric fundoplasty; with fundic patch (Thal-Nissen procedure)	UGI
General Surgery	Stomach Anti-Reflux	43326	Esophagogastric fundoplasty; with gastroplasty (eg, Collis)	UGI
General Surgery	Stomach Anti-Reflux	56349	Laparoscopy, surgical; esophagogastric fundoplasty (eg, Nissen, Belsey IV, Hill, Toupet procedures)	UGI
General Surgery	Stomach Gastric Bypass (non-bariatric)	43810	Gastroduodenostomy	UGI
General Surgery	Stomach Gastric Bypass (non-bariatric)	43820	Gastrojejunostomy; without vagotomy	UGI
General Surgery	Stomach Gastric Bypass (non-bariatric)	43825	Gastrojejunostomy; with vagotomy, any type	UGI
General Surgery	Stomach Gastric Bypass (non-bariatric)	43860	Revision of gastrojejunal anastomosis (gastrojejunostomy) with reconstruction, with or without partial gastrectomy or intestine resection; without vagotomy	UGI
General Surgery	Stomach Other	43500	Gastrotomy; with exploration or foreign body removal	UGI
General Surgery	Stomach Other	43605	Biopsy of stomach; by laparotomy	UGI
General Surgery	Stomach Other	43610	Excision, local; ulcer or benign tumor of stomach	UGI
General Surgery	Stomach Other	43611	Excision, local; malignant tumor of stomach	UGI
General Surgery	Stomach Other	43840	Gastrorrhaphy, suture of perforated duodenal or gastric ulcer, wound, or injury	UGI
General Surgery	Stomach Other	43870	Closure of gastrostomy, surgical	UGI
General Surgery	Stomach Partial Gastrectomy	43630	Hemigastrectomy or distal subtotal gastrectomy including pyloroplasty, gastroduodenostomy or gastrojejunostomy; without vagotomy	UGI
General Surgery	Stomach Partial Gastrectomy	43631	Gastrectomy, partial, distal; with gastroduodenostomy	UGI
General Surgery	Stomach Partial Gastrectomy	43632	Gastrectomy, partial, distal; with gastrojejunostomy	UGI
General Surgery	Stomach Partial Gastrectomy	43633	Gastrectomy, partial, distal; with Roux-en-Y reconstruction	UGI
General Surgery	Stomach Partial Gastrectomy	43634	Gastrectomy, partial, distal; with formation of intestinal pouch	UGI

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Stomach Partial Gastrectomy	43638	Gastrectomy, partial, proximal, thoracic or abdominal approach including esophagogastrotomy, with vagotomy;	UGI
General Surgery	Stomach Partial Gastrectomy	43639	Gastrectomy, partial, proximal, thoracic or abdominal approach including esophagogastrotomy, with vagotomy; with pyloroplasty or pyloromyotomy	UGI
General Surgery	Stomach Total Gastrectomy	43620	Gastrectomy, total; with esophagoenterostomy	UGI
General Surgery	Stomach Total Gastrectomy	43621	Gastrectomy, total; with Roux-en-Y reconstruction	UGI
General Surgery	Stomach Total Gastrectomy	43622	Gastrectomy, total; with formation of intestinal pouch, any type	UGI
General Surgery	Stomach Total Gastrectomy	43625	Gastrectomy, total; with repair by intestinal transplant	UGI
General Surgery	Thyroidectomy Partial	60200	Excision of cyst or adenoma of thyroid, or transection of isthmus	Endocrine
General Surgery	Thyroidectomy Partial	60210	Partial thyroid lobectomy, unilateral; with or without isthmusectomy	Endocrine
General Surgery	Thyroidectomy Partial	60212	Partial thyroid lobectomy, unilateral; with contralateral subtotal lobectomy, including isthmusectomy	Endocrine
General Surgery	Thyroidectomy Partial	60220	Total thyroid lobectomy, unilateral; with or without isthmusectomy	Endocrine
General Surgery	Thyroidectomy Partial	60225	Total thyroid lobectomy, unilateral; with contralateral subtotal lobectomy, including isthmusectomy	Endocrine
General Surgery	Thyroidectomy Partial	60245	Thyroidectomy, subtotal or partial	Endocrine
General Surgery	Thyroidectomy Partial	60246	Thyroidectomy, subtotal or partial; with removal of substernal thyroid gland, cervical approach	Endocrine
General Surgery	Thyroidectomy Substernal	60270	Thyroidectomy, including substernal thyroid; sternal split or transthoracic approach	Endocrine
General Surgery	Thyroidectomy Substernal	60271	Thyroidectomy, including substernal thyroid; cervical approach	Endocrine
General Surgery	Thyroidectomy Total	60225	Total thyroid lobectomy, unilateral; with contralateral subtotal lobectomy, including isthmusectomy	Endocrine
General Surgery	Thyroidectomy Total	60240	Thyroidectomy, total or complete	Endocrine
General Surgery	Thyroidectomy Total	60252	Thyroidectomy, total or subtotal for malignancy; with limited neck dissection	Endocrine
General Surgery	Thyroidectomy Total	60254	Thyroidectomy, total or subtotal for malignancy; with radical neck dissection	Endocrine
General Surgery	Thyroidectomy Total	60260	Thyroidectomy, removal of all remaining thyroid tissue following previous removal of a portion of thyroid	Endocrine
General Surgery	Thyroidectomy Total	60270	Thyroidectomy, including substernal thyroid; sternal split or transthoracic approach	Endocrine
General Surgery	Thyroidectomy Total	60271	Thyroidectomy, including substernal thyroid; cervical approach	Endocrine
General Surgery	Ulcer	43501	Gastrotomy; with suture repair of bleeding ulcer	Bowel
General Surgery	Ulcer	43502	Gastrotomy; with suture repair of pre-existing esophagogastric laceration (eg, Mallory-Weiss)	Bowel
General Surgery	Ulcer	43640	Vagotomy including pyloroplasty, with or without gastrotomy; truncal or selective	Bowel
General Surgery	Ulcer	43840	Gastrorrhaphy, suture of perforated duodenal or gastric ulcer, wound, or injury	Bowel
General Surgery	Ulcer	44010	Duodenotomy, for exploration, biopsy(s), or foreign body removal	Bowel
General Surgery	Ulcer	44600	Suture of intestine (enterorrhaphy), large or small, for perforated ulcer, diverticulum, wound, injury or rupture; single	Bowel
General Surgery	Ulcer	44602	Suture of small intestine (enterorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture; single perforation	Bowel

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
General Surgery	Ulcer	44603	Suture of small intestine (enterorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture; multiple perforations	Bowel
General Surgery	Ulcer	44610	Suture of intestine (enterorrhaphy), large or small, for perforated ulcer, diverticulum, wound, injury or rupture; multiple	Bowel
Orthopedic Surgery	Hip Repair	27122	Acetabuloplasty; resection, femoral head (eg, Girdlestone procedure)	Ortho
Orthopedic Surgery	Hip Repair	27125	Hemiarthroplasty, hip, partial (eg, femoral stem prosthesis, bipolar arthroplasty)	Ortho
Orthopedic Surgery	Hip Repair	27234	Treatment of open femoral fracture, proximal end, neck, with uncomplicated soft tissue closure, with manipulation (including skeletal traction)	Ortho
Orthopedic Surgery	Hip Repair	27236	Open treatment of femoral fracture, proximal end, neck, internal fixation or prosthetic replacement	Ortho
Orthopedic Surgery	Hip Repair	27242	Treatment of open intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture, with uncomplicated soft tissue closure (including traction)	Ortho
Orthopedic Surgery	Hip Repair	27244	Treatment of intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture; with plate/screw type implant, with or without cerclage	Ortho
Orthopedic Surgery	Hip Repair	27245	Treatment of intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture; with intramedullary implant, with or without interlocking screws and/or cerclage	Ortho
Orthopedic Surgery	Hip Repair	27248	Open treatment of greater trochanteric fracture, includes internal fixation, when performed	Ortho
Orthopedic Surgery	Hip Repair	27269	Open treatment of femoral fracture, proximal end, head, includes internal fixation, when performed	Ortho
Orthopedic Surgery	Hip Repair	27506	Open treatment of femoral shaft fracture, with or without external fixation, with insertion of intramedullary implant, with or without cerclage and/or locking screws	Ortho
Orthopedic Surgery	Hip Repair	27507	Open treatment of femoral shaft fracture with plate/screws, with or without cerclage	Ortho
Orthopedic Surgery	Hip Replacement	27125	Hemiarthroplasty, hip, partial (eg, femoral stem prosthesis, bipolar arthroplasty)	Ortho
Orthopedic Surgery	Hip Replacement	27126	Partial hip replacement (hemiarthroplasty); cup	Ortho
Orthopedic Surgery	Hip Replacement	27130	Arthroplasty, acetabular and proximal femoral prosthetic replacement (total hip arthroplasty), with or without autograft or allograft	Ortho
Orthopedic Surgery	Hip Replacement	27132	Conversion of previous hip surgery to total hip arthroplasty, with or without autograft or allograft	Ortho
Orthopedic Surgery	Hip Replacement	27236	Open treatment of femoral fracture, proximal end, neck, internal fixation or prosthetic replacement	Ortho
Orthopedic Surgery	Hip Replacement Revision	27091	Removal of hip prosthesis; complicated, including total hip prosthesis, methylmethacrylate with or without insertion of spacer	Ortho
Orthopedic Surgery	Hip Replacement Revision	27132	Conversion of previous hip surgery to total hip arthroplasty, with or without autograft or allograft	Ortho
Orthopedic Surgery	Hip Replacement Revision	27134	Revision of total hip arthroplasty; both components, with or without autograft or allograft	Ortho
Orthopedic Surgery	Hip Replacement Revision	27137	Revision of total hip arthroplasty; acetabular component only, with or without autograft or allograft	Ortho
Orthopedic Surgery	Hip Replacement Revision	27138	Revision of total hip arthroplasty; femoral component only, with or without allograft	Ortho
Orthopedic Surgery	Knee Replacement	27440	Arthroplasty, knee, tibial plateau;	Ortho
Orthopedic Surgery	Knee Replacement	27441	Arthroplasty, knee, tibial plateau; with debridement and partial synovectomy	Ortho
Orthopedic Surgery	Knee Replacement	27442	Arthroplasty, femoral condyles or tibial plateau(s), knee;	Ortho
Orthopedic Surgery	Knee Replacement	27443	Arthroplasty, femoral condyles or tibial plateau(s), knee; with debridement and partial synovectomy	Ortho
Orthopedic Surgery	Knee Replacement	27445	Arthroplasty, knee, hinge prosthesis (eg, Walldius type)	Ortho

<b>Surgical Type</b>	<b>Procedure Category</b>	<b>CPT Code</b>	<b>CPT Label</b>	<b>Broad Category</b>
Orthopedic Surgery	Knee Replacement	27446	Arthroplasty, knee, condyle and plateau; medial OR lateral compartment	Ortho
Orthopedic Surgery	Knee Replacement	27447	Arthroplasty, knee, condyle and plateau; medial AND lateral compartments with or without patella resurfacing (total knee arthroplasty)	Ortho
Orthopedic Surgery	Knee Replacement Revision	27486	Revision of total knee arthroplasty, with or without allograft; 1 component	Ortho
Orthopedic Surgery	Knee Replacement Revision	27487	Revision of total knee arthroplasty, with or without allograft; femoral and entire tibial component	Ortho
Orthopedic Surgery	Knee Replacement Revision	27488	Removal of prosthesis, including total knee prosthesis, methylmethacrylate with or without insertion of spacer, knee	Ortho

**eTable 3. Patient Selection Summary**

Exclusion Step	Admissions Retained			Surgeons Retained		Patients Retained N (%)	Hospitals Retained N (%)
	Overall N (%)	New Surgeon N (%)	Exp. Surgeon N (%)	New Surgeons N	Exp. Surgeons N		
All admissions that occurred between July 1, 2009 and June 30, 2013 and had a qualifying ICD-9 principal procedure code.	3,964,039 (100.0%)	---	---	---	---	3,445,111 (100.0%)	4,850 (100.0%)
Exclude admissions with patients who could not be found in the Master Beneficiary Summary File, or who had missing date of birth or sex in the MBSF.	3,964,039 (100.0%)	---	---	---	---	3,445,111 (100.0%)	4,850 (100.0%)
Exclude admissions where patients were under age 65.5 at admission.	3,325,852 (83.9%)	---	---	---	---	2,903,409 (84.3%)	4,704 (97.0%)
Exclude admissions outside the 50 states or District of Columbia.	3,315,358 (83.6%)	---	---	---	---	2,893,902 (84.0%)	4,691 (96.7%)
Exclude admissions with discharge status: still patient.	3,313,559 (83.6%)	---	---	---	---	2,893,059 (84.0%)	4,688 (96.7%)
Exclude admissions with Medicare status: End-Stage Renal Disease.	3,313,559 (83.6%)	---	---	---	---	2,893,059 (84.0%)	4,688 (96.7%)
Exclude admissions that were not in short-term acute-care hospitals.	3,240,443 (81.7%)	---	---	---	---	2,831,630 (82.2%)	3,404 (70.2%)
Exclude admissions if the patient was in HMO or lacked Part B in the month of admission, the month following, or the 6 months prior to admission.*	3,053,095 (77.0%)	---	---	---	---	2,667,183 (77.4%)	3,400 (70.1%)
Exclude admissions without Part B CPT operation of interest.	2,805,064 (70.8%)	---	---	---	---	2,469,059 (71.7%)	3,383 (69.8%)
Exclude admissions whose surgeons were neither new nor experienced in the AMA file.	2,371,411 (59.8%)	121,016 (--)	2,250,395 (--)	4,201	30,414	2,104,245 (61.1%)	3,355 (69.2%)
Exclude admissions in which a new surgeon was too far removed from their YOT, or YOG, or in which an experienced surgeon was too close to their YOT, or YOG.	2,180,789 (55.0%)	101,431 (100.0%)	2,079,358 (100.0%)	4,131	29,851	1,944,814 (56.5%)	3,350 (69.1%)
Exclude admissions from a surgeon's minority specialty practice (Gensurg or Orthopedic).	2,180,369 (55.0%)	101,425 (100.0%)	2,078,944 (100.0%)	4,131	29,851	1,944,460 (56.4%)	3,350 (69.1%)
Exclude admissions if a patient saw a surgeon at their non-majority hospital.	1,921,257 (48.5%)	87,134 (85.9%)	1,834,123 (88.2%)	4,131	29,851	1,722,870 (50.0%)	3,175 (65.5%)
Randomly sample 1 admission per patient.	1,692,429 (42.7%)	78,735 (77.6%)	1,613,694 (77.6%)	4,101	29,700	1,692,429 (49.1%)	3,172 (65.4%)
Exclude admissions from surgeons that did not have at least 10 cases.	1,652,900 (41.7%)	71,001 (70.0%)	1,581,899 (76.1%)	2,206	20,954	1,652,900 (48.0%)	2,944 (60.7%)
Exclude admissions from hospitals that did not have at least 1 new surgeon and at least 1 experienced surgeon.	762,201 (19.2%)	68,036 (67.1%)	694,165 (33.4%)	2,119	8,503	762,201 (22.1%)	1,221 (25.2%)

\*Month following exclusion does not apply if the patient dies before the end of the month of admission.

**eTable 4. Risk Models for 30-day Mortality** All risk models were estimated using the patients of surgeons who were eligible for study inclusion but whose surgeons did not pair in the surgeon level match. In addition to overall risk models, risk models based only on patient comorbidities were estimated in order to help balance these variables in the patient level matches.

eTable 4a. General Surgery (2009-9/30/2010) Risk Model.

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-4.03 (0.11)			
Age 65-69 (Reference)	--	--	--	--
Age 70-74	0.19 (0.08)	1.21 (1.21, 1.41)	2.4	0.0160
Age 75-79	0.48 (0.08)	1.61 (1.61, 1.87)	6.2	<.0001
Age 80-84	0.66 (0.08)	1.94 (1.94, 2.25)	8.6	<.0001
Age 85+	1.12 (0.08)	3.06 (3.06, 3.56)	14.7	<.0001
Sex (female)	-0.12 (0.04)	0.89 (0.89, 0.97)	-2.6	0.0090
Emergent Admission	0.66 (0.05)	1.93 (1.93, 2.12)	13.7	<.0001
Transfer-in	0.54 (0.09)	1.72 (1.72, 2.05)	6.0	<.0001
Past Admission in Last 6 Months	0.14 (0.05)	1.15 (1.15, 1.26)	2.9	0.0039
Principal Procedure Categories				
Appendectomy	-1.50 (0.19)	0.22 (0.22, 0.32)	-8.0	<.0001
Bariatric	-1.86 (0.58)	0.16 (0.16, 0.49)	-3.2	0.0014
Biliary common duct	-0.54 (0.64)	0.58 (0.58, 2.03)	-0.8	0.3963
Biliary other	-0.73 (0.29)	0.48 (0.48, 0.84)	-2.6	0.0107
Cholecystectomy	-1.36 (0.08)	0.26 (0.26, 0.30)	-18.0	<.0001
Colectomy Partial - Lap	-1.25 (0.13)	0.29 (0.29, 0.37)	-9.5	<.0001
Colectomy Partial – Open (Reference)	--	--	--	--
Colectomy Total - Lap	-0.54 (0.75)	0.58 (0.58, 2.54)	-0.7	0.4697
Colectomy Total - Open	0.38 (0.13)	1.46 (1.46, 1.87)	2.9	0.0036
Esophagectomy or Esophagomyotomy	-0.26 (0.26)	0.77 (0.77, 1.29)	-1.0	0.3225
Hernia Abdominal – Lap	-1.49 (0.42)	0.22 (0.22, 0.51)	-3.6	0.0004
Hernia Abdominal – Open	-1.16 (0.15)	0.31 (0.31, 0.42)	-7.7	<.0001
Hernia Groin – Lap	-2.64 (1.01)	0.07 (0.07, 0.52)	-2.6	0.0089
Hernia Groin – Open	-1.36 (0.16)	0.26 (0.26, 0.35)	-8.7	<.0001
Large Bowel Other	-0.49 (0.21)	0.61 (0.61, 0.93)	-2.3	0.0215
Liver Partial Hepatectomy	-0.51 (0.20)	0.60 (0.60, 0.89)	-2.5	0.0119
Lysis of Adhesions	-0.47 (0.09)	0.63 (0.63, 0.75)	-5.0	<.0001
Mastectomy	-1.84 (0.29)	0.16 (0.16, 0.28)	-6.5	<.0001
Pancreatectomy	-0.74 (0.17)	0.48 (0.48, 0.67)	-4.3	<.0001
Parathyroidectomy	-1.68 (0.34)	0.19 (0.19, 0.37)	-4.9	<.0001
PD Access Procedure	-1.10 (0.27)	0.33 (0.33, 0.56)	-4.1	<.0001
Proctectomy	-0.73 (0.16)	0.48 (0.48, 0.65)	-4.7	<.0001
Pyloroplasty	0.35 (0.35)	1.42 (1.42, 2.81)	1.0	0.3117
Small Bowel Other	-0.06 (0.17)	0.94 (0.94, 1.32)	-0.4	0.7149
Small Bowel Resection	0.02 (0.07)	1.02 (1.02, 1.16)	0.2	0.8082
Splenectomy	0.26 (0.18)	1.29 (1.29, 1.84)	1.4	0.1616
Stomach Anti-Reflux	-1.31 (0.42)	0.27 (0.27, 0.61)	-3.2	0.0016
Stomach Gastric Bypass (non-bariatric)	0.64 (0.19)	1.90 (1.90, 2.76)	3.4	0.0008
Stomach Other	0.47 (0.26)	1.60 (1.60, 2.66)	1.8	0.0656
Stomach Partial Gastrectomy	-0.21 (0.15)	0.81 (0.81, 1.09)	-1.4	0.1707
Stomach Total Gastrectomy	0.33 (0.24)	1.39 (1.39, 2.23)	1.3	0.1779
Thyroidectomy Partial	-1.94 (0.51)	0.14 (0.14, 0.39)	-3.8	0.0001
Thyroidectomy Total	-1.53 (0.36)	0.22 (0.22, 0.44)	-4.2	<.0001
Ulcer	0.72 (0.12)	2.06 (2.06, 2.63)	5.8	<.0001
Same-Day Secondary Procedures				
Major Operative Therapeutic Procedure	0.40 (0.05)	1.49 (1.49, 1.64)	7.9	<.0001
Comorbidities				
Congestive Heart Failure	0.33 (0.05)	1.39 (1.39, 1.54)	6.5	<.0001
Past Myocardial Infarction	0.00 (0.07)	1.00 (1.00, 1.14)	0.0	0.9724
Past Arrhythmia	0.03 (0.05)	1.03 (1.03, 1.13)	0.6	0.5689
Angina	-0.11 (0.10)	0.89 (0.89, 1.08)	-1.2	0.2448
Valvular Disease	0.07 (0.05)	1.08 (1.08, 1.18)	1.6	0.1203
Unstable Angina	0.07 (0.12)	1.07 (1.07, 1.35)	0.6	0.5360
Hypertension	-0.35 (0.06)	0.71 (0.71, 0.80)	-5.6	<.0001



<b>Covariate</b>	<b>Estimate (SE)</b>	<b>Odds Ratio (95% CI)</b>	<b>Chi-Square</b>	<b>P-value</b>
Diabetes	-0.12 (0.05)	0.89 (0.89, 0.97)	-2.5	0.0111
Renal Dysfunction	1.37 (0.05)	3.95 (3.95, 4.33)	29.4	<.0001
Renal Failure	0.25 (0.07)	1.28 (1.28, 1.46)	3.8	0.0001
Liver Disease	0.42 (0.05)	1.53 (1.53, 1.69)	7.9	<.0001
Cancer	-0.09 (0.05)	0.91 (0.91, 1.00)	-1.9	0.0534
Specific Abdominal Cancer	0.41 (0.09)	1.51 (1.51, 1.82)	4.3	<.0001
Dementia	0.41 (0.06)	1.51 (1.51, 1.69)	7.5	<.0001
Stroke	0.07 (0.07)	1.07 (1.07, 1.22)	1.1	0.2838
Seizure	0.12 (0.14)	1.13 (1.13, 1.48)	0.9	0.3921
Paraplegia	0.17 (0.12)	1.18 (1.18, 1.50)	1.4	0.1716
COPD	0.38 (0.05)	1.46 (1.46, 1.59)	8.3	<.0001
Asthma	-0.09 (0.07)	0.92 (0.92, 1.06)	-1.2	0.2363
Post-inflammatory Pulmonary Fibrosis	0.49 (0.09)	1.63 (1.63, 1.94)	5.6	<.0001
Hypothyroidism	-0.05 (0.05)	0.95 (0.95, 1.05)	-1.0	0.3394
Thrombocytopenia	0.14 (0.10)	1.15 (1.15, 1.39)	1.4	0.1613
Collagen Vascular Disease	0.12 (0.08)	1.13 (1.13, 1.32)	1.4	0.1560
Chronic Peptic Ulcer	0.67 (0.25)	1.94 (1.94, 3.15)	2.7	0.0069
Coagulopathy	-0.16 (0.28)	0.85 (0.85, 1.48)	-0.6	0.5682
Other Coagulopathy	0.49 (0.07)	1.63 (1.63, 1.87)	7.1	<.0001
Cushing's Disease	-0.17 (0.65)	0.85 (0.85, 3.00)	-0.3	0.7953
Graves' Disease	-0.24 (0.42)	0.79 (0.79, 1.78)	-0.6	0.5712
Summary Statistics				
Number of Observations	53,021			
Number of Deaths	2,838			
C-statistic	0.859			

**eTable 4b. General Surgery (2009-9/30/2010) Risk Model (Comorbidities Only).**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-3.81 (0.06)			
Congestive Heart Failure	0.43 (0.05)	1.53 (1.53, 1.68)	8.8	<.0001
Past Myocardial Infarction	-0.05 (0.06)	0.95 (0.95, 1.08)	-0.7	0.4645
Past Arrhythmia	0.08 (0.05)	1.08 (1.08, 1.18)	1.7	0.0815
Angina	-0.16 (0.09)	0.85 (0.85, 1.02)	-1.7	0.0811
Valvular Disease	0.18 (0.05)	1.20 (1.20, 1.31)	4.0	0.0001
Unstable Angina	0.02 (0.11)	1.02 (1.02, 1.28)	0.2	0.8298
Hypertension	-0.34 (0.06)	0.71 (0.71, 0.80)	-5.7	<.0001
Diabetes	-0.25 (0.04)	0.78 (0.78, 0.84)	-5.8	<.0001
Renal Dysfunction	1.73 (0.05)	5.66 (5.66, 6.18)	38.4	<.0001
Renal Failure	0.08 (0.06)	1.09 (1.09, 1.22)	1.4	0.1685
Liver Disease	0.30 (0.05)	1.35 (1.35, 1.49)	5.9	<.0001
Cancer	0.05 (0.04)	1.05 (1.05, 1.14)	1.1	0.2593
Specific Abdominal Cancer	0.36 (0.08)	1.44 (1.44, 1.67)	4.7	<.0001
Dementia	0.70 (0.05)	2.01 (2.01, 2.23)	13.4	<.0001
Stroke	0.07 (0.06)	1.07 (1.07, 1.22)	1.1	0.2629
Seizure	0.12 (0.13)	1.12 (1.12, 1.46)	0.9	0.3846
Paraplegia	0.19 (0.12)	1.21 (1.21, 1.53)	1.7	0.0937
COPD	0.46 (0.04)	1.58 (1.58, 1.72)	10.6	<.0001
Asthma	-0.17 (0.07)	0.84 (0.84, 0.96)	-2.5	0.0136
Post-inflammatory Pulmonary Fibrosis	0.49 (0.08)	1.63 (1.63, 1.92)	5.9	<.0001
Hypothyroidism	-0.04 (0.05)	0.96 (0.96, 1.05)	-0.9	0.3797
Thrombocytopenia	0.20 (0.09)	1.22 (1.22, 1.46)	2.2	0.0287
Collagen Vascular Disease	0.13 (0.08)	1.14 (1.14, 1.33)	1.7	0.0982
Chronic Peptic Ulcer	1.02 (0.23)	2.77 (2.77, 4.35)	4.4	<.0001
Coagulopathy	-0.01 (0.27)	0.99 (0.99, 1.67)	0.0	0.9631
Other Coagulopathy	0.59 (0.07)	1.80 (1.80, 2.05)	9.0	<.0001
Cushing's Disease	-0.11 (0.62)	0.90 (0.90, 3.02)	-0.2	0.8585
Graves' Disease	-0.70 (0.39)	0.50 (0.50, 1.07)	-1.8	0.0757
Hemoglobin Disorder	0.38 (1.08)	1.46 (1.46, 12.13)	0.3	0.7288
Summary Statistics				
Number of Observations	53,021			
Number of Deaths	2,838			
C-statistic	0.792			

**eTable 4c. Orthopedics (2009-9/30/2010) Risk Model.**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-5.93 (0.25)			
Age 65-69 (Reference)	--	--	--	--
Age 70-74	0.13 (0.15)	1.14 (1.14, 1.54)	0.9	0.3754
Age 75-79	0.64 (0.14)	1.89 (1.89, 2.48)	4.7	<.0001
Age 80-84	1.03 (0.13)	2.81 (2.81, 3.63)	7.8	<.0001
Age 85+	1.60 (0.13)	4.93 (4.93, 6.34)	12.4	<.0001
Sex (Female)	-0.44 (0.05)	0.64 (0.64, 0.71)	-8.4	<.0001
Emergent Admission	0.54 (0.06)	1.71 (1.71, 1.93)	8.9	<.0001
Transfer-in	0.30 (0.17)	1.35 (1.35, 1.90)	1.8	0.0773
Past Admission in Last 6 Months	-0.06 (0.06)	0.94 (0.94, 1.06)	-0.9	0.3449
Principal Procedure Categories				
Hip Repair	1.20 (0.23)	3.32 (3.32, 5.20)	5.3	<.0001
Hip Replacement	0.96 (0.22)	2.60 (2.60, 4.04)	4.3	<.0001
Hip Replacement Revision	0.23 (0.27)	1.26 (1.26, 2.15)	0.8	0.4068
Knee Replacement	-0.25 (0.23)	0.78 (0.78, 1.23)	-1.1	0.2822
Knee Replacement Revision (Reference)	--	--	--	--
Same-Day Secondary Procedures				
Major Operative Therapeutic Procedure	0.35 (0.10)	1.42 (1.42, 1.71)	3.7	0.0003
Comorbidities				
Congestive Heart Failure	0.55 (0.06)	1.74 (1.74, 1.94)	9.6	<.0001
Past Myocardial Infarction	0.21 (0.08)	1.24 (1.24, 1.44)	2.7	0.0080
Past Arrhythmia	0.00 (0.06)	1.00 (1.00, 1.11)	0.0	0.9804
Angina	-0.37 (0.14)	0.69 (0.69, 0.91)	-2.6	0.0091
Valvular Disease	0.20 (0.05)	1.22 (1.22, 1.36)	3.7	0.0002
Unstable Angina	0.06 (0.18)	1.06 (1.06, 1.50)	0.4	0.7198
Hypertension	-0.40 (0.07)	0.67 (0.67, 0.76)	-5.8	<.0001
Diabetes	-0.13 (0.06)	0.88 (0.88, 0.98)	-2.2	0.0253
Renal Dysfunction	0.84 (0.06)	2.31 (2.31, 2.59)	14.8	<.0001
Renal Failure	0.17 (0.09)	1.19 (1.19, 1.42)	1.8	0.0648
Liver Disease	0.59 (0.11)	1.80 (1.80, 2.21)	5.5	<.0001
Cancer	0.05 (0.06)	1.05 (1.05, 1.18)	0.9	0.3582
Specific Abdominal Cancer	0.77 (0.28)	2.16 (2.16, 3.75)	2.8	0.0058
Dementia	0.86 (0.05)	2.37 (2.37, 2.64)	16.0	<.0001
Stroke	0.11 (0.07)	1.11 (1.11, 1.27)	1.6	0.1124
Seizure	0.23 (0.13)	1.25 (1.25, 1.63)	1.7	0.0928
Paraplegia	0.07 (0.14)	1.07 (1.07, 1.41)	0.5	0.6076
COPD	0.40 (0.05)	1.49 (1.49, 1.66)	7.4	<.0001
Asthma	-0.29 (0.10)	0.75 (0.75, 0.92)	-2.8	0.0046
Post-inflammatory Pulmonary Fibrosis	0.36 (0.11)	1.43 (1.43, 1.76)	3.3	0.0009
Hypothyroidism	-0.11 (0.06)	0.89 (0.89, 1.00)	-2.0	0.0440
Thrombocytopenia	0.21 (0.13)	1.23 (1.23, 1.60)	1.5	0.1245
Collagen Vascular Disease	-0.35 (0.11)	0.70 (0.70, 0.88)	-3.1	0.0021
Coagulopathy	0.02 (0.33)	1.02 (1.02, 1.95)	0.1	0.9444
Other Coagulopathy	0.17 (0.10)	1.18 (1.18, 1.44)	1.7	0.0944
Cushing's Disease	1.09 (0.87)	2.97 (2.97, 16.21)	1.3	0.2077
Graves' Disease	0.02 (0.52)	1.02 (1.02, 2.83)	0.0	0.9711
Summary Statistics				
Number of Observations	110,509			
Number of Deaths	1,919			
C-statistic	0.887			

**eTable 4d. Orthopedics (2009-9/30/2010) Risk Model (Comorbidities Only).**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-4.72 (0.07)	0.01 (0.01, 0.01)	-69.4	<.0001
Congestive Heart Failure	0.87 (0.06)	2.38 (2.38, 2.66)	15.1	<.0001
Past Myocardial Infarction	0.20 (0.08)	1.22 (1.22, 1.42)	2.5	0.0118
Past Arrhythmia	0.02 (0.05)	1.03 (1.03, 1.14)	0.5	0.6458
Angina	-0.41 (0.14)	0.66 (0.66, 0.88)	-2.9	0.0039
Valvular Disease	0.35 (0.05)	1.41 (1.41, 1.57)	6.4	<.0001
Unstable Angina	0.07 (0.17)	1.07 (1.07, 1.51)	0.4	0.6912
Hypertension	-0.46 (0.07)	0.63 (0.63, 0.72)	-6.7	<.0001
Diabetes	-0.29 (0.06)	0.75 (0.75, 0.84)	-5.2	<.0001
Renal Dysfunction	1.08 (0.06)	2.95 (2.95, 3.29)	19.3	<.0001
Renal Failure	0.17 (0.09)	1.19 (1.19, 1.42)	1.9	0.0596
Liver Disease	0.46 (0.10)	1.59 (1.59, 1.95)	4.5	<.0001
Cancer	0.15 (0.05)	1.16 (1.16, 1.29)	2.7	0.0065
Specific Abdominal Cancer	0.97 (0.28)	2.65 (2.65, 4.57)	3.5	0.0005
Dementia	1.73 (0.05)	5.64 (5.64, 6.22)	34.4	<.0001
Stroke	0.15 (0.07)	1.16 (1.16, 1.33)	2.2	0.0261
Seizure	0.23 (0.13)	1.26 (1.26, 1.64)	1.7	0.0834
Paraplegia	0.12 (0.14)	1.13 (1.13, 1.48)	0.9	0.3855
COPD	0.51 (0.05)	1.66 (1.66, 1.84)	9.5	<.0001
Asthma	-0.55 (0.10)	0.57 (0.57, 0.70)	-5.6	<.0001
Post-inflammatory Pulmonary Fibrosis	0.49 (0.11)	1.62 (1.62, 2.00)	4.5	<.0001
Hypothyroidism	-0.11 (0.06)	0.89 (0.89, 1.00)	-2.0	0.0406
Thrombocytopenia	0.21 (0.13)	1.23 (1.23, 1.60)	1.5	0.1224
Collagen Vascular Disease	-0.58 (0.11)	0.56 (0.56, 0.70)	-5.2	<.0001
Chronic Peptic Ulcer	-0.33 (1.02)	0.72 (0.72, 5.34)	-0.3	0.7445
Coagulopathy	0.04 (0.33)	1.04 (1.04, 1.97)	0.1	0.8957
Other Coagulopathy	0.11 (0.10)	1.11 (1.11, 1.35)	1.1	0.2828
Cushing's Disease	0.94 (0.84)	2.56 (2.56, 13.37)	1.1	0.2645
Graves' Disease	-0.33 (0.52)	0.72 (0.72, 1.98)	-0.6	0.5206
Summary Statistics				
Number of Observations	110,509			
Number of Deaths	1,919			
C-statistic	0.836			

**eTable 4e. General Surgery (10/1/2010-2013) Risk Model.**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-4.20 (0.08)			
Age 65-69 (Reference)	--	--	--	--
Age 70-74	0.17 (0.05)	1.18 (1.18, 1.32)	3.1	0.0021
Age 75-79	0.43 (0.05)	1.54 (1.54, 1.71)	8.2	<.0001
Age 80-84	0.71 (0.05)	2.04 (2.04, 2.26)	13.4	<.0001
Age 85+	1.09 (0.05)	2.98 (2.98, 3.30)	20.8	<.0001
Sex (female)	-0.05 (0.03)	0.95 (0.95, 1.01)	-1.6	0.1145
Emergent Admission	0.60 (0.03)	1.82 (1.82, 1.94)	18.1	<.0001
Transfer-in	0.62 (0.06)	1.86 (1.86, 2.10)	10.0	<.0001
Past Admission in Last 6 Months	0.05 (0.03)	1.05 (1.05, 1.12)	1.4	0.1625
<b>Principal Procedure Categories</b>				
Adrenalectomy	-1.74 (0.59)	0.18 (0.18, 0.56)	-2.9	0.0034
Appendectomy	-1.49 (0.13)	0.23 (0.23, 0.29)	-11.1	<.0001
Bariatric	-1.83 (0.38)	0.16 (0.16, 0.34)	-4.8	<.0001
Biliary common duct	-0.57 (0.50)	0.57 (0.57, 1.50)	-1.1	0.2516
Biliary other	-0.52 (0.21)	0.60 (0.60, 0.90)	-2.5	0.0134
Cholecystectomy	-1.31 (0.05)	0.27 (0.27, 0.30)	-24.7	<.0001
Colectomy Partial - Lap	-1.13 (0.08)	0.32 (0.32, 0.38)	-14.0	<.0001
Colectomy Partial - Open (Reference)	--	--	--	--
Colectomy Total - Lap	-0.43 (0.44)	0.65 (0.65, 1.52)	-1.0	0.3196
Colectomy Total - Open	0.71 (0.08)	2.04 (2.04, 2.40)	8.6	<.0001
Esophagectomy or Esophagomyotomy	-0.44 (0.21)	0.64 (0.64, 0.97)	-2.1	0.0346
Hernia Abdominal - Lap	-1.24 (0.26)	0.29 (0.29, 0.48)	-4.8	<.0001
Hernia Abdominal - Open	-0.90 (0.10)	0.41 (0.41, 0.49)	-9.4	<.0001
Hernia Groin - Lap	-1.71 (0.46)	0.18 (0.18, 0.44)	-3.7	0.0002
Hernia Groin - Open	-1.24 (0.11)	0.29 (0.29, 0.35)	-11.8	<.0001
Large Bowel Other	-0.01 (0.14)	0.99 (0.99, 1.31)	-0.1	0.9564
Liver Procedures	-0.81 (0.52)	0.44 (0.44, 1.24)	-1.6	0.1210
Liver Partial Hepatectomy	-0.87 (0.16)	0.42 (0.42, 0.58)	-5.4	<.0001
Lysis of Adhesions	-0.49 (0.07)	0.61 (0.61, 0.70)	-7.3	<.0001
Mastectomy	-1.71 (0.19)	0.18 (0.18, 0.27)	-8.8	<.0001
Pancreatectomy	-0.75 (0.11)	0.47 (0.47, 0.59)	-6.6	<.0001
Parathyroidectomy	-2.15 (0.34)	0.12 (0.12, 0.23)	-6.3	<.0001
PD Access Procedure	-0.78 (0.18)	0.46 (0.46, 0.66)	-4.3	<.0001
Proctectomy	-0.75 (0.11)	0.47 (0.47, 0.58)	-7.1	<.0001
Proctopexy	-2.32 (1.01)	0.10 (0.10, 0.71)	-2.3	0.0213
Pyloroplasty	0.05 (0.33)	1.05 (1.05, 1.99)	0.1	0.8861
Small Bowel Other	-0.34 (0.14)	0.71 (0.71, 0.94)	-2.4	0.0165
Small Bowel Resection	0.12 (0.05)	1.13 (1.13, 1.23)	2.6	0.0106
Splenectomy	0.13 (0.13)	1.14 (1.14, 1.48)	1.0	0.3320
Stomach Anti-Reflux	-1.24 (0.36)	0.29 (0.29, 0.59)	-3.4	0.0006
Stomach Gastric Bypass (non-bariatric)	0.49 (0.14)	1.63 (1.63, 2.14)	3.5	0.0004
Stomach Other	0.31 (0.19)	1.36 (1.36, 1.96)	1.7	0.0971
Stomach Partial Gastrectomy	0.00 (0.10)	1.00 (1.00, 1.22)	0.0	0.9677
Stomach Total Gastrectomy	0.04 (0.20)	1.04 (1.04, 1.55)	0.2	0.8595
Thyroidectomy Partial	-2.36 (0.50)	0.09 (0.09, 0.25)	-4.7	<.0001
Thyroidectomy Substernal	-1.55 (0.72)	0.21 (0.21, 0.86)	-2.2	0.0298
Thyroidectomy Total	-2.25 (0.38)	0.11 (0.11, 0.22)	-5.9	<.0001
Ulcer	0.46 (0.09)	1.59 (1.59, 1.89)	5.3	<.0001
<b>Same-Day Secondary Procedures</b>				
Major Operative Therapeutic Procedure	0.31 (0.03)	1.37 (1.37, 1.47)	9.0	<.0001
<b>Comorbidities</b>				
Congestive Heart Failure	0.36 (0.03)	1.43 (1.43, 1.53)	10.3	<.0001
Past Myocardial Infarction	0.05 (0.04)	1.05 (1.05, 1.14)	1.2	0.2285
Past Arrhythmia	0.04 (0.03)	1.04 (1.04, 1.11)	1.2	0.2275
Angina	-0.29 (0.07)	0.75 (0.75, 0.86)	-4.0	0.0001
Valvular Disease	0.15 (0.03)	1.16 (1.16, 1.24)	4.6	<.0001
Unstable Angina	0.18 (0.08)	1.20 (1.20, 1.40)	2.2	0.0266
Hypertension	-0.22 (0.05)	0.80 (0.80, 0.88)	-4.5	<.0001
Diabetes	-0.08 (0.03)	0.92 (0.92, 0.98)	-2.7	0.0072

<b>Covariate</b>	<b>Estimate (SE)</b>	<b>Odds Ratio (95% CI)</b>	<b>Chi-Square</b>	<b>P-value</b>
Renal Dysfunction	1.18 (0.03)	3.25 (3.25, 3.46)	36.1	<.0001
Renal Failure	0.29 (0.04)	1.34 (1.34, 1.46)	6.5	<.0001
Liver Disease	0.34 (0.04)	1.40 (1.40, 1.51)	9.2	<.0001
Cancer	-0.02 (0.03)	0.98 (0.98, 1.05)	-0.6	0.5816
Specific Abdominal Cancer	0.54 (0.07)	1.71 (1.71, 1.95)	8.0	<.0001
Dementia	0.38 (0.04)	1.46 (1.46, 1.57)	10.1	<.0001
Stroke	-0.02 (0.04)	0.98 (0.98, 1.07)	-0.4	0.6788
Seizure	0.37 (0.08)	1.44 (1.44, 1.70)	4.4	<.0001
Paraplegia	0.33 (0.08)	1.40 (1.40, 1.63)	4.3	<.0001
COPD	0.42 (0.03)	1.51 (1.51, 1.61)	13.2	<.0001
Asthma	-0.10 (0.05)	0.91 (0.91, 1.00)	-2.0	0.0458
Post-inflammatory Pulmonary Fibrosis	0.32 (0.06)	1.37 (1.37, 1.55)	5.2	<.0001
Hypothyroidism	-0.05 (0.03)	0.95 (0.95, 1.02)	-1.4	0.1724
Thrombocytopenia	0.18 (0.06)	1.20 (1.20, 1.35)	3.0	0.0026
Collagen Vascular Disease	0.05 (0.06)	1.05 (1.05, 1.17)	0.9	0.3538
Chronic Peptic Ulcer	0.24 (0.20)	1.27 (1.27, 1.89)	1.2	0.2286
Coagulopathy	-0.06 (0.18)	0.94 (0.94, 1.34)	-0.3	0.7439
Other Coagulopathy	0.67 (0.05)	1.95 (1.95, 2.14)	14.4	<.0001
Cushing's Disease	0.46 (0.36)	1.59 (1.59, 3.22)	1.3	0.1979
Graves' Disease	-0.40 (0.28)	0.67 (0.67, 1.16)	-1.4	0.1549
Hemoglobin Disorder	-0.39 (0.75)	0.67 (0.67, 2.95)	-0.5	0.6015
Summary Statistics				
Number of Observations	113,644			
Number of Deaths	5,779			
C-statistic	0.851			

**eTable 4f. General Surgery (10/1/2010-2013) Risk Model (Comorbidities Only Model).**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-4.04 (0.05)			
Congestive Heart Failure	0.45 (0.03)	1.58 (1.58, 1.68)	13.5	<.0001
Past Myocardial Infarction	-0.02 (0.04)	0.98 (0.98, 1.06)	-0.4	0.6672
Past Arrhythmia	0.11 (0.03)	1.12 (1.12, 1.19)	3.6	0.0003
Angina	-0.34 (0.07)	0.71 (0.71, 0.81)	-4.9	<.0001
Valvular Disease	0.25 (0.03)	1.28 (1.28, 1.36)	7.9	<.0001
Unstable Angina	0.16 (0.08)	1.17 (1.17, 1.36)	2.1	0.0396
Hypertension	-0.15 (0.05)	0.86 (0.86, 0.95)	-3.2	0.0016
Diabetes	-0.26 (0.03)	0.77 (0.77, 0.82)	-8.5	<.0001
Renal Dysfunction	1.48 (0.03)	4.41 (4.41, 4.70)	46.8	<.0001
Renal Failure	0.18 (0.04)	1.20 (1.20, 1.30)	4.4	<.0001
Liver Disease	0.21 (0.03)	1.24 (1.24, 1.32)	6.1	<.0001
Cancer	0.08 (0.03)	1.09 (1.09, 1.15)	2.9	0.0041
Specific Abdominal Cancer	0.38 (0.05)	1.47 (1.47, 1.63)	7.1	<.0001
Dementia	0.69 (0.04)	1.99 (1.99, 2.14)	19.5	<.0001
Stroke	0.00 (0.04)	1.00 (1.00, 1.08)	0.0	0.9922
Seizure	0.30 (0.08)	1.35 (1.35, 1.59)	3.8	0.0002
Paraplegia	0.31 (0.08)	1.36 (1.36, 1.58)	4.1	<.0001
COPD	0.48 (0.03)	1.61 (1.61, 1.71)	15.8	<.0001
Asthma	-0.15 (0.05)	0.86 (0.86, 0.94)	-3.2	0.0012
Post-inflammatory Pulmonary Fibrosis	0.39 (0.06)	1.48 (1.48, 1.66)	6.6	<.0001
Hypothyroidism	-0.03 (0.03)	0.97 (0.97, 1.03)	-1.0	0.3076
Thrombocytopenia	0.17 (0.06)	1.19 (1.19, 1.33)	3.0	0.0027
Collagen Vascular Disease	0.07 (0.05)	1.07 (1.07, 1.19)	1.3	0.2012
Chronic Peptic Ulcer	0.57 (0.19)	1.76 (1.76, 2.57)	2.9	0.0034
Coagulopathy	-0.04 (0.18)	0.96 (0.96, 1.35)	-0.2	0.8170
Other Coagulopathy	0.77 (0.04)	2.17 (2.17, 2.36)	17.6	<.0001
Cushing's Disease	0.24 (0.33)	1.27 (1.27, 2.40)	0.7	0.4657
Graves' Disease	-0.68 (0.27)	0.51 (0.51, 0.86)	-2.5	0.0119
Hemoglobin Disorder	-0.59 (0.75)	0.56 (0.56, 2.40)	-0.8	0.4323
Summary Statistics				
Number of Observations	113,644			
Number of Deaths	5,779			
C-statistic	0.791			

**eTable 4g. Orthopedics (10/1/2010-2013) Risk Model.**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-6.36 (0.17)	0.00 (0.00, 0.00)	-38.2	<.0001
Age 65-69 (Reference)	--	--	--	--
Age 70-74	0.35 (0.10)	1.41 (1.41, 1.72)	3.5	0.0005
Age 75-79	0.74 (0.09)	2.10 (2.10, 2.52)	8.0	<.0001
Age 80-84	1.04 (0.09)	2.83 (2.83, 3.37)	11.6	<.0001
Age 85+	1.68 (0.09)	5.38 (5.38, 6.38)	19.3	<.0001
Sex (Female)	-0.44 (0.03)	0.64 (0.64, 0.69)	-13.0	<.0001
Emergent Admission	0.66 (0.04)	1.94 (1.94, 2.10)	16.9	<.0001
Transfer-in	0.72 (0.10)	2.06 (2.06, 2.48)	7.6	<.0001
Past Admission in Last 6 Months	-0.06 (0.04)	0.94 (0.94, 1.01)	-1.6	0.1108
Principal Procedure Categories				
Hip Repair	1.13 (0.15)	3.09 (3.09, 4.11)	7.7	<.0001
Hip Replacement	0.96 (0.14)	2.60 (2.60, 3.45)	6.6	<.0001
Hip Replacement Revision	0.40 (0.17)	1.49 (1.49, 2.08)	2.4	0.0180
Knee Replacement	-0.31 (0.15)	0.73 (0.73, 0.98)	-2.1	0.0390
Knee Replacement Revision (Reference)	--	--	--	--
Same-Day Secondary Procedures				
Major Operative Therapeutic Procedure	0.42 (0.06)	1.53 (1.53, 1.72)	7.1	<.0001
Comorbidities				
Congestive Heart Failure	0.55 (0.04)	1.73 (1.73, 1.86)	14.8	<.0001
Past Myocardial Infarction	0.08 (0.05)	1.08 (1.08, 1.19)	1.7	0.0903
Past Arrhythmia	0.06 (0.04)	1.06 (1.06, 1.14)	1.7	0.0967
Angina	-0.14 (0.09)	0.87 (0.87, 1.03)	-1.6	0.1106
Valvular Disease	0.19 (0.04)	1.21 (1.21, 1.29)	5.3	<.0001
Unstable Angina	-0.03 (0.12)	0.97 (0.97, 1.23)	-0.3	0.7876
Hypertension	-0.23 (0.05)	0.80 (0.80, 0.88)	-4.6	<.0001
Diabetes	-0.06 (0.04)	0.94 (0.94, 1.01)	-1.8	0.0756
Renal Dysfunction	0.71 (0.04)	2.04 (2.04, 2.19)	19.9	<.0001
Renal Failure	0.27 (0.06)	1.31 (1.31, 1.47)	4.5	<.0001
Liver Disease	0.65 (0.07)	1.92 (1.92, 2.19)	9.8	<.0001
Cancer	0.07 (0.03)	1.08 (1.08, 1.15)	2.1	0.0331
Specific Abdominal Cancer	0.60 (0.20)	1.81 (1.81, 2.68)	3.0	0.0026
Dementia	0.94 (0.03)	2.57 (2.57, 2.75)	27.1	<.0001
Stroke	0.12 (0.04)	1.12 (1.12, 1.21)	2.9	0.0041
Seizure	0.16 (0.09)	1.18 (1.18, 1.40)	1.8	0.0670
Paraplegia	0.18 (0.09)	1.19 (1.19, 1.42)	2.0	0.0406
COPD	0.47 (0.03)	1.60 (1.60, 1.72)	13.6	<.0001
Asthma	-0.11 (0.06)	0.90 (0.90, 1.01)	-1.9	0.0641
Post-inflammatory Pulmonary Fibrosis	0.26 (0.07)	1.30 (1.30, 1.48)	3.8	0.0001
Hypothyroidism	-0.09 (0.04)	0.91 (0.91, 0.98)	-2.5	0.0115
Thrombocytopenia	-0.03 (0.09)	0.97 (0.97, 1.14)	-0.4	0.7058
Collagen Vascular Disease	-0.18 (0.07)	0.83 (0.83, 0.95)	-2.8	0.0056
Coagulopathy	0.11 (0.20)	1.12 (1.12, 1.67)	0.5	0.5919
Other Coagulopathy	0.27 (0.07)	1.31 (1.31, 1.49)	4.0	0.0001
Cushing's Disease	0.45 (0.73)	1.57 (1.57, 6.60)	0.6	0.5398
Graves' Disease	-0.49 (0.43)	0.62 (0.62, 1.42)	-1.1	0.2533
Summary Statistics				
Number of Observations	263,714			
Number of Deaths	4,571			
C-statistic	0.898			



**eTable 4h. Orthopedics (10/1/2010-2013) Risk Model (Comorbidities Only).**

Covariate	Estimate (SE)	Odds Ratio (95% CI)	Chi-Square	P-value
Intercept	-5.10 (0.05)	0.01 (0.01, 0.01)	-103.3	<.0001
Congestive Heart Failure	0.82 (0.04)	2.27 (2.27, 2.44)	22.0	<.0001
Past Myocardial Infarction	0.11 (0.05)	1.12 (1.12, 1.23)	2.4	0.0166
Past Arrhythmia	0.11 (0.03)	1.12 (1.12, 1.20)	3.2	0.0012
Angina	-0.22 (0.09)	0.80 (0.80, 0.95)	-2.5	0.0113
Valvular Disease	0.34 (0.03)	1.40 (1.40, 1.50)	9.6	<.0001
Unstable Angina	-0.06 (0.12)	0.95 (0.95, 1.20)	-0.5	0.6439
Hypertension	-0.22 (0.05)	0.81 (0.81, 0.89)	-4.4	<.0001
Diabetes	-0.23 (0.04)	0.79 (0.79, 0.85)	-6.6	<.0001
Renal Dysfunction	0.97 (0.04)	2.64 (2.64, 2.83)	27.2	<.0001
Renal Failure	0.25 (0.06)	1.28 (1.28, 1.44)	4.2	<.0001
Liver Disease	0.51 (0.07)	1.67 (1.67, 1.90)	7.9	<.0001
Cancer	0.18 (0.03)	1.20 (1.20, 1.28)	5.5	<.0001
Specific Abdominal Cancer	0.75 (0.20)	2.11 (2.11, 3.12)	3.8	0.0002
Dementia	1.84 (0.03)	6.30 (6.30, 6.72)	56.2	<.0001
Stroke	0.19 (0.04)	1.21 (1.21, 1.31)	4.8	<.0001
Seizure	0.06 (0.09)	1.06 (1.06, 1.27)	0.7	0.4844
Paraplegia	0.18 (0.09)	1.20 (1.20, 1.42)	2.1	0.0377
COPD	0.56 (0.03)	1.76 (1.76, 1.88)	16.4	<.0001
Asthma	-0.36 (0.06)	0.70 (0.70, 0.78)	-6.3	<.0001
Post-inflammatory Pulmonary Fibrosis	0.38 (0.07)	1.46 (1.46, 1.66)	5.6	<.0001
Hypothyroidism	-0.09 (0.03)	0.91 (0.91, 0.98)	-2.6	0.0107
Thrombocytopenia	-0.03 (0.08)	0.97 (0.97, 1.15)	-0.3	0.7543
Collagen Vascular Disease	-0.42 (0.07)	0.66 (0.66, 0.75)	-6.3	<.0001
Coagulopathy	0.08 (0.20)	1.08 (1.08, 1.62)	0.4	0.6887
Other Coagulopathy	0.24 (0.07)	1.27 (1.27, 1.45)	3.7	0.0002
Cushing's Disease	0.11 (0.73)	1.12 (1.12, 4.66)	0.2	0.8754
Graves' Disease	-0.68 (0.42)	0.51 (0.51, 1.15)	-1.6	0.1053
Summary Statistics				
Number of Observations	263,714			
Number of Deaths	4,571			
C-statistic	0.856			

**eTable 5. Prolonged Length of Stay.** A prolonged stay is defined as exceeding the length of stay at which the rate of discharge begins to decline (the Hollander-Proschan point)<sup>6-9</sup> or in-hospital death. In-hospital deaths are included to avoid giving inappropriate credit for the early death of a patient. The cutpoints for defining a prolonged stay were estimated separately for each procedure category and era using a dataset of 996,086 patients not used for matching.

<b>Procedure Category</b>	<b>HP Cutpoint (Days)</b>
Adrenalectomy	3
Appendectomy	3
Bariatric	3
Biliary Common Duct	8
Biliary Other	7
Cholecystectomy	4
Colectomy Partial - Lap	5
Colectomy Partial - Open	6
Colectomy Total - Lap	4
Colectomy Total - Open	14
Esophagectomy	9
Esophagomyotomy	2
Hernia Abdominal – Lap	3
Hernia Abdominal – Open	4
Hernia Groin – Lap	3
Hernia Groin – Open	3
Hip Repair	6
Hip Replacement	5
Hip Replacement Revision	5
Knee Replacement	5
Knee Replacement Revision	5
Large Bowel Other	6
Liver Other	7
Liver Partial Hepatectomy	6
Lysis Of Adhesions	8
Mastectomy	3
Pancreatectomy	7
Parathyroidectomy	3
Pd Access Procedure	8
Proctectomy	6
Proctopexy	5
Pyloroplasty	11
Small Bowel Other	8
Small Bowel Resection	7
Splenectomy	4
Stomach Anti-Reflux	3
Stomach Gastric Bypass	13
Stomach Other	6
Stomach Partial Gastrectomy	7
Stomach Total Gastrectomy	9
Thyroidectomy Partial	4
Thyroidectomy Substernal	3
Thyroidectomy Total	3
Ulcer	8

eTable 6. Complete Step Table

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation + Emerg.	Year + Operation	Year		
Number of Surgeons	2,119	1,820	1,820	1,820	1,820	1,820	1,820	8,503
Number of Patients	68,036	18,200	18,200	18,200	18,200	18,200	203,113	694,165
<b>Year of admission (mean)</b>	2011.4	<b>2011.5</b>	<b>2011.4</b>	<b>2011.5</b>	<b>2011.5</b>	<b>2011.5</b>	2011.0	2011.0
<b>Principal Procedure Categories</b>								
<i>General Surgery</i>								
Adrenalectomy	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.3	0.3	0.3
Appendectomy	5.1	<b>5.3</b>	<b>5.3</b>	<b>5.3</b>	<b>5.3</b>	3.9	3.9	3.7
Bariatric	0.3	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	0.8	0.6	1.2
Biliary common duct	0.1	--*	--*	--*	--*	--*	0.1	0.1
Biliary other	0.2	--*	--*	--*	--*	0.3	0.4	0.4
Cholecystectomy	31.0	<b>29.8</b>	<b>29.8</b>	<b>29.8</b>	<b>29.8</b>	24.5	25.4	23.1
Colectomy Partial – Lap	9.3	<b>9.1</b>	<b>9.1</b>	<b>9.1</b>	<b>9.1</b>	9.0	10.0	9.0
Colectomy Partial – Open	17.8	<b>18.0</b>	<b>18.0</b>	<b>18.0</b>	<b>18.0</b>	18.2	17.7	17.2
Colectomy Total – Lap	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.2	0.2	0.1
Colectomy Total – Open	1.3	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	1.2	1.0	1.0
Esophagectomy	0.1	--*	--*	--*	--*	0.1	0.2	0.4
Esophagomyotomy	0.1	--*	--*	--*	--*	0.2	0.2	0.2
Hernia Abdominal – Lap	1.4	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	1.3	1.3	1.2
Hernia Abdominal – Open	3.2	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	5.6	5.3	5.1
Hernia Groin – Lap	0.4	<b>0.4</b>	<b>0.4</b>	<b>0.4</b>	<b>0.4</b>	0.3	0.5	0.3
Hernia Groin – Open	3.4	<b>3.6</b>	<b>3.6</b>	<b>3.6</b>	<b>3.6</b>	3.4	3.2	3.1
Large Bowel Other	0.7	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	0.8	0.8	0.8
Liver Other	--*	--*	--*	--*	--*	0.1	0.1	0.1
Liver Partial Hepatectomy	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.5	0.7	1.1
Lysis of Adhesions	5.5	<b>5.6</b>	<b>5.6</b>	<b>5.6</b>	<b>5.6</b>	5.6	5.1	4.6
Mastectomy	1.3	<b>1.4</b>	<b>1.4</b>	<b>1.4</b>	<b>1.4</b>	3.0	2.6	3.9
Pancreatectomy	0.7	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	1.7	1.8	2.5
Parathyroidectomy	0.3	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.7	0.8	1.3
PD Access Procedure	0.3	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.3	0.3	0.3
Proctectomy	2.8	<b>2.9</b>	<b>2.9</b>	<b>2.9</b>	<b>2.9</b>	2.9	3.1	3.4
Proctopexy	0.1	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	0.1	0.1	0.2
Pyloroplasty	0.1	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	0.1	0.1	0.1
Small Bowel Other	0.7	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	0.8	0.7	0.7
Small Bowel Resection	8.3	<b>8.3</b>	<b>8.3</b>	<b>8.3</b>	<b>8.3</b>	6.9	6.6	6.1
Splenectomy	0.7	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	1.0	0.8	0.8
Stomach Anti-Reflux	0.4	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.7	1.0	0.9
Stomach Gastric Bypass (non-bariatric)	0.4	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.5	0.5	0.5
Stomach Other	0.3	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.4	0.3	0.3
Stomach Partial Gastrectomy	0.9	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	1.4	1.5	1.5
Stomach Total Gastrectomy	0.1	--*	--*	--*	--*	0.3	0.4	0.4

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation + Emerg.	Year + Operation	Year		
Thyroidectomy Partial	0.2	0.3	0.3	0.3	0.3	0.6	0.6	1.1
Thyroidectomy Substernal	--*	--*	--*	--*	--*	0.1	0.1	0.2
Thyroidectomy Total	0.4	0.5	0.5	0.5	0.5	0.9	0.8	1.7
Ulcer	1.4	1.4	1.4	1.4	1.4	1.2	1.0	0.9
<i>Orthopedic Surgery</i>								
Hip Repair	23.2	29.7	29.7	29.7	29.7	17.1	10.4	9.0
Hip Replacement	46.8	50.1	50.1	50.1	50.1	37.4	35.5	33.4
Hip Replacement Revision	3.7	2.0	2.0	2.0	2.0	3.0	3.5	3.2
Knee Replacement	23.2	16.8	16.8	16.8	16.8	39.8	47.3	51.0
Knee Replacement Revision	3.1	1.5	1.5	1.5	1.5	2.8	3.4	3.5
<b>Emergent Admission</b>	47.2	53.9	53.9	53.9	43.0	34.7	25.8	23.0
<b>Risk Factors &amp; Patient Demographics</b>								
Age at Admission (years, mean)	78.7	79.0	79.1	78.7	78.2	77.2	77.0	76.7
Age 65-69	18.1	17.2	16.9	18.1	19.0	21.6	21.6	22.7
Age 70-74	19.7	19.7	19.1	19.9	21.2	23.4	23.9	24.5
Age 75-79	19.0	18.7	18.8	19.1	19.5	20.3	21.2	21.2
Age 80-84	18.6	18.7	18.5	18.8	18.5	17.0	17.0	16.5
Age 85+	24.6	25.8	26.7	24.1	21.9	17.8	16.3	15.0
Sex (% female)	63.5	63.0	63.1	62.5	61.9	61.8	62.8	63.0
Transfer-in	2.5	2.5	2.5	1.9	2.2	2.0	1.5	1.2
Past Admission in Last 6 Months	24.0	25.6	24.1	24.5	24.1	22.9	19.3	18.0
Admission after 9/30/2010	84.6	87.4	87.4	87.4	87.4	87.4	68.5	68.4
Admission in 2012 or 2013	48.3	54.9	49.7	54.8	54.9	54.9	36.6	37.3
Probability of 30-day Death	4.8	5.6	5.5	5.2	4.7	4.2	3.0	2.7
Comorbidity Count (mean)	4.0	4.1	4.0	4.0	4.0	3.9	3.5	3.5
<i>Same-Day Secondary Procedures</i>								
Major Operative Therapeutic <i>Comorbidities*</i>	22.1	26.7	25.7	25.6	25.8	26.5	19.7	18.3
Congestive Heart Failure	20.5	22.2	21.4	20.5	19.9	18.2	15.2	14.0
Past Myocardial Infarction	9.9	10.4	9.1	9.9	10.0	9.5	8.3	8.0
Past Arrhythmia	29.2	30.5	29.8	30.3	30.0	29.2	26.9	26.7
Angina	3.6	4.0	2.9	3.5	3.6	3.7	3.5	3.4
Valvular Disease	22.9	23.9	22.9	22.8	22.4	21.0	19.6	19.4
Unstable Angina	1.8	1.8	1.4	2.0	2.1	1.9	1.5	1.4
Hypertension	85.8	86.0	86.0	85.1	85.1	85.2	84.7	84.5
Diabetes	31.8	32.5	32.9	31.9	32.0	32.2	30.1	29.8
Renal Dysfunction	22.7	25.2	24.8	22.6	21.5	20.8	16.4	15.5
Renal Failure	5.0	5.6	5.0	5.2	5.1	4.8	3.7	3.5
Liver Disease	8.8	10.7	10.2	10.8	10.7	10.4	7.8	7.5
Cancer	33.6	36.0	37.9	37.4	37.6	38.7	34.4	34.4
Specific Abdominal Cancer	1.5	1.9	2.3	2.0	2.0	2.6	2.0	2.2

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation + Emerg.	Year + Operation	Year		
Dementia	19.9	21.2	20.5	18.4	16.7	13.8	11.7	10.7
Stroke	14.7	15.9	14.4	15.1	14.1	13.0	11.0	10.5
Seizure	2.2	2.3	1.6	2.1	2.0	2.0	1.6	1.5
Paraplegia	2.6	2.9	2.0	2.7	2.5	2.2	1.7	1.5
COPD	25.9	27.3	26.4	26.7	26.4	24.9	21.7	20.4
Asthma	9.3	9.1	9.3	9.7	9.9	10.1	9.8	10.0
Post-inflammatory Pulmonary Fibrosis	3.6	3.9	3.9	3.8	3.6	3.5	2.8	2.7
Hypothyroidism	25.3	25.2	24.6	25.4	25.2	24.5	25.0	25.0
Thrombocytopenia	2.8	2.9	3.1	2.9	2.9	2.6	2.3	2.2
Collagen Vascular Disease	7.3	6.8	6.1	7.3	7.3	7.4	7.7	7.9
AIDS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Chronic Peptic Ulcer	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Coagulopathy	0.5	0.4	0.5	0.5	0.5	0.4	0.5	0.5
Other Coagulopathy	4.1	4.5	4.5	4.4	4.2	4.1	3.9	4.1
Cushing's Disease	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Graves' Disease	0.3	0.4	0.3	0.3	0.3	0.4	0.3	0.4
Hemoglobin Disorder	0.0	--*	--*	--*	--*	--*	0.0	0.0

**eTable 6a. Step Table for General Surgery**

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation+ Emerg.	Year + Operation	Year		
Number of Surgeons	1,027	994	994	994	994	994	994	4,324
Number of Patients	28,536	9,940	9,940	9,940	9,940	9,940	72,068	220,137
<b>Year of admission (mean)</b>	2011.3	<b>2011.5</b>	<b>2011.3</b>	<b>2011.5</b>	<b>2011.5</b>	<b>2011.5</b>	2010.9	2010.9
<b>Principal Procedure Categories</b>								
Adrenalectomy	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.3	0.3	0.3
Appendectomy	5.1	<b>5.3</b>	<b>5.3</b>	<b>5.3</b>	<b>5.3</b>	3.9	3.9	3.7
Bariatric	0.3	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	0.8	0.6	1.2
Biliary common duct	0.1	--*	--*	--*	--*	--*	0.1	0.1
Biliary other	0.2	--*	--*	--*	--*	0.3	0.4	0.4
Cholecystectomy	31.0	<b>29.8</b>	<b>29.8</b>	<b>29.8</b>	<b>29.8</b>	24.5	25.4	23.1
Colectomy Partial – Lap	9.3	<b>9.1</b>	<b>9.1</b>	<b>9.1</b>	<b>9.1</b>	9.0	10.0	9.0
Colectomy Partial – Open	17.8	<b>18.0</b>	<b>18.0</b>	<b>18.0</b>	<b>18.0</b>	18.2	17.7	17.2
Colectomy Total – Lap	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.2	0.2	0.1
Colectomy Total – Open	1.3	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	1.2	1.0	1.0
Esophagectomy	0.1	--*	--*	--*	--*	0.1	0.2	0.4
Esophagomyotomy	0.1	--*	--*	--*	--*	0.2	0.2	0.2
Hernia Abdominal – Lap	1.4	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	1.3	1.3	1.2
Hernia Abdominal – Open	3.2	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	<b>3.3</b>	5.6	5.3	5.1
Hernia Groin – Lap	0.4	<b>0.4</b>	<b>0.4</b>	<b>0.4</b>	<b>0.4</b>	0.3	0.5	0.3
Hernia Groin – Open	3.4	<b>3.6</b>	<b>3.6</b>	<b>3.6</b>	<b>3.6</b>	3.4	3.2	3.1
Large Bowel Other	0.7	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	0.8	0.8	0.8
Liver Other	--*	--*	--*	--*	--*	0.1	0.1	0.1
Liver Partial Hepatectomy	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.5	0.7	1.1
Lysis of Adhesions	5.5	<b>5.6</b>	<b>5.6</b>	<b>5.6</b>	<b>5.6</b>	5.6	5.1	4.6
Mastectomy	1.3	<b>1.4</b>	<b>1.4</b>	<b>1.4</b>	<b>1.4</b>	3.0	2.6	3.9
Pancreatectomy	0.7	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	1.7	1.8	2.5
Parathyroidectomy	0.3	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.7	0.8	1.3
PD Access Procedure	0.3	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.3	0.3	0.3
Proctectomy	2.8	<b>2.9</b>	<b>2.9</b>	<b>2.9</b>	<b>2.9</b>	2.9	3.1	3.4
Proctopexy	0.1	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	<b>0.1</b>	0.1	0.1	0.2
Pyloroplasty	0.1	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>	0.1	0.1	0.1
Small Bowel Other	0.7	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	0.8	0.7	0.7
Small Bowel Resection	8.3	<b>8.3</b>	<b>8.3</b>	<b>8.3</b>	<b>8.3</b>	6.9	6.6	6.1
Splenectomy	0.7	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	1.0	0.8	0.8
Stomach Anti-Reflux	0.4	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.7	1.0	0.9
Stomach Gastric Bypass (non-bariatric)	0.4	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.5	0.5	0.5
Stomach Other	0.3	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.4	0.3	0.3
Stomach Partial Gastrectomy	0.9	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.0</b>	1.4	1.5	1.5
Stomach Total Gastrectomy	0.1	--*	--*	--*	--*	0.3	0.4	0.4
Thyroidectomy Partial	0.2	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	0.6	0.6	1.1

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation + Emerg.	Year + Operation	Year		
Thyroidectomy Substernal	--*	--*	--*	--*	--*	0.1	0.1	0.2
Thyroidectomy Total	0.4	0.5	0.5	0.5	0.5	0.9	0.8	1.7
Ulcer	1.4	1.4	1.4	1.4	1.4	1.2	1.0	0.9
<b>Emergent Admission</b>	51.3	52.7	52.7	52.7	44.9	40.5	39.7	37.9
<b>Risk Factors &amp; Patient Demographics</b>								
Age at Admission (years, mean)	77.1	77.0	77.0	76.9	76.9	76.6	76.8	76.6
Age 65-69	21.6	21.6	21.7	22.3	22.1	23.0	22.3	23.3
Age 70-74	22.9	23.6	23.2	23.0	23.8	24.6	23.7	24.0
Age 75-79	20.7	20.4	20.9	21.1	21.1	20.9	21.1	20.8
Age 80-84	18.1	17.9	17.9	17.9	17.4	16.9	17.4	17.0
Age 85+	16.7	16.5	16.3	15.7	15.5	14.6	15.6	14.9
Sex (% female)	56.2	56.5	56.8	56.0	55.5	57.1	57.2	58.1
Transfer-in	4.0	3.5	3.5	2.9	3.2	3.1	2.9	2.6
Past Admission in Last 6 Months	29.0	28.7	27.2	27.8	27.9	27.8	27.7	27.3
Admission after 9/30/2010	82.2	86.3	86.3	86.3	86.3	86.3	67.3	66.9
Admission in 2012 or 2013	46.2	53.8	46.9	53.6	53.7	53.8	34.7	34.9
Probability of 30-day Death	6.2	6.2	6.0	5.9	5.6	5.4	5.2	5.1
Comorbidity Count (mean)	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.2
<i>Same-Day Secondary Procedures</i>								
Major Operative Therapeutic Comorbidities*	42.9	43.5	42.0	42.0	42.2	42.8	41.4	42.4
Congestive Heart Failure	22.5	22.8	21.1	20.9	20.9	20.3	20.0	19.2
Past Myocardial Infarction	11.4	11.2	9.6	10.6	11.1	10.8	10.5	10.3
Past Arrhythmia	30.5	30.7	29.4	31.2	31.1	31.0	29.9	30.0
Angina	4.3	4.4	3.1	4.0	4.1	4.1	4.5	4.4
Valvular Disease	23.6	23.5	21.7	22.4	22.2	21.7	22.1	22.2
Unstable Angina	2.5	2.3	1.8	2.6	2.7	2.5	2.5	2.3
Hypertension	85.5	85.3	85.1	84.0	84.3	84.6	84.4	84.4
Diabetes	35.7	35.4	35.7	34.9	35.1	35.2	34.5	35.0
Renal Dysfunction	27.9	28.2	27.2	25.3	24.6	24.6	22.9	22.6
Renal Failure	6.7	6.5	5.8	6.1	6.2	6.2	5.8	5.9
Liver Disease	16.1	16.3	16.1	17.0	16.9	16.4	16.3	16.9
Cancer	43.5	43.7	46.8	47.1	47.5	49.3	50.0	52.2
Specific Abdominal Cancer	3.2	3.1	3.8	3.3	3.4	4.6	5.3	6.5
Dementia	13.3	13.3	11.6	11.5	11.3	11.0	10.8	10.5
Stroke	13.7	14.0	12.1	14.0	13.5	13.2	12.4	12.0
Seizure	2.0	2.1	1.4	2.0	1.9	2.2	1.9	1.8
Paraplegia	2.7	2.7	1.7	2.6	2.5	2.5	2.3	2.1
COPD	29.2	28.6	27.6	28.4	28.5	28.3	27.6	26.5
Asthma	9.6	9.4	9.9	10.0	10.3	10.4	9.9	10.1
Post-inflammatory Pulmonary Fibrosis	3.8	3.9	3.7	4.0	3.8	3.9	3.7	3.5

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation+ Emerg.	Year + Operation	Year		
Hypothyroidism	23.2	<b>23.3</b>	<b>24.8</b>	23.7	23.8	23.2	23.4	24.0
Thrombocytopenia	3.3	<b>3.1</b>	<b>3.6</b>	3.4	3.5	3.3	3.2	3.4
Collagen Vascular Disease	6.3	<b>6.1</b>	<b>6.4</b>	6.7	6.6	6.8	6.3	6.4
AIDS	0.1	--*	--*	--*	--*	--*	0.1	0.1
Chronic Peptic Ulcer	0.3	<b>0.3</b>	<b>0.3</b>	0.2	0.2	0.2	0.3	0.3
Coagulopathy	0.5	<b>0.4</b>	<b>0.5</b>	0.4	0.5	0.4	0.4	0.5
Other Coagulopathy	4.8	<b>4.9</b>	<b>5.1</b>	4.7	4.6	4.7	4.5	4.9
Cushing's Disease	0.1	--*	<b>0.1</b>	0.1	0.1	0.1	0.1	0.1
Graves' Disease	0.4	<b>0.4</b>	<b>0.4</b>	0.3	0.4	0.5	0.4	0.5
Hemoglobin Disorder	--*	--*	--*	--*	--*	--*	0.0	0.0



eTable 6b. Step Table for Orthopedic Surgery

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation+ Emerg	Year + Operation	Year		
Number of Surgeons	1,092	826	826	826	826	826	826	4,179
Number of Patients	39,500	8,260	8,260	8,260	8,260	8,260	131,045	474,028
<b>Year of admission (mean)</b>	2011.4	<b>2011.6</b>	<b>2011.5</b>	<b>2011.6</b>	<b>2011.6</b>	<b>2011.6</b>	2011.0	2011.0
<b>Principal Procedure Categories</b>								
Hip Repair	23.2	<b>29.7</b>	<b>29.7</b>	<b>29.7</b>	<b>29.7</b>	17.1	10.4	9.0
Hip Replacement	46.8	<b>50.1</b>	<b>50.1</b>	<b>50.1</b>	<b>50.1</b>	37.4	35.5	33.4
Hip Replacement Revision	3.7	<b>2.0</b>	<b>2.0</b>	<b>2.0</b>	<b>2.0</b>	3.0	3.5	3.2
Knee Replacement	23.2	<b>16.8</b>	<b>16.8</b>	<b>16.8</b>	<b>16.8</b>	39.8	47.3	51.0
Knee Replacement Revision	3.1	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>	2.8	3.4	3.5
<b>Emergent Admission</b>	44.3	<b>55.3</b>	<b>55.3</b>	<b>55.3</b>	40.8	27.8	18.2	16.1
<b>Risk Factors &amp; Patient Demographics</b>								
Age at Admission (years, mean)	79.9	<b>81.3</b>	<b>81.7</b>	80.8	79.9	78.0	77.1	76.7
Age 65-69	15.5	<b>11.9</b>	<b>11.2</b>	13.1	15.1	19.8	21.3	22.4
Age 70-74	17.4	<b>15.0</b>	<b>14.3</b>	16.1	18.0	21.8	24.0	24.8
Age 75-79	17.8	<b>16.6</b>	<b>16.2</b>	16.8	17.5	19.5	21.3	21.4
Age 80-84	18.9	<b>19.7</b>	<b>19.2</b>	19.9	19.8	17.2	16.8	16.3
Age 85+	30.4	<b>36.9</b>	<b>39.2</b>	34.0	29.6	21.7	16.6	15.1
Sex (% female)	68.8	<b>70.9</b>	<b>70.7</b>	70.5	69.7	67.5	65.9	65.3
Transfer-in	1.5	<b>1.3</b>	<b>1.3</b>	0.7	1.0	0.7	0.7	0.6
Past Admission in Last 6 Months	20.4	<b>21.9</b>	<b>20.4</b>	20.5	19.4	17.1	14.7	13.7
Admission after 9/30/2010	86.3	<b>88.7</b>	<b>88.7</b>	88.7	88.7	88.7	69.2	69.1
Admission in 2012 or 2013	49.8	<b>56.3</b>	<b>53.1</b>	56.3	56.3	56.3	37.7	38.4
Probability of 30-day Death	3.8	<b>4.8</b>	<b>4.9</b>	4.3	3.7	2.6	1.8	1.6
Comorbidity Count (mean)	3.7	<b>4.0</b>	<b>3.9</b>	3.8	3.7	3.5	3.2	3.1
<i>Same-Day Secondary Procedures</i>								
Major Operative Therapeutic <i>Comorbidities*</i>	7.0	<b>6.6</b>	<b>5.9</b>	5.9	6.0	6.9	7.7	7.1
Congestive Heart Failure	19.0	<b>21.5</b>	<b>21.9</b>	20.0	18.6	15.8	12.5	11.5
Past Myocardial Infarction	8.9	<b>9.4</b>	<b>8.6</b>	9.0	8.7	7.9	7.1	6.9
Past Arrhythmia	28.3	<b>30.3</b>	<b>30.2</b>	29.1	28.8	27.0	25.3	25.1
Angina	3.0	<b>3.4</b>	<b>2.7</b>	2.9	3.0	3.2	2.9	2.9
Valvular Disease	22.4	<b>24.3</b>	<b>24.3</b>	23.4	22.5	20.1	18.3	18.1
Unstable Angina	1.2	<b>1.3</b>	<b>0.8</b>	1.1	1.2	1.2	1.0	0.9
Hypertension	86.0	<b>86.8</b>	<b>87.1</b>	86.4	86.1	86.0	84.9	84.5
Diabetes	29.0	<b>29.0</b>	<b>29.7</b>	28.3	28.1	28.5	27.7	27.4
Renal Dysfunction	19.0	<b>21.6</b>	<b>21.9</b>	19.4	17.8	16.1	12.8	12.2
Renal Failure	3.9	<b>4.4</b>	<b>4.0</b>	4.0	3.7	3.0	2.6	2.4
Liver Disease	3.5	<b>3.9</b>	<b>3.2</b>	3.3	3.3	3.1	3.1	3.1
Cancer	26.4	<b>26.7</b>	<b>27.1</b>	25.7	25.6	25.9	25.8	26.1
Specific Abdominal Cancer	0.4	<b>0.5</b>	<b>0.4</b>	0.4	0.4	0.2	0.2	0.2

Variable (percent unless noted)	All New Surgeon Patients	Sampled & Matched New Surgeon Patients	Exp. Surgeon Patients Matched for:				All Exp. After Surgeon Pairing	All Exp. Before Surgeon Pairing
			Year + Operation + Emerg. + Risk Factors	Year + Operation+ Emerg	Year + Operation	Year		
Dementia	24.7	<b>30.8</b>	<b>31.3</b>	26.7	23.2	17.1	12.2	10.8
Stroke	15.5	<b>18.1</b>	<b>17.2</b>	16.4	14.8	12.9	10.3	9.7
Seizure	2.3	<b>2.6</b>	<b>1.8</b>	2.3	2.0	1.8	1.5	1.4
Paraplegia	2.5	<b>3.1</b>	<b>2.4</b>	2.8	2.5	1.9	1.3	1.2
COPD	23.6	<b>25.8</b>	<b>25.0</b>	24.7	23.8	20.9	18.5	17.6
Asthma	9.1	<b>8.8</b>	<b>8.7</b>	9.2	9.4	9.9	9.8	9.9
Post-inflammatory Pulmonary Fibrosis	3.4	<b>3.8</b>	<b>4.0</b>	3.5	3.4	3.0	2.4	2.3
Hypothyroidism	26.8	<b>27.5</b>	<b>24.3</b>	27.5	26.8	25.9	25.8	25.5
Thrombocytopenia	2.4	<b>2.7</b>	<b>2.4</b>	2.3	2.2	1.9	1.7	1.6
Collagen Vascular Disease	8.0	<b>7.7</b>	<b>5.8</b>	8.0	8.2	8.0	8.5	8.6
AIDS	0.1	--*	--*	--*	--*	--*	0.0	0.0
Chronic Peptic Ulcer	0.1	--*	--*	--*	0.1	--*	0.1	0.1
Coagulopathy	0.4	<b>0.3</b>	<b>0.4</b>	0.5	0.5	0.4	0.5	0.5
Other Coagulopathy	3.7	<b>4.0</b>	<b>3.8</b>	4.0	3.7	3.3	3.6	3.7
Cushing's Disease	0.0	--*	--*	--*	--*	--*	0.1	0.0
Graves' Disease	0.3	<b>0.3</b>	<b>0.2</b>	0.3	0.2	0.2	0.3	0.3
Hemoglobin Disorder	--*	--*	--*	--*	--*	--*	0.0	0.0

**eTable 7. Complete Matching Tables for Year Match** Displays the covariate balance when new and experienced surgeon patients were paired only on year of admission. Covariates not included in the matching algorithm are displayed below the horizontal line.

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	18,200	18,200	18,200	203,113				
Year of admission (mean)	2011.5	2011.5	2011.5	2011.0	0.47	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
Principal Procedure Categories								
General Surgery								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	-0.01	0.6831
Appendectomy	5.3	5.3	3.9	3.9	0.07	<.0001	0.07	<.0001
Bariatric	0.5	0.5	0.8	0.6	-0.01	0.2398	-0.04	0.0070
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	-0.01	1.0000
Biliary other	--*	--*	0.3	0.4	-0.06	<.0001	-0.05	0.0001
Cholecystectomy	29.8	29.8	24.5	25.4	0.10	<.0001	0.12	<.0001
Colectomy Partial – Lap	9.1	9.1	9.0	10.0	-0.03	0.0044	0.00	0.8821
Colectomy Partial – Open	18.0	18.0	18.2	17.7	0.01	0.4414	0.00	0.7966
Colectomy Total – Lap	0.3	0.3	0.2	0.2	0.02	0.0570	0.02	0.1169
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	0.1	0.2	-0.03	0.0157	-0.02	0.2377
Esophagomyotomy	--*	--*	0.2	0.2	-0.02	0.0563	-0.01	0.4241
Hernia Abdominal – Lap	1.5	1.5	1.3	1.3	0.01	0.3790	0.01	0.3936
Hernia Abdominal – Open	3.3	3.3	5.6	5.3	-0.10	<.0001	-0.11	<.0001
Hernia Groin – Lap	0.4	0.4	0.3	0.5	-0.01	0.2948	0.01	0.7197
Hernia Groin – Open	3.6	3.6	3.4	3.2	0.02	0.0608	0.01	0.5878
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.01	0.7502
Liver Other	--*	--*	0.1	0.1	-0.03	0.0188	-0.05	0.0034
Liver Partial Hepatectomy	0.3	0.3	0.5	0.7	-0.05	<.0001	-0.03	0.0235
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	0.9261
Mastectomy	1.4	1.4	3.0	2.6	-0.09	<.0001	-0.12	<.0001
Pancreatectomy	0.7	0.7	1.7	1.8	-0.09	<.0001	-0.09	<.0001
Parathyroidectomy	0.3	0.3	0.7	0.8	-0.06	<.0001	-0.05	0.0002
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	0.8955
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	0.8329
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.1	0.1	0.01	0.3695	0.01	0.5713
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	0.8719
Small Bowel Resection	8.3	8.3	6.9	6.6	0.07	<.0001	0.05	0.0003
Splenectomy	0.7	0.7	1.0	0.8	-0.01	0.2853	-0.03	0.0384
Stomach Anti-Reflux	0.3	0.3	0.7	1.0	-0.09	<.0001	-0.06	<.0001
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.5	0.5	-0.03	0.0090	-0.03	0.0742
Stomach Other	0.3	0.3	0.4	0.3	-0.01	0.5090	-0.01	0.4492
Stomach Partial Gastrectomy	1.0	1.0	1.4	1.5	-0.04	0.0002	-0.04	0.0076
Stomach Total Gastrectomy	--*	--*	0.3	0.4	-0.07	<.0001	-0.04	0.0005
Thyroidectomy Partial	0.3	0.3	0.6	0.6	-0.06	<.0001	-0.06	0.0001
Thyroidectomy Substernal	--*	--*	0.1	0.1	-0.01	0.4359	-0.02	0.2099
Thyroidectomy Total	0.5	0.5	0.9	0.8	-0.04	0.0001	-0.06	0.0001
Ulcer	1.4	1.4	1.2	1.0	0.04	0.0004	0.02	0.1478
Orthopedic Surgery								
Hip Repair	29.7	29.7	17.1	10.4	0.50	<.0001	0.32	<.0001
Hip Replacement	50.1	50.1	37.4	35.5	0.30	<.0001	0.26	<.0001
Hip Replacement Revision	2.0	2.0	3.0	3.5	-0.09	<.0001	-0.06	0.0001
Knee Replacement	16.8	16.8	39.8	47.3	-0.69	<.0001	-0.52	<.0001
Knee Replacement Revision	1.5	1.5	2.8	3.4	-0.13	<.0001	-0.09	<.0001
Emergent Admission	53.9	53.9	34.7	25.8	0.60	<.0001	0.41	<.0001
Risk Factors & Patient Demographics								

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Age at Admission (years, mean)	79.0	79.0	77.2	77.0	0.25	<.0001	0.22	<.0001
Age 65-69	17.2	17.2	21.6	21.6	-0.11	<.0001	-0.11	<.0001
Age 70-74	19.7	19.7	23.4	23.9	-0.10	<.0001	-0.09	<.0001
Age 75-79	18.7	18.7	20.3	21.2	-0.06	<.0001	-0.04	0.0002
Age 80-84	18.7	18.7	17.0	17.0	0.04	<.0001	0.04	<.0001
Age 85+	25.8	25.8	17.8	16.3	0.24	<.0001	0.20	<.0001
Sex (% female)	63.0	63.0	61.8	62.8	0.00	0.5862	0.02	0.0188
Transfer-in	2.5	2.5	2.0	1.5	0.08	<.0001	0.04	0.0009
Past Admission in Last 6 Months	25.6	25.6	22.9	19.3	0.15	<.0001	0.07	<.0001
Admission after 9/30/2010	87.4	87.4	87.4	68.5	0.47	<.0001	0.00	1.0000
Admission in 2012 or 2013	54.9	54.9	54.9	36.6	0.37	<.0001	0.00	1.0000
Probability of 30-day Death	5.6	5.6	4.2	3.0	0.35	<.0001	0.19	<.0001
Comorbidity Count (mean)	4.1	4.1	3.9	3.5	0.26	<.0001	0.12	<.0001
Same-Day Secondary Procedures								
Major Operative Therapeutic	26.7	26.7	26.5	19.7	0.17	<.0001	0.01	0.6608
Comorbidities								
Congestive Heart Failure	22.2	22.2	18.2	15.2	0.18	<.0001	0.10	<.0001
Past Myocardial Infarction	10.4	10.4	9.5	8.3	0.07	<.0001	0.03	0.0036
Past Arrhythmia	30.5	30.5	29.2	26.9	0.08	<.0001	0.03	0.0050
Angina	4.0	4.0	3.7	3.5	0.02	0.0012	0.01	0.2303
Valvular Disease	23.9	23.9	21.0	19.6	0.10	<.0001	0.07	<.0001
Unstable Angina	1.8	1.8	1.9	1.5	0.02	0.0015	-0.01	0.4875
Hypertension	86.0	86.0	85.2	84.7	0.04	<.0001	0.02	0.0304
Diabetes	32.5	32.5	32.2	30.1	0.05	<.0001	0.01	0.5014
Renal Dysfunction	25.2	25.2	20.8	16.4	0.22	<.0001	0.11	<.0001
Renal Failure	5.6	5.6	4.8	3.7	0.09	<.0001	0.04	0.0004
Liver Disease	10.7	10.7	10.4	7.8	0.10	<.0001	0.01	0.3055
Cancer	36.0	36.0	38.7	34.4	0.03	<.0001	-0.06	<.0001
Specific Abdominal Cancer	1.9	1.9	2.6	2.0	-0.01	0.4093	-0.05	<.0001
Dementia	21.2	21.2	13.8	11.7	0.26	<.0001	0.20	<.0001
Stroke	15.9	15.9	13.0	11.0	0.14	<.0001	0.08	<.0001
Seizure	2.3	2.3	2.0	1.6	0.05	<.0001	0.02	0.0571
Paraplegia	2.9	2.9	2.2	1.7	0.08	<.0001	0.04	0.0001
COPD	27.3	27.3	24.9	21.7	0.13	<.0001	0.06	<.0001
Asthma	9.1	9.1	10.1	9.8	-0.02	0.0021	-0.04	0.0009
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.5	2.8	0.06	<.0001	0.02	0.0414
Hypothyroidism	25.2	25.2	24.5	25.0	0.01	0.4475	0.02	0.0941
Thrombocytopenia	2.9	2.9	2.6	2.3	0.04	<.0001	0.02	0.1111
Collagen Vascular Disease	6.8	6.8	7.4	7.7	-0.04	<.0001	-0.02	0.0429
AIDS	0.1	0.1	0.1	0.1	0.01	0.0569	0.01	0.5845
Chronic Peptic Ulcer	0.2	0.2	0.2	0.2	0.01	0.2543	0.01	0.7160
Coagulopathy	0.4	0.4	0.4	0.5	-0.01	0.1639	0.00	1.0000
Other Coagulopathy	4.5	4.5	4.1	3.9	0.03	0.0002	0.02	0.0823
Cushing's Disease	0.1	0.1	0.1	0.1	0.00	0.7697	-0.02	0.1100
Graves' Disease	0.4	0.4	0.4	0.3	0.00	0.7414	0.00	1.0000
Hemoglobin Disorder	--*	--*	--*	0.0	0.00	1.0000	0.00	1.0000

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 7a. General Surgery Year Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	9,940	9,940	9,940	72,068				
Year of admission (mean)	2011.5	2011.5	2011.5	2010.9	0.48	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
<b>Principal Procedure Categories</b>								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	-0.01	0.6831
Appendectomy	5.3	5.3	3.9	3.9	0.07	<.0001	0.07	<.0001
Bariatric	0.5	0.5	0.8	0.6	-0.01	0.2398	-0.04	0.0070
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	-0.01	1.0000
Biliary other	--*	--*	0.3	0.4	-0.06	<.0001	-0.05	0.0001
Cholecystectomy	29.8	29.8	24.5	25.4	0.10	<.0001	0.12	<.0001
Colectomy Partial – Lap	9.1	9.1	9.0	10.0	-0.03	0.0044	0.00	0.8821
Colectomy Partial – Open	18.0	18.0	18.2	17.7	0.01	0.4414	0.00	0.7966
Colectomy Total – Lap	0.3	0.3	0.2	0.2	0.02	0.0570	0.02	0.1169
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	0.1	0.2	-0.03	0.0157	-0.02	0.2377
Esophagomyotomy	--*	--*	0.2	0.2	-0.02	0.0563	-0.01	0.4241
Hernia Abdominal – Lap	1.5	1.5	1.3	1.3	0.01	0.3790	0.01	0.3936
Hernia Abdominal – Open	3.3	3.3	5.6	5.3	-0.10	<.0001	-0.11	<.0001
Hernia Groin – Lap	0.4	0.4	0.3	0.5	-0.01	0.2948	0.01	0.7197
Hernia Groin – Open	3.6	3.6	3.4	3.2	0.02	0.0608	0.01	0.5878
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.01	0.7502
Liver Other	--*	--*	0.1	0.1	-0.03	0.0188	-0.05	0.0034
Liver Partial Hepatectomy	0.3	0.3	0.5	0.7	-0.05	<.0001	-0.03	0.0235
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	0.9261
Mastectomy	1.4	1.4	3.0	2.6	-0.09	<.0001	-0.12	<.0001
Pancreatectomy	0.7	0.7	1.7	1.8	-0.09	<.0001	-0.09	<.0001
Parathyroidectomy	0.3	0.3	0.7	0.8	-0.06	<.0001	-0.05	0.0002
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	0.8955
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	0.8329
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.1	0.1	0.01	0.3695	0.01	0.5713
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	0.8719
Small Bowel Resection	8.3	8.3	6.9	6.6	0.07	<.0001	0.05	0.0003
Splenectomy	0.7	0.7	1.0	0.8	-0.01	0.2853	-0.03	0.0384
Stomach Anti-Reflux	0.3	0.3	0.7	1.0	-0.09	<.0001	-0.06	<.0001
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.5	0.5	-0.03	0.0090	-0.03	0.0742
Stomach Other	0.3	0.3	0.4	0.3	-0.01	0.5090	-0.01	0.4492
Stomach Partial Gastrectomy	1.0	1.0	1.4	1.5	-0.04	0.0002	-0.04	0.0076
Stomach Total Gastrectomy	--*	--*	0.3	0.4	-0.07	<.0001	-0.04	0.0005
Thyroidectomy Partial	0.3	0.3	0.6	0.6	-0.06	<.0001	-0.06	0.0001
Thyroidectomy Substernal	--*	--*	0.1	0.1	-0.01	0.4359	-0.02	0.2099
Thyroidectomy Total	0.5	0.5	0.9	0.8	-0.04	0.0001	-0.06	0.0001
Ulcer	1.4	1.4	1.2	1.0	0.04	0.0004	0.02	0.1478
Emergent Admission	52.7	52.7	40.5	39.7	0.26	<.0001	0.25	<.0001
<b>Risk Factors &amp; Patient Demographics</b>								
Age at Admission (years, mean)	77.0	77.0	76.6	76.8	0.03	0.0131	0.06	<.0001
Age 65-69	21.6	21.6	23.0	22.3	-0.02	0.1161	-0.04	0.0135
Age 70-74	23.6	23.6	24.6	23.7	0.00	0.8503	-0.02	0.1008
Age 75-79	20.4	20.4	20.9	21.1	-0.02	0.1448	-0.01	0.4512
Age 80-84	17.9	17.9	16.9	17.4	0.01	0.2200	0.03	0.0724
Age 85+	16.5	16.5	14.6	15.6	0.03	0.0172	0.05	0.0002
Sex (% female)	56.5	56.5	57.1	57.2	-0.01	0.1946	-0.01	0.3747
Transfer-in	3.5	3.5	3.1	2.9	0.04	0.0007	0.03	0.0882
Past Admission in Last 6 Months	28.7	28.7	27.8	27.7	0.02	0.0346	0.02	0.1387
Admission after 9/30/2010	86.3	86.3	86.3	67.3	0.46	<.0001	0.00	1.0000

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Admission in 2012 or 2013	53.8	53.8	53.8	34.7	0.39	<.0001	0.00	1.0000
Probability of 30-day Death	6.2	6.2	5.4	5.2	0.12	<.0001	0.09	<.0001
Comorbidity Count (mean)	4.3	4.3	4.2	4.2	0.04	0.0002	0.02	0.1306
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	43.5	43.5	42.8	41.4	0.04	0.0001	0.01	0.3302
Congestive Heart Failure	22.8	22.8	20.3	20.0	0.07	<.0001	0.06	<.0001
Past Myocardial Infarction	11.2	11.2	10.8	10.5	0.02	0.0196	0.01	0.3896
Past Arrhythmia	30.7	30.7	31.0	29.9	0.02	0.1383	-0.01	0.6231
Angina	4.4	4.4	4.1	4.5	0.00	0.7182	0.02	0.2932
Valvular Disease	23.5	23.5	21.7	22.1	0.03	0.0011	0.04	0.0024
Unstable Angina	2.3	2.3	2.5	2.5	-0.01	0.2117	-0.02	0.2272
Hypertension	85.3	85.3	84.6	84.4	0.03	0.0141	0.02	0.1267
Diabetes	35.4	35.4	35.2	34.5	0.02	0.0559	0.01	0.7329
Renal Dysfunction	28.2	28.2	24.6	22.9	0.12	<.0001	0.08	<.0001
Renal Failure	6.5	6.5	6.2	5.8	0.03	0.0052	0.01	0.4000
Liver Disease	16.3	16.3	16.4	16.3	0.00	0.9769	0.00	0.9236
Cancer	43.7	43.7	49.3	50.0	-0.13	<.0001	-0.11	<.0001
Specific Abdominal Cancer	3.1	3.1	4.6	5.3	-0.11	<.0001	-0.07	<.0001
Dementia	13.3	13.3	11.0	10.8	0.08	<.0001	0.07	<.0001
Stroke	14.0	14.0	13.2	12.4	0.05	<.0001	0.03	0.0718
Seizure	2.1	2.1	2.2	1.9	0.02	0.0767	-0.01	0.6962
Paraplegia	2.7	2.7	2.5	2.3	0.03	0.0128	0.01	0.3462
COPD	28.6	28.6	28.3	27.6	0.02	0.0295	0.01	0.6598
Asthma	9.4	9.4	10.4	9.9	-0.02	0.1263	-0.03	0.0224
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.9	3.7	0.01	0.2327	0.00	0.9122
Hypothyroidism	23.3	23.3	23.2	23.4	0.00	0.8596	0.00	0.8535
Thrombocytopenia	3.1	3.1	3.3	3.2	-0.01	0.5041	-0.01	0.4920
Collagen Vascular Disease	6.1	6.1	6.8	6.3	-0.01	0.2906	-0.03	0.0324
AIDS	--*	--*	--*	0.1	0.00	1.0000	0.01	0.7905
Chronic Peptic Ulcer	0.3	0.3	0.2	0.3	-0.01	0.5748	0.01	0.5826
Coagulopathy	0.4	0.4	0.4	0.4	0.00	0.8702	0.01	0.4331
Other Coagulopathy	4.9	4.9	4.7	4.5	0.02	0.0796	0.01	0.6904
Cushing's Disease	--*	--*	0.1	0.1	-0.01	0.3436	-0.02	0.2860
Graves' Disease	0.4	0.4	0.5	0.4	-0.01	0.6195	-0.02	0.2397
Hemoglobin Disorder	--*	--*	--*	0.0	-0.01	0.5015	0.00	1.0000

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 7b. Orthopedic Surgery Year Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	8,260	8,260	8,260	131,045				
Year of admission (mean)	2011.6	2011.6	2011.6	2011.0	0.48	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
Principal Procedure Categories								
Hip Repair	29.7	29.7	17.1	10.4	0.50	<.0001	0.32	<.0001
Hip Replacement	50.1	50.1	37.4	35.5	0.30	<.0001	0.26	<.0001
Hip Replacement Revision	2.0	2.0	3.0	3.5	-0.09	<.0001	-0.06	0.0001
Knee Replacement	16.8	16.8	39.8	47.3	-0.69	<.0001	-0.52	<.0001
Knee Replacement Revision	1.5	1.5	2.8	3.4	-0.13	<.0001	-0.09	<.0001
Emergent Admission	55.3	55.3	27.8	18.2	0.83	<.0001	0.62	<.0001
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	81.3	81.3	78.0	77.1	0.53	<.0001	0.41	<.0001
Age 65-69	11.9	11.9	19.8	21.3	-0.25	<.0001	-0.21	<.0001
Age 70-74	15.0	15.0	21.8	24.0	-0.23	<.0001	-0.17	<.0001
Age 75-79	16.6	16.6	19.5	21.3	-0.12	<.0001	-0.08	<.0001
Age 80-84	19.7	19.7	17.2	16.8	0.08	<.0001	0.07	<.0001
Age 85+	36.9	36.9	21.7	16.6	0.47	<.0001	0.35	<.0001
Sex (% female)	70.9	70.9	67.5	65.9	0.11	<.0001	0.07	<.0001
Transfer-in	1.3	1.3	0.7	0.7	0.07	<.0001	0.06	0.0001
Past Admission in Last 6 Months								
Admission after 9/30/2010	88.7	88.7	88.7	69.2	0.49	<.0001	0.00	1.0000
Admission in 2012 or 2013	56.3	56.3	56.3	37.7	0.38	<.0001	0.00	1.0000
Probability of 30-day Death								
Comorbidity Count (mean)	4.0	4.0	3.5	3.2	0.54	<.0001	0.40	<.0001
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	6.6	6.6	6.9	7.7	-0.04	0.0002	-0.01	0.3518
Congestive Heart Failure								
Past Myocardial Infarction	21.5	21.5	15.8	12.5	0.24	<.0001	0.15	<.0001
Past Arrhythmia	9.4	9.4	7.9	7.1	0.08	<.0001	0.06	0.0004
Angina	30.3	30.3	27.0	25.3	0.11	<.0001	0.08	<.0001
Valvular Disease	3.4	3.4	3.2	2.9	0.03	0.0159	0.01	0.5723
Unstable Angina	24.3	24.3	20.1	18.3	0.15	<.0001	0.10	<.0001
Hypertension	1.3	1.3	1.2	1.0	0.03	0.0067	0.01	0.6270
Diabetes	86.8	86.8	86.0	84.9	0.06	<.0001	0.02	0.1287
Renal Dysfunction	29.0	29.0	28.5	27.7	0.03	0.0121	0.01	0.5360
Renal Failure	21.6	21.6	16.1	12.8	0.23	<.0001	0.15	<.0001
Liver Disease	4.4	4.4	3.0	2.6	0.10	<.0001	0.08	<.0001
Cancer	3.9	3.9	3.1	3.1	0.05	<.0001	0.04	0.0051
Specific Abdominal Cancer	26.7	26.7	25.9	25.8	0.02	0.0782	0.02	0.2507
Dementia	0.5	0.5	0.2	0.2	0.05	<.0001	0.05	0.0036
Stroke	30.8	30.8	17.1	12.2	0.47	<.0001	0.34	<.0001
Seizure	18.1	18.1	12.9	10.3	0.22	<.0001	0.15	<.0001
Paraplegia	2.6	2.6	1.8	1.5	0.08	<.0001	0.05	0.0010
COPD	3.1	3.1	1.9	1.3	0.12	<.0001	0.08	<.0001
Asthma	25.8	25.8	20.9	18.5	0.18	<.0001	0.12	<.0001
Post-inflammatory Pulmonary Fibrosis	8.8	8.8	9.9	9.8	-0.03	0.0028	-0.04	0.0172
Hypothyroidism	3.8	3.8	3.0	2.4	0.08	<.0001	0.05	0.0030
Thrombocytopenia	27.5	27.5	25.9	25.8	0.04	0.0008	0.03	0.0267
Collagen Vascular Disease	2.7	2.7	1.9	1.7	0.07	<.0001	0.06	0.0004
AIDS	7.7	7.7	8.0	8.5	-0.03	0.0120	-0.01	0.4873
Chronic Peptic Ulcer	--*	--*	--*	0.0	0.02	0.0156	0.01	0.8035
Coagulopathy	--*	--*	--*	0.1	0.01	0.5189	0.00	1.0000
Other Coagulopathy	0.3	0.3	0.4	0.5	-0.03	0.0287	-0.02	0.3573
Cushing's Disease	4.0	4.0	3.3	3.6	0.02	0.0677	0.03	0.0248
	--*	--*	--*	0.1	0.00	1.0000	-0.02	0.3436

<b>Covariate (percent unless noted)</b>	<b>All New Surgeon Patients before Match</b>	<b>Matched New Surgeon Patients</b>	<b>Matched Exp. Surgeon Patients</b>	<b>All Exp. Surgeon Patients before Match</b>	<b>Stand Diff before Match</b>	<b>P before Match</b>	<b>Stand Diff after Match</b>	<b>P after Match</b>
Graves' Disease	0.3	0.3	0.2	0.3	0.01	0.6043	0.02	0.1258
Hemoglobin Disorder	--*	--*	--*	0.0	0.01	0.3563	-0.01	1.0000

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.



**eTable 8. Complete Matching Tables for Operation Match** Displays the covariate balance when new and experienced surgeon patients were paired only on year of admission and procedure. Covariates not included in the matching algorithm are displayed below the horizontal line.

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	18,200	18,200	18,200	203,113				
Year of admission (mean)	2011.5	2011.5	2011.5	2011.0	0.47	<.0001	0.00	0.8588
Principal Procedure Categories								
General Surgery								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	0.00	1.0000
Appendectomy	5.3	5.3	5.3	3.9	0.07	<.0001	0.00	1.0000
Bariatric	0.5	0.5	0.5	0.6	-0.01	0.2398	0.00	1.0000
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	0.00	1.0000
Biliary other	--*	--*	--*	0.4	-0.06	<.0001	0.00	1.0000
Cholecystectomy	29.8	29.8	29.8	25.4	0.10	<.0001	0.00	1.0000
Colectomy Partial – Lap	9.1	9.1	9.1	10.0	-0.03	0.0044	0.00	1.0000
Colectomy Partial – Open	18.0	18.0	18.0	17.7	0.01	0.4414	0.00	1.0000
Colectomy Total – Lap	0.3	0.3	0.3	0.2	0.02	0.0570	0.00	1.0000
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	--*	0.2	-0.03	0.0157	0.00	1.0000
Esophagomyotomy	--*	--*	--*	0.2	-0.02	0.0563	0.00	1.0000
Hernia Abdominal – Lap	1.5	1.5	1.5	1.3	0.01	0.3790	0.00	1.0000
Hernia Abdominal – Open	3.3	3.3	3.3	5.3	-0.10	<.0001	0.00	1.0000
Hernia Groin – Lap	0.4	0.4	0.4	0.5	-0.01	0.2948	0.00	1.0000
Hernia Groin – Open	3.6	3.6	3.6	3.2	0.02	0.0608	0.00	1.0000
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.00	1.0000
Liver Other	--*	--*	--*	0.1	-0.03	0.0188	0.00	1.0000
Liver Partial Hepatectomy	0.3	0.3	0.3	0.7	-0.05	<.0001	0.00	1.0000
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	1.0000
Mastectomy	1.4	1.4	1.4	2.6	-0.09	<.0001	0.00	1.0000
Pancreatectomy	0.7	0.7	0.7	1.8	-0.09	<.0001	0.00	1.0000
Parathyroidectomy	0.3	0.3	0.3	0.8	-0.06	<.0001	0.00	1.0000
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	1.0000
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	1.0000
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.2	0.1	0.01	0.3695	0.00	1.0000
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	1.0000
Small Bowel Resection	8.3	8.3	8.3	6.6	0.07	<.0001	0.00	1.0000
Splenectomy	0.7	0.7	0.7	0.8	-0.01	0.2853	0.00	1.0000
Stomach Anti-Reflux	0.3	0.3	0.3	1.0	-0.09	<.0001	0.00	1.0000
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.3	0.5	-0.03	0.0090	0.00	1.0000
Stomach Other	0.3	0.3	0.3	0.3	-0.01	0.5090	0.00	1.0000
Stomach Partial Gastrectomy	1.0	1.0	1.0	1.5	-0.04	0.0002	0.00	1.0000
Stomach Total Gastrectomy	--*	--*	--*	0.4	-0.07	<.0001	0.00	1.0000
Thyroidectomy Partial	0.3	0.3	0.3	0.6	-0.06	<.0001	0.00	1.0000
Thyroidectomy Substernal	--*	--*	--*	0.1	-0.01	0.4359	0.00	1.0000
Thyroidectomy Total	0.5	0.5	0.5	0.8	-0.04	0.0001	0.00	1.0000
Ulcer	1.4	1.4	1.4	1.0	0.04	0.0004	0.00	1.0000
Orthopedic Surgery								
Hip Repair	29.7	29.7	29.7	10.4	0.50	<.0001	0.00	1.0000
Hip Replacement	50.1	50.1	50.1	35.5	0.30	<.0001	0.00	1.0000
Hip Replacement Revision	2.0	2.0	2.0	3.5	-0.09	<.0001	0.00	1.0000
Knee Replacement	16.8	16.8	16.8	47.3	-0.69	<.0001	0.00	1.0000
Knee Replacement Revision	1.5	1.5	1.5	3.4	-0.13	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
Emergent Admission	53.9	53.9	43.0	25.8	0.60	<.0001	0.23	<.0001
Risk Factors & Patient Demographics								

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Age at Admission (years, mean)	79.0	79.0	78.2	77.0	0.25	<.0001	0.09	<.0001
Age 65-69	17.2	17.2	19.0	21.6	-0.11	<.0001	-0.05	<.0001
Age 70-74	19.7	19.7	21.2	23.9	-0.10	<.0001	-0.04	0.0005
Age 75-79	18.7	18.7	19.5	21.2	-0.06	<.0001	-0.02	0.0484
Age 80-84	18.7	18.7	18.5	17.0	0.04	<.0001	0.01	0.6374
Age 85+	25.8	25.8	21.9	16.3	0.24	<.0001	0.10	<.0001
Sex (% female)	63.0	63.0	61.9	62.8	0.00	0.5862	0.02	0.0296
Transfer-in	2.5	2.5	2.2	1.5	0.08	<.0001	0.02	0.0499
Past Admission in Last 6 Months	25.6	25.6	24.1	19.3	0.15	<.0001	0.04	0.0005
Admission after 9/30/2010	87.4	87.4	87.4	68.5	0.47	<.0001	0.00	1.0000
Admission in 2012 or 2013	54.9	54.9	54.9	36.6	0.37	<.0001	0.00	0.9078
Probability of 30-day Death	5.6	5.6	4.7	3.0	0.35	<.0001	0.12	<.0001
Comorbidity Count (mean)	4.1	4.1	4.0	3.5	0.26	<.0001	0.07	<.0001
Same-Day Secondary Procedures								
Major Operative Therapeutic	26.7	26.7	25.8	19.7	0.17	<.0001	0.02	0.0404
Comorbidities								
Congestive Heart Failure	22.2	22.2	19.9	15.2	0.18	<.0001	0.06	<.0001
Past Myocardial Infarction	10.4	10.4	10.0	8.3	0.07	<.0001	0.01	0.2060
Past Arrhythmia	30.5	30.5	30.0	26.9	0.08	<.0001	0.01	0.3099
Angina	4.0	4.0	3.6	3.5	0.02	0.0012	0.02	0.0838
Valvular Disease	23.9	23.9	22.4	19.6	0.10	<.0001	0.04	0.0005
Unstable Angina	1.8	1.8	2.1	1.5	0.02	0.0015	-0.02	0.1382
Hypertension	86.0	86.0	85.1	84.7	0.04	<.0001	0.03	0.0171
Diabetes	32.5	32.5	32.0	30.1	0.05	<.0001	0.01	0.2573
Renal Dysfunction	25.2	25.2	21.5	16.4	0.22	<.0001	0.09	<.0001
Renal Failure	5.6	5.6	5.1	3.7	0.09	<.0001	0.03	0.0249
Liver Disease	10.7	10.7	10.7	7.8	0.10	<.0001	0.00	0.9325
Cancer	36.0	36.0	37.6	34.4	0.03	<.0001	-0.03	0.0023
Specific Abdominal Cancer	1.9	1.9	2.0	2.0	-0.01	0.4093	-0.01	0.5228
Dementia	21.2	21.2	16.7	11.7	0.26	<.0001	0.12	<.0001
Stroke	15.9	15.9	14.1	11.0	0.14	<.0001	0.05	<.0001
Seizure	2.3	2.3	2.0	1.6	0.05	<.0001	0.03	0.0153
Paraplegia	2.9	2.9	2.5	1.7	0.08	<.0001	0.02	0.0375
COPD	27.3	27.3	26.4	21.7	0.13	<.0001	0.02	0.0396
Asthma	9.1	9.1	9.9	9.8	-0.02	0.0021	-0.03	0.0117
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.6	2.8	0.06	<.0001	0.01	0.2133
Hypothyroidism	25.2	25.2	25.2	25.0	0.01	0.4475	0.00	0.9519
Thrombocytopenia	2.9	2.9	2.9	2.3	0.04	<.0001	0.00	0.9503
Collagen Vascular Disease	6.8	6.8	7.3	7.7	-0.04	<.0001	-0.02	0.0544
AIDS	0.1	0.1	0.1	0.1	0.01	0.0569	0.01	0.7200
Chronic Peptic Ulcer	0.2	0.2	0.2	0.2	0.01	0.2543	0.00	0.9049
Coagulopathy	0.4	0.4	0.5	0.5	-0.01	0.1639	-0.02	0.1116
Other Coagulopathy	4.5	4.5	4.2	3.9	0.03	0.0002	0.01	0.2064
Cushing's Disease	0.1	0.1	0.1	0.1	0.00	0.7697	-0.01	0.4419
Graves' Disease	0.4	0.4	0.3	0.3	0.00	0.7414	0.01	0.4665
Hemoglobin Disorder	--*	--*	--*	0.0	0.00	1.0000	-0.01	0.5078

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 8a. General Surgery Operation Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	9,940	9,940	9,940	72,068				
Year of admission (mean)	2011.5	2011.5	2011.5	2010.9	0.48	<.0001	0.00	0.8102
Principal Procedure Categories								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	0.00	1.0000
Appendectomy	5.3	5.3	5.3	3.9	0.07	<.0001	0.00	1.0000
Bariatric	0.5	0.5	0.5	0.6	-0.01	0.2398	0.00	1.0000
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	0.00	1.0000
Biliary other	--*	--*	--*	0.4	-0.06	<.0001	0.00	1.0000
Cholecystectomy	29.8	29.8	29.8	25.4	0.10	<.0001	0.00	1.0000
Colectomy Partial – Lap	9.1	9.1	9.1	10.0	-0.03	0.0044	0.00	1.0000
Colectomy Partial – Open	18.0	18.0	18.0	17.7	0.01	0.4414	0.00	1.0000
Colectomy Total – Lap	0.3	0.3	0.3	0.2	0.02	0.0570	0.00	1.0000
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	--*	0.2	-0.03	0.0157	0.00	1.0000
Esophagomyotomy	--*	--*	--*	0.2	-0.02	0.0563	0.00	1.0000
Hernia Abdominal – Lap	1.5	1.5	1.5	1.3	0.01	0.3790	0.00	1.0000
Hernia Abdominal – Open	3.3	3.3	3.3	5.3	-0.10	<.0001	0.00	1.0000
Hernia Groin – Lap	0.4	0.4	0.4	0.5	-0.01	0.2948	0.00	1.0000
Hernia Groin – Open	3.6	3.6	3.6	3.2	0.02	0.0608	0.00	1.0000
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.00	1.0000
Liver Other	--*	--*	--*	0.1	-0.03	0.0188	0.00	1.0000
Liver Partial Hepatectomy	0.3	0.3	0.3	0.7	-0.05	<.0001	0.00	1.0000
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	1.0000
Mastectomy	1.4	1.4	1.4	2.6	-0.09	<.0001	0.00	1.0000
Pancreatectomy	0.7	0.7	0.7	1.8	-0.09	<.0001	0.00	1.0000
Parathyroidectomy	0.3	0.3	0.3	0.8	-0.06	<.0001	0.00	1.0000
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	1.0000
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	1.0000
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.2	0.1	0.01	0.3695	0.00	1.0000
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	1.0000
Small Bowel Resection	8.3	8.3	8.3	6.6	0.07	<.0001	0.00	1.0000
Splenectomy	0.7	0.7	0.7	0.8	-0.01	0.2853	0.00	1.0000
Stomach Anti-Reflux	0.3	0.3	0.3	1.0	-0.09	<.0001	0.00	1.0000
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.3	0.5	-0.03	0.0090	0.00	1.0000
Stomach Other	0.3	0.3	0.3	0.3	-0.01	0.5090	0.00	1.0000
Stomach Partial Gastrectomy	1.0	1.0	1.0	1.5	-0.04	0.0002	0.00	1.0000
Stomach Total Gastrectomy	--*	--*	--*	0.4	-0.07	<.0001	0.00	1.0000
Thyroidectomy Partial	0.3	0.3	0.3	0.6	-0.06	<.0001	0.00	1.0000
Thyroidectomy Substernal	--*	--*	--*	0.1	-0.01	0.4359	0.00	1.0000
Thyroidectomy Total	0.5	0.5	0.5	0.8	-0.04	0.0001	0.00	1.0000
Ulcer	1.4	1.4	1.4	1.0	0.04	0.0004	0.00	1.0000
<b>Unmatched Covariates</b>								
Emergent Admission	52.7	52.7	44.9	39.7	0.26	<.0001	0.16	<.0001
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	77.0	77.0	76.9	76.8	0.03	0.0131	0.02	0.1238
Age 65-69	21.6	21.6	22.1	22.3	-0.02	0.1161	-0.01	0.3278
Age 70-74	23.6	23.6	23.8	23.7	0.00	0.8503	0.00	0.7514
Age 75-79	20.4	20.4	21.1	21.1	-0.02	0.1448	-0.02	0.2277
Age 80-84	17.9	17.9	17.4	17.4	0.01	0.2200	0.01	0.4347
Age 85+	16.5	16.5	15.5	15.6	0.03	0.0172	0.03	0.0442
Sex (% female)	56.5	56.5	55.5	57.2	-0.01	0.1946	0.02	0.1702
Transfer-in	3.5	3.5	3.2	2.9	0.04	0.0007	0.02	0.2231
Past Admission in Last 6 Months	28.7	28.7	27.9	27.7	0.02	0.0346	0.02	0.1860
Admission after 9/30/2010	86.3	86.3	86.3	67.3	0.46	<.0001	0.00	1.0000

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Admission in 2012 or 2013	53.8	53.8	53.7	34.7	0.39	<.0001	0.00	0.8757
Probability of 30-day Death	6.2	6.2	5.6	5.2	0.12	<.0001	0.08	<.0001
Comorbidity Count (mean)	4.3	4.3	4.2	4.2	0.04	0.0002	0.02	0.1055
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	43.5	43.5	42.2	41.4	0.04	0.0001	0.03	0.0755
Congestive Heart Failure	22.8	22.8	20.9	20.0	0.07	<.0001	0.05	0.0014
Past Myocardial Infarction	11.2	11.2	11.1	10.5	0.02	0.0196	0.01	0.7184
Past Arrhythmia	30.7	30.7	31.1	29.9	0.02	0.1383	-0.01	0.5391
Angina	4.4	4.4	4.1	4.5	0.00	0.7182	0.01	0.3271
Valvular Disease	23.5	23.5	22.2	22.1	0.03	0.0011	0.03	0.0282
Unstable Angina	2.3	2.3	2.7	2.5	-0.01	0.2117	-0.03	0.0325
Hypertension	85.3	85.3	84.3	84.4	0.03	0.0141	0.03	0.0362
Diabetes	35.4	35.4	35.1	34.5	0.02	0.0559	0.01	0.6454
Renal Dysfunction	28.2	28.2	24.6	22.9	0.12	<.0001	0.08	<.0001
Renal Failure	6.5	6.5	6.2	5.8	0.03	0.0052	0.01	0.3525
Liver Disease	16.3	16.3	16.9	16.3	0.00	0.9769	-0.01	0.3310
Cancer	43.7	43.7	47.5	50.0	-0.13	<.0001	-0.08	<.0001
Specific Abdominal Cancer	3.1	3.1	3.4	5.3	-0.11	<.0001	-0.02	0.2156
Dementia	13.3	13.3	11.3	10.8	0.08	<.0001	0.06	<.0001
Stroke	14.0	14.0	13.5	12.4	0.05	<.0001	0.02	0.2845
Seizure	2.1	2.1	1.9	1.9	0.02	0.0767	0.02	0.2876
Paraplegia	2.7	2.7	2.5	2.3	0.03	0.0128	0.01	0.3701
COPD	28.6	28.6	28.5	27.6	0.02	0.0295	0.00	0.9374
Asthma	9.4	9.4	10.3	9.9	-0.02	0.1263	-0.03	0.0268
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.8	3.7	0.01	0.2327	0.00	0.7680
Hypothyroidism	23.3	23.3	23.8	23.4	0.00	0.8596	-0.01	0.4322
Thrombocytopenia	3.1	3.1	3.5	3.2	-0.01	0.5041	-0.02	0.1035
Collagen Vascular Disease	6.1	6.1	6.6	6.3	-0.01	0.2906	-0.02	0.1093
AIDS	--*	--*	--*	0.1	0.00	1.0000	0.00	1.0000
Chronic Peptic Ulcer	0.3	0.3	0.2	0.3	-0.01	0.5748	0.01	0.4879
Coagulopathy	0.4	0.4	0.5	0.4	0.00	0.8702	-0.01	0.6054
Other Coagulopathy	4.9	4.9	4.6	4.5	0.02	0.0796	0.01	0.4228
Cushing's Disease	--*	--*	0.1	0.1	-0.01	0.3436	-0.01	0.6474
Graves' Disease	0.4	0.4	0.4	0.4	-0.01	0.6195	0.00	1.0000
Hemoglobin Disorder	--*	--*	--*	0.0	-0.01	0.5015	0.00	1.0000

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 8b. Orthopedic Surgery Operation Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	8,260	8,260	8,260	131,045				
Year of admission (mean)	2011.6	2011.6	2011.6	2011.0	0.48	<.0001	0.00	1.0000
Principal Procedure Categories								
Hip Repair	29.7	29.7	29.7	10.4	0.50	<.0001	0.00	1.0000
Hip Replacement	50.1	50.1	50.1	35.5	0.30	<.0001	0.00	1.0000
Hip Replacement Revision	2.0	2.0	2.0	3.5	-0.09	<.0001	0.00	1.0000
Knee Replacement	16.8	16.8	16.8	47.3	-0.69	<.0001	0.00	1.0000
Knee Replacement Revision	1.5	1.5	1.5	3.4	-0.13	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
Emergent Admission	55.3	55.3	40.8	18.2	0.83	<.0001	0.33	<.0001
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	81.3	81.3	79.9	77.1	0.53	<.0001	0.18	<.0001
Age 65-69	11.9	11.9	15.1	21.3	-0.25	<.0001	-0.09	<.0001
Age 70-74	15.0	15.0	18.0	24.0	-0.23	<.0001	-0.08	<.0001
Age 75-79	16.6	16.6	17.5	21.3	-0.12	<.0001	-0.02	0.1066
Age 80-84	19.7	19.7	19.8	16.8	0.08	<.0001	0.00	0.9067
Age 85+	36.9	36.9	29.6	16.6	0.47	<.0001	0.17	<.0001
Sex (% female)	70.9	70.9	69.7	65.9	0.11	<.0001	0.03	0.0766
Transfer-in	1.3	1.3	1.0	0.7	0.07	<.0001	0.03	0.0722
Past Admission in Last 6 Months	21.9	21.9	19.4	14.7	0.19	<.0001	0.06	0.0001
Admission after 9/30/2010	88.7	88.7	88.7	69.2	0.49	<.0001	0.00	1.0000
Admission in 2012 or 2013	56.3	56.3	56.3	37.7	0.38	<.0001	0.00	1.0000
Probability of 30-day Death	4.8	4.8	3.7	1.8	0.54	<.0001	0.20	<.0001
Comorbidity Count (mean)	4.0	4.0	3.7	3.2	0.36	<.0001	0.14	<.0001
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	6.6	6.6	6.0	7.7	-0.04	0.0002	0.02	0.1311
Congestive Heart Failure	21.5	21.5	18.6	12.5	0.24	<.0001	0.08	<.0001
Past Myocardial Infarction	9.4	9.4	8.7	7.1	0.08	<.0001	0.03	0.1288
Past Arrhythmia	30.3	30.3	28.8	25.3	0.11	<.0001	0.04	0.0266
Angina	3.4	3.4	3.0	2.9	0.03	0.0159	0.02	0.1322
Valvular Disease	24.3	24.3	22.5	18.3	0.15	<.0001	0.04	0.0066
Unstable Angina	1.3	1.3	1.2	1.0	0.03	0.0067	0.01	0.6270
Hypertension	86.8	86.8	86.1	84.9	0.06	<.0001	0.02	0.2282
Diabetes	29.0	29.0	28.1	27.7	0.03	0.0121	0.02	0.2346
Renal Dysfunction	21.6	21.6	17.8	12.8	0.23	<.0001	0.10	<.0001
Renal Failure	4.4	4.4	3.7	2.6	0.10	<.0001	0.04	0.0129
Liver Disease	3.9	3.9	3.3	3.1	0.05	<.0001	0.03	0.0608
Cancer	26.7	26.7	25.6	25.8	0.02	0.0782	0.03	0.0996
Specific Abdominal Cancer	0.5	0.5	0.4	0.2	0.05	<.0001	0.03	0.1293
Dementia	30.8	30.8	23.2	12.2	0.47	<.0001	0.19	<.0001
Stroke	18.1	18.1	14.8	10.3	0.22	<.0001	0.10	<.0001
Seizure	2.6	2.6	2.0	1.5	0.08	<.0001	0.04	0.0197
Paraplegia	3.1	3.1	2.5	1.3	0.12	<.0001	0.04	0.0423
COPD	25.8	25.8	23.8	18.5	0.18	<.0001	0.05	0.0025
Asthma	8.8	8.8	9.4	9.8	-0.03	0.0028	-0.02	0.2028
Post-inflammatory Pulmonary Fibrosis	3.8	3.8	3.4	2.4	0.08	<.0001	0.03	0.1321
Hypothyroidism	27.5	27.5	26.8	25.8	0.04	0.0008	0.01	0.3539
Thrombocytopenia	2.7	2.7	2.2	1.7	0.07	<.0001	0.04	0.0267
Collagen Vascular Disease	7.7	7.7	8.2	8.5	-0.03	0.0120	-0.02	0.2737
AIDS	--*	--*	--*	0.0	0.02	0.0156	0.01	0.8035
Chronic Peptic Ulcer	--*	--*	0.1	0.1	0.01	0.5189	-0.02	0.4804
Coagulopathy	0.3	0.3	0.5	0.5	-0.03	0.0287	-0.03	0.0811
Other Coagulopathy	4.0	4.0	3.7	3.6	0.02	0.0677	0.02	0.3300
Cushing's Disease	--*	--*	--*	0.1	0.00	1.0000	-0.01	0.7265

<b>Covariate (percent unless noted)</b>	<b>All New Surgeon Patients before Match</b>	<b>Matched New Surgeon Patients</b>	<b>Matched Exp. Surgeon Patients</b>	<b>All Exp. Surgeon Patients before Match</b>	<b>Stand Diff before Match</b>	<b>P before Match</b>	<b>Stand Diff after Match</b>	<b>P after Match</b>
Graves' Disease	0.3	0.3	0.2	0.3	0.01	0.6043	0.02	0.3013
Hemoglobin Disorder	--*	--*	--*	0.0	0.01	0.3563	-0.03	0.4530

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 9. Complete Matching Tables for Emergent Status Match** Displays the covariate balance when new and experienced surgeon patients were paired only on year of admission, procedure, and emergent status. Covariates not included in the matching algorithm are displayed below the horizontal line.

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	18,200	18,200	18,200	203,113				
Year of admission (mean)	2011.5	2011.5	2011.5	2011.0	0.47	<.0001	0.00	0.7644
Principal Procedure Categories								
General Surgery								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	0.00	1.0000
Appendectomy	5.3	5.3	5.3	3.9	0.07	<.0001	0.00	1.0000
Bariatric	0.5	0.5	0.5	0.6	-0.01	0.2398	0.00	1.0000
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	0.00	1.0000
Biliary other	--*	--*	--*	0.4	-0.06	<.0001	0.00	1.0000
Cholecystectomy	29.8	29.8	29.8	25.4	0.10	<.0001	0.00	1.0000
Colectomy Partial – Lap	9.1	9.1	9.1	10.0	-0.03	0.0044	0.00	1.0000
Colectomy Partial – Open	18.0	18.0	18.0	17.7	0.01	0.4414	0.00	1.0000
Colectomy Total – Lap	0.3	0.3	0.3	0.2	0.02	0.0570	0.00	1.0000
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	--*	0.2	-0.03	0.0157	0.00	1.0000
Esophagomyotomy	--*	--*	--*	0.2	-0.02	0.0563	0.00	1.0000
Hernia Abdominal – Lap	1.5	1.5	1.5	1.3	0.01	0.3790	0.00	1.0000
Hernia Abdominal – Open	3.3	3.3	3.3	5.3	-0.10	<.0001	0.00	1.0000
Hernia Groin – Lap	0.4	0.4	0.4	0.5	-0.01	0.2948	0.00	1.0000
Hernia Groin – Open	3.6	3.6	3.6	3.2	0.02	0.0608	0.00	1.0000
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.00	1.0000
Liver Other	--*	--*	--*	0.1	-0.03	0.0188	0.00	1.0000
Liver Partial Hepatectomy	0.3	0.3	0.3	0.7	-0.05	<.0001	0.00	1.0000
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	1.0000
Mastectomy	1.4	1.4	1.4	2.6	-0.09	<.0001	0.00	1.0000
Pancreatectomy	0.7	0.7	0.7	1.8	-0.09	<.0001	0.00	1.0000
Parathyroidectomy	0.3	0.3	0.3	0.8	-0.06	<.0001	0.00	1.0000
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	1.0000
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	1.0000
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.2	0.1	0.01	0.3695	0.00	1.0000
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	1.0000
Small Bowel Resection	8.3	8.3	8.3	6.6	0.07	<.0001	0.00	1.0000
Splenectomy	0.7	0.7	0.7	0.8	-0.01	0.2853	0.00	1.0000
Stomach Anti-Reflux	0.3	0.3	0.3	1.0	-0.09	<.0001	0.00	1.0000
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.3	0.5	-0.03	0.0090	0.00	1.0000
Stomach Other	0.3	0.3	0.3	0.3	-0.01	0.5090	0.00	1.0000
Stomach Partial Gastrectomy	1.0	1.0	1.0	1.5	-0.04	0.0002	0.00	1.0000
Stomach Total Gastrectomy	--*	--*	--*	0.4	-0.07	<.0001	0.00	1.0000
Thyroidectomy Partial	0.3	0.3	0.3	0.6	-0.06	<.0001	0.00	1.0000
Thyroidectomy Substernal	--*	--*	--*	0.1	-0.01	0.4359	0.00	1.0000
Thyroidectomy Total	0.5	0.5	0.5	0.8	-0.04	0.0001	0.00	1.0000
Ulcer	1.4	1.4	1.4	1.0	0.04	0.0004	0.00	1.0000
Orthopedic Surgery								
Hip Repair	29.7	29.7	29.7	10.4	0.50	<.0001	0.00	1.0000
Hip Replacement	50.1	50.1	50.1	35.5	0.30	<.0001	0.00	1.0000
Hip Replacement Revision	2.0	2.0	2.0	3.5	-0.09	<.0001	0.00	1.0000
Knee Replacement	16.8	16.8	16.8	47.3	-0.69	<.0001	0.00	1.0000
Knee Replacement Revision	1.5	1.5	1.5	3.4	-0.13	<.0001	0.00	1.0000
Emergent Admission	53.9	53.9	53.9	25.8	0.60	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
Risk Factors & Patient Demographics								

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Age at Admission (years, mean)	79.0	79.0	78.7	77.0	0.25	<.0001	0.04	0.0006
Age 65-69	17.2	17.2	18.1	21.6	-0.11	<.0001	-0.02	0.0187
Age 70-74	19.7	19.7	19.9	23.9	-0.10	<.0001	0.00	0.6358
Age 75-79	18.7	18.7	19.1	21.2	-0.06	<.0001	-0.01	0.2841
Age 80-84	18.7	18.7	18.8	17.0	0.04	<.0001	0.00	0.7883
Age 85+	25.8	25.8	24.1	16.3	0.24	<.0001	0.04	0.0002
Sex (% female)	63.0	63.0	62.5	62.8	0.00	0.5862	0.01	0.3455
Transfer-in	2.5	2.5	1.9	1.5	0.08	<.0001	0.05	<.0001
Past Admission in Last 6 Months	25.6	25.6	24.5	19.3	0.15	<.0001	0.03	0.0132
Admission after 9/30/2010	87.4	87.4	87.4	68.5	0.47	<.0001	0.00	1.0000
Admission in 2012 or 2013	54.9	54.9	54.8	36.6	0.37	<.0001	0.00	0.8414
Probability of 30-day Death	5.6	5.6	5.2	3.0	0.35	<.0001	0.06	<.0001
Comorbidity Count (mean)	4.1	4.1	4.0	3.5	0.26	<.0001	0.04	<.0001
Same-Day Secondary Procedures								
Major Operative Therapeutic	26.7	26.7	25.6	19.7	0.17	<.0001	0.03	0.0131
Comorbidities								
Congestive Heart Failure	22.2	22.2	20.5	15.2	0.18	<.0001	0.04	0.0001
Past Myocardial Infarction	10.4	10.4	9.9	8.3	0.07	<.0001	0.02	0.0954
Past Arrhythmia	30.5	30.5	30.3	26.9	0.08	<.0001	0.01	0.6001
Angina	4.0	4.0	3.5	3.5	0.02	0.0012	0.02	0.0292
Valvular Disease	23.9	23.9	22.8	19.6	0.10	<.0001	0.03	0.0163
Unstable Angina	1.8	1.8	2.0	1.5	0.02	0.0015	-0.01	0.4411
Hypertension	86.0	86.0	85.1	84.7	0.04	<.0001	0.02	0.0178
Diabetes	32.5	32.5	31.9	30.1	0.05	<.0001	0.01	0.2301
Renal Dysfunction	25.2	25.2	22.6	16.4	0.22	<.0001	0.06	<.0001
Renal Failure	5.6	5.6	5.2	3.7	0.09	<.0001	0.02	0.0772
Liver Disease	10.7	10.7	10.8	7.8	0.10	<.0001	0.00	0.7478
Cancer	36.0	36.0	37.4	34.4	0.03	<.0001	-0.03	0.0059
Specific Abdominal Cancer	1.9	1.9	2.0	2.0	-0.01	0.4093	0.00	0.9697
Dementia	21.2	21.2	18.4	11.7	0.26	<.0001	0.08	<.0001
Stroke	15.9	15.9	15.1	11.0	0.14	<.0001	0.02	0.0522
Seizure	2.3	2.3	2.1	1.6	0.05	<.0001	0.01	0.2421
Paraplegia	2.9	2.9	2.7	1.7	0.08	<.0001	0.01	0.3543
COPD	27.3	27.3	26.7	21.7	0.13	<.0001	0.01	0.2024
Asthma	9.1	9.1	9.7	9.8	-0.02	0.0021	-0.02	0.0695
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.8	2.8	0.06	<.0001	0.01	0.6219
Hypothyroidism	25.2	25.2	25.4	25.0	0.01	0.4475	-0.01	0.6383
Thrombocytopenia	2.9	2.9	2.9	2.3	0.04	<.0001	0.00	0.8270
Collagen Vascular Disease	6.8	6.8	7.3	7.7	-0.04	<.0001	-0.02	0.0683
AIDS	0.1	0.1	0.1	0.1	0.01	0.0569	0.00	0.8600
Chronic Peptic Ulcer	0.2	0.2	0.2	0.2	0.01	0.2543	0.00	0.8098
Coagulopathy	0.4	0.4	0.5	0.5	-0.01	0.1639	-0.01	0.2906
Other Coagulopathy	4.5	4.5	4.4	3.9	0.03	0.0002	0.00	0.7209
Cushing's Disease	0.1	0.1	0.1	0.1	0.00	0.7697	-0.01	0.4419
Graves' Disease	0.4	0.4	0.3	0.3	0.00	0.7414	0.01	0.4665
Hemoglobin Disorder	--*	--*	--*	0.0	0.00	1.0000	-0.02	0.1459

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.



**eTable 9a. General Surgery Emergent Status Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	9,940	9,940	9,940	72,068				
Year of admission (mean)	2011.5	2011.5	2011.5	2010.9	0.48	<.0001	0.01	0.6858
Principal Procedure Categories								
Adrenalectomy								
Appendectomy	0.3	0.3	0.3	0.3	0.00	0.8358	0.00	1.0000
Bariatric	5.3	5.3	5.3	3.9	0.07	<.0001	0.00	1.0000
Biliary common duct	0.5	0.5	0.5	0.6	-0.01	0.2398	0.00	1.0000
Biliary other	--*	--*	--*	0.1	-0.01	0.6182	0.00	1.0000
Cholecystectomy	--*	--*	--*	0.4	-0.06	<.0001	0.00	1.0000
Colectomy Partial – Lap	29.8	29.8	29.8	25.4	0.10	<.0001	0.00	1.0000
Colectomy Partial – Open	9.1	9.1	9.1	10.0	-0.03	0.0044	0.00	1.0000
Colectomy Total – Lap	18.0	18.0	18.0	17.7	0.01	0.4414	0.00	1.0000
Colectomy Total – Open	0.3	0.3	0.3	0.2	0.02	0.0570	0.00	1.0000
Esophagectomy	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagomyotomy	--*	--*	--*	0.2	-0.03	0.0157	0.00	1.0000
Hernia Abdominal – Lap	--*	--*	--*	0.2	-0.02	0.0563	0.00	1.0000
Hernia Abdominal – Open	1.5	1.5	1.5	1.3	0.01	0.3790	0.00	1.0000
Hernia Groin – Lap	3.3	3.3	3.3	5.3	-0.10	<.0001	0.00	1.0000
Hernia Groin – Open	0.4	0.4	0.4	0.5	-0.01	0.2948	0.00	1.0000
Large Bowel Other	3.6	3.6	3.6	3.2	0.02	0.0608	0.00	1.0000
Liver Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.00	1.0000
Liver Partial Hepatectomy	--*	--*	--*	0.1	-0.03	0.0188	0.00	1.0000
Lysis of Adhesions	0.3	0.3	0.3	0.7	-0.05	<.0001	0.00	1.0000
Mastectomy	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	1.0000
Pancreatectomy	1.4	1.4	1.4	2.6	-0.09	<.0001	0.00	1.0000
Parathyroidectomy	0.7	0.7	0.7	1.8	-0.09	<.0001	0.00	1.0000
PD Access Procedure	0.3	0.3	0.3	0.8	-0.06	<.0001	0.00	1.0000
Proctectomy	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	1.0000
Proctopexy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	1.0000
Pyloroplasty	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Small Bowel Other	0.2	0.2	0.2	0.1	0.01	0.3695	0.00	1.0000
Small Bowel Resection	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	1.0000
Splenectomy	8.3	8.3	8.3	6.6	0.07	<.0001	0.00	1.0000
Stomach Anti-Reflux	0.7	0.7	0.7	0.8	-0.01	0.2853	0.00	1.0000
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.3	1.0	-0.09	<.0001	0.00	1.0000
Stomach Other	0.3	0.3	0.3	0.5	-0.03	0.0090	0.00	1.0000
Stomach Partial Gastrectomy	0.3	0.3	0.3	0.3	-0.01	0.5090	0.00	1.0000
Stomach Total Gastrectomy	1.0	1.0	1.0	1.5	-0.04	0.0002	0.00	1.0000
Thyroidectomy Partial	--*	--*	--*	0.4	-0.07	<.0001	0.00	1.0000
Thyroidectomy Substernal	0.3	0.3	0.3	0.6	-0.06	<.0001	0.00	1.0000
Thyroidectomy Total	--*	--*	--*	0.1	-0.01	0.4359	0.00	1.0000
Ulcer	0.5	0.5	0.5	0.8	-0.04	0.0001	0.00	1.0000
Emergent Admission	1.4	1.4	1.4	1.0	0.04	0.0004	0.00	1.0000
<b>Unmatched Covariates</b>								
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	77.0	77.0	76.9	76.8	0.03	0.0131	0.01	0.3339
Age 65-69	21.6	21.6	22.3	22.3	-0.02	0.1161	-0.02	0.2300
Age 70-74	23.6	23.6	23.0	23.7	0.00	0.8503	0.01	0.3391
Age 75-79	20.4	20.4	21.1	21.1	-0.02	0.1448	-0.02	0.2859
Age 80-84	17.9	17.9	17.9	17.4	0.01	0.2200	0.00	0.9705
Age 85+	16.5	16.5	15.7	15.6	0.03	0.0172	0.02	0.1377
Sex (% female)	56.5	56.5	56.0	57.2	-0.01	0.1946	0.01	0.4836
Transfer-in	3.5	3.5	2.9	2.9	0.04	0.0007	0.04	0.0068
Past Admission in Last 6 Months	28.7	28.7	27.8	27.7	0.02	0.0346	0.02	0.1518
Admission after 9/30/2010	86.3	86.3	86.3	67.3	0.46	<.0001	0.00	1.0000

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Admission in 2012 or 2013	53.8	53.8	53.6	34.7	0.39	<.0001	0.00	0.7870
Probability of 30-day Death	6.2	6.2	5.9	5.2	0.12	<.0001	0.04	0.0017
Comorbidity Count (mean)	4.3	4.3	4.2	4.2	0.04	0.0002	0.02	0.0928
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	43.5	43.5	42.0	41.4	0.04	0.0001	0.03	0.0304
Congestive Heart Failure	22.8	22.8	20.9	20.0	0.07	<.0001	0.05	0.0017
Past Myocardial Infarction	11.2	11.2	10.6	10.5	0.02	0.0196	0.02	0.1798
Past Arrhythmia	30.7	30.7	31.2	29.9	0.02	0.1383	-0.01	0.3903
Angina	4.4	4.4	4.0	4.5	0.00	0.7182	0.02	0.1483
Valvular Disease	23.5	23.5	22.4	22.1	0.03	0.0011	0.03	0.0484
Unstable Angina	2.3	2.3	2.6	2.5	-0.01	0.2117	-0.02	0.1072
Hypertension	85.3	85.3	84.0	84.4	0.03	0.0141	0.04	0.0099
Diabetes	35.4	35.4	34.9	34.5	0.02	0.0559	0.01	0.4488
Renal Dysfunction	28.2	28.2	25.3	22.9	0.12	<.0001	0.07	<.0001
Renal Failure	6.5	6.5	6.1	5.8	0.03	0.0052	0.02	0.2096
Liver Disease	16.3	16.3	17.0	16.3	0.00	0.9769	-0.02	0.2161
Cancer	43.7	43.7	47.1	50.0	-0.13	<.0001	-0.07	<.0001
Specific Abdominal Cancer	3.1	3.1	3.3	5.3	-0.11	<.0001	-0.01	0.5181
Dementia	13.3	13.3	11.5	10.8	0.08	<.0001	0.05	0.0002
Stroke	14.0	14.0	14.0	12.4	0.05	<.0001	0.00	1.0000
Seizure	2.1	2.1	2.0	1.9	0.02	0.0767	0.01	0.5479
Paraplegia	2.7	2.7	2.6	2.3	0.03	0.0128	0.00	0.8252
COPD	28.6	28.6	28.4	27.6	0.02	0.0295	0.00	0.8016
Asthma	9.4	9.4	10.0	9.9	-0.02	0.1263	-0.02	0.1311
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	4.0	3.7	0.01	0.2327	0.00	0.8551
Hypothyroidism	23.3	23.3	23.7	23.4	0.00	0.8596	-0.01	0.5361
Thrombocytopenia	3.1	3.1	3.4	3.2	-0.01	0.5041	-0.02	0.3151
Collagen Vascular Disease	6.1	6.1	6.7	6.3	-0.01	0.2906	-0.03	0.0812
AIDS	--*	--*	--*	0.1	0.00	1.0000	0.01	0.7905
Chronic Peptic Ulcer	0.3	0.3	0.2	0.3	-0.01	0.5748	0.01	0.4879
Coagulopathy	0.4	0.4	0.4	0.4	0.00	0.8702	0.00	1.0000
Other Coagulopathy	4.9	4.9	4.7	4.5	0.02	0.0796	0.01	0.6904
Cushing's Disease	--*	--*	0.1	0.1	-0.01	0.3436	-0.01	0.5032
Graves' Disease	0.4	0.4	0.3	0.4	-0.01	0.6195	0.01	0.7235
Hemoglobin Disorder	--*	--*	--*	0.0	-0.01	0.5015	-0.01	0.6250

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 9b. Orthopedic Surgery Emergent Status Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	8,260	8,260	8,260	131,045				
Year of admission (mean)	2011.6	2011.6	2011.6	2011.0	0.48	<.0001	0.00	1.0000
Principal Procedure Categories								
Hip Repair	29.7	29.7	29.7	10.4	0.50	<.0001	0.00	1.0000
Hip Replacement	50.1	50.1	50.1	35.5	0.30	<.0001	0.00	1.0000
Hip Replacement Revision	2.0	2.0	2.0	3.5	-0.09	<.0001	0.00	1.0000
Knee Replacement	16.8	16.8	16.8	47.3	-0.69	<.0001	0.00	1.0000
Knee Replacement Revision	1.5	1.5	1.5	3.4	-0.13	<.0001	0.00	1.0000
Emergent Admission	55.3	55.3	55.3	18.2	0.83	<.0001	0.00	1.0000
<b>Unmatched Covariates</b>								
<b>Risk Factors &amp; Patient Demographics</b>								
Age at Admission (years, mean)	81.3	81.3	80.8	77.1	0.53	<.0001	0.06	0.0001
Age 65-69	11.9	11.9	13.1	21.3	-0.25	<.0001	-0.03	0.0186
Age 70-74	15.0	15.0	16.1	24.0	-0.23	<.0001	-0.03	0.0435
Age 75-79	16.6	16.6	16.8	21.3	-0.12	<.0001	-0.01	0.7072
Age 80-84	19.7	19.7	19.9	16.8	0.08	<.0001	-0.01	0.7400
Age 85+	36.9	36.9	34.0	16.6	0.47	<.0001	0.07	0.0002
Sex (% female)	70.9	70.9	70.5	65.9	0.11	<.0001	0.01	0.5271
Transfer-in	1.3	1.3	0.7	0.7	0.07	<.0001	0.07	<.0001
Past Admission in Last 6 Months	21.9	21.9	20.5	14.7	0.19	<.0001	0.04	0.0315
Admission after 9/30/2010	88.7	88.7	88.7	69.2	0.49	<.0001	0.00	1.0000
Admission in 2012 or 2013	56.3	56.3	56.3	37.7	0.38	<.0001	0.00	1.0000
Probability of 30-day Death	4.8	4.8	4.3	1.8	0.54	<.0001	0.08	<.0001
Comorbidity Count (mean)	4.0	4.0	3.8	3.2	0.36	<.0001	0.08	<.0001
Same-Day Secondary Procedures								
Major Operative Therapeutic	6.6	6.6	5.9	7.7	-0.04	0.0002	0.03	0.0709
Comorbidities								
Congestive Heart Failure	21.5	21.5	20.0	12.5	0.24	<.0001	0.04	0.0156
Past Myocardial Infarction	9.4	9.4	9.0	7.1	0.08	<.0001	0.02	0.3318
Past Arrhythmia	30.3	30.3	29.1	25.3	0.11	<.0001	0.03	0.0795
Angina	3.4	3.4	2.9	2.9	0.03	0.0159	0.03	0.1004
Valvular Disease	24.3	24.3	23.4	18.3	0.15	<.0001	0.02	0.1654
Unstable Angina	1.3	1.3	1.1	1.0	0.03	0.0067	0.02	0.3228
Hypertension	86.8	86.8	86.4	84.9	0.06	<.0001	0.01	0.5373
Diabetes	29.0	29.0	28.3	27.7	0.03	0.0121	0.02	0.3438
Renal Dysfunction	21.6	21.6	19.4	12.8	0.23	<.0001	0.06	0.0006
Renal Failure	4.4	4.4	4.0	2.6	0.10	<.0001	0.02	0.2168
Liver Disease	3.9	3.9	3.3	3.1	0.05	<.0001	0.03	0.0608
Cancer	26.7	26.7	25.7	25.8	0.02	0.0782	0.02	0.1468
Specific Abdominal Cancer	0.5	0.5	0.4	0.2	0.05	<.0001	0.03	0.0999
Dementia	30.8	30.8	26.7	12.2	0.47	<.0001	0.10	<.0001
Stroke	18.1	18.1	16.4	10.3	0.22	<.0001	0.05	0.0062
Seizure	2.6	2.6	2.3	1.5	0.08	<.0001	0.02	0.3155
Paraplegia	3.1	3.1	2.8	1.3	0.12	<.0001	0.02	0.2877
COPD	25.8	25.8	24.7	18.5	0.18	<.0001	0.03	0.1031
Asthma	8.8	8.8	9.2	9.8	-0.03	0.0028	-0.02	0.3146
Post-inflammatory Pulmonary Fibrosis	3.8	3.8	3.5	2.4	0.08	<.0001	0.02	0.3202
Hypothyroidism	27.5	27.5	27.5	25.8	0.04	0.0008	0.00	0.9861
Thrombocytopenia	2.7	2.7	2.3	1.7	0.07	<.0001	0.03	0.1012
Collagen Vascular Disease	7.7	7.7	8.0	8.5	-0.03	0.0120	-0.01	0.4183
AIDS	--*	--*	--*	0.0	0.02	0.0156	0.00	1.0000
Chronic Peptic Ulcer	--*	--*	--*	0.1	0.01	0.5189	-0.01	0.6289
Coagulopathy	0.3	0.3	0.5	0.5	-0.03	0.0287	-0.03	0.1028
Other Coagulopathy	4.0	4.0	4.0	3.6	0.02	0.0677	0.00	0.9682
Cushing's Disease	--*	--*	--*	0.1	0.00	1.0000	-0.01	1.0000

<b>Covariate (percent unless noted)</b>	<b>All New Surgeon Patients before Match</b>	<b>Matched New Surgeon Patients</b>	<b>Matched Exp. Surgeon Patients</b>	<b>All Exp. Surgeon Patients before Match</b>	<b>Stand Diff before Match</b>	<b>P before Match</b>	<b>Stand Diff after Match</b>	<b>P after Match</b>
Graves' Disease	0.3	0.3	0.3	0.3	0.01	0.6043	0.01	0.5676
Hemoglobin Disorder	--*	--*	--*	0.0	0.01	0.3563	-0.03	0.2889

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.  
P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 10. Complete Matching Tables for Risk Factor Match** Displays the covariate balance when new and experienced surgeon patients were paired on all covariates: year of admission, procedure, emergent status, and risk factors.

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	18,200	18,200	18,200	203,113				
Year of admission (mean)	2011.5	2011.5	2011.4	2011.0	0.47	<.0001	0.10	<.0001
Principal Procedure Categories								
General Surgery								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	0.00	1.0000
Appendectomy	5.3	5.3	5.3	3.9	0.07	<.0001	0.00	1.0000
Bariatric	0.5	0.5	0.5	0.6	-0.01	0.2398	0.00	1.0000
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	0.00	1.0000
Biliary other	--*	--*	--*	0.4	-0.06	<.0001	0.00	1.0000
Cholecystectomy	29.8	29.8	29.8	25.4	0.10	<.0001	0.00	1.0000
Colectomy Partial – Lap	9.1	9.1	9.1	10.0	-0.03	0.0044	0.00	1.0000
Colectomy Partial – Open	18.0	18.0	18.0	17.7	0.01	0.4414	0.00	1.0000
Colectomy Total – Lap	0.3	0.3	0.3	0.2	0.02	0.0570	0.00	1.0000
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	--*	0.2	-0.03	0.0157	0.00	1.0000
Esophagomyotomy	--*	--*	--*	0.2	-0.02	0.0563	0.00	1.0000
Hernia Abdominal – Lap	1.5	1.5	1.5	1.3	0.01	0.3790	0.00	1.0000
Hernia Abdominal – Open	3.3	3.3	3.3	5.3	-0.10	<.0001	0.00	1.0000
Hernia Groin – Lap	0.4	0.4	0.4	0.5	-0.01	0.2948	0.00	1.0000
Hernia Groin – Open	3.6	3.6	3.6	3.2	0.02	0.0608	0.00	1.0000
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.00	1.0000
Liver Other	--*	--*	--*	0.1	-0.03	0.0188	0.00	1.0000
Liver Partial Hepatectomy	0.3	0.3	0.3	0.7	-0.05	<.0001	0.00	1.0000
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	1.0000
Mastectomy	1.4	1.4	1.4	2.6	-0.09	<.0001	0.00	1.0000
Pancreatectomy	0.7	0.7	0.7	1.8	-0.09	<.0001	0.00	1.0000
Parathyroidectomy	0.3	0.3	0.3	0.8	-0.06	<.0001	0.00	1.0000
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	1.0000
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	1.0000
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.2	0.1	0.01	0.3695	0.00	1.0000
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	1.0000
Small Bowel Resection	8.3	8.3	8.3	6.6	0.07	<.0001	0.00	1.0000
Splenectomy	0.7	0.7	0.7	0.8	-0.01	0.2853	0.00	1.0000
Stomach Anti-Reflux	0.3	0.3	0.3	1.0	-0.09	<.0001	0.00	1.0000
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.3	0.5	-0.03	0.0090	0.00	1.0000
Stomach Other	0.3	0.3	0.3	0.3	-0.01	0.5090	0.00	1.0000
Stomach Partial Gastrectomy	1.0	1.0	1.0	1.5	-0.04	0.0002	0.00	1.0000
Stomach Total Gastrectomy	--*	--*	--*	0.4	-0.07	<.0001	0.00	1.0000
Thyroidectomy Partial	0.3	0.3	0.3	0.6	-0.06	<.0001	0.00	1.0000
Thyroidectomy Substernal	--*	--*	--*	0.1	-0.01	0.4359	0.00	1.0000
Thyroidectomy Total	0.5	0.5	0.5	0.8	-0.04	0.0001	0.00	1.0000
Ulcer	1.4	1.4	1.4	1.0	0.04	0.0004	0.00	1.0000
Orthopedic Surgery								
Hip Repair	29.7	29.7	29.7	10.4	0.50	<.0001	0.00	1.0000
Hip Replacement	50.1	50.1	50.1	35.5	0.30	<.0001	0.00	1.0000
Hip Replacement Revision	2.0	2.0	2.0	3.5	-0.09	<.0001	0.00	1.0000
Knee Replacement	16.8	16.8	16.8	47.3	-0.69	<.0001	0.00	1.0000
Knee Replacement Revision	1.5	1.5	1.5	3.4	-0.13	<.0001	0.00	1.0000
Emergent Admission	53.9	53.9	53.9	25.8	0.60	<.0001	0.00	1.0000
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	79.0	79.0	79.1	77.0	0.25	<.0001	-0.02	0.0447

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Age 65-69	17.2	17.2	16.9	21.6	-0.11	<.0001	0.01	0.5489
Age 70-74	19.7	19.7	19.1	23.9	-0.10	<.0001	0.01	0.1896
Age 75-79	18.7	18.7	18.8	21.2	-0.06	<.0001	0.00	0.8193
Age 80-84	18.7	18.7	18.5	17.0	0.04	<.0001	0.01	0.5715
Age 85+	25.8	25.8	26.7	16.3	0.24	<.0001	-0.02	0.0453
Sex (% female)	63.0	63.0	63.1	62.8	0.00	0.5862	0.00	0.8620
Transfer-in	2.5	2.5	2.5	1.5	0.08	<.0001	0.00	0.9734
Past Admission in Last 6 Months	25.6	25.6	24.1	19.3	0.15	<.0001	0.04	0.0008
Admission after 9/30/2010	87.4	87.4	87.4	68.5	0.47	<.0001	0.00	1.0000
Admission in 2012 or 2013	54.9	54.9	49.7	36.6	0.37	<.0001	0.11	<.0001
Probability of 30-day Death	5.6	5.6	5.5	3.0	0.35	<.0001	0.01	0.3718
Comorbidity Count (mean)	4.1	4.1	4.0	3.5	0.26	<.0001	0.04	0.0079
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	26.7	26.7	25.7	19.7	0.17	<.0001	0.03	0.0207
Congestive Heart Failure	22.2	22.2	21.4	15.2	0.18	<.0001	0.02	0.0821
Past Myocardial Infarction	10.4	10.4	9.1	8.3	0.07	<.0001	0.04	0.0001
Past Arrhythmia	30.5	30.5	29.8	26.9	0.08	<.0001	0.02	0.1123
Angina	4.0	4.0	2.9	3.5	0.02	0.0012	0.06	<.0001
Valvular Disease	23.9	23.9	22.9	19.6	0.10	<.0001	0.02	0.0220
Unstable Angina	1.8	1.8	1.4	1.5	0.02	0.0015	0.04	0.0008
Hypertension	86.0	86.0	86.0	84.7	0.04	<.0001	0.00	0.9157
Diabetes	32.5	32.5	32.9	30.1	0.05	<.0001	-0.01	0.3836
Renal Dysfunction	25.2	25.2	24.8	16.4	0.22	<.0001	0.01	0.4172
Renal Failure	5.6	5.6	5.0	3.7	0.09	<.0001	0.03	0.0114
Liver Disease	10.7	10.7	10.2	7.8	0.10	<.0001	0.02	0.1502
Cancer	36.0	36.0	37.9	34.4	0.03	<.0001	-0.04	0.0003
Specific Abdominal Cancer	1.9	1.9	2.3	2.0	-0.01	0.4093	-0.02	0.0236
Dementia	21.2	21.2	20.5	11.7	0.26	<.0001	0.02	0.1098
Stroke	15.9	15.9	14.4	11.0	0.14	<.0001	0.04	0.0001
Seizure	2.3	2.3	1.6	1.6	0.05	<.0001	0.06	<.0001
Paraplegia	2.9	2.9	2.0	1.7	0.08	<.0001	0.06	<.0001
COPD	27.3	27.3	26.4	21.7	0.13	<.0001	0.02	0.0555
Asthma	9.1	9.1	9.3	9.8	-0.02	0.0021	-0.01	0.4686
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.9	2.8	0.06	<.0001	0.00	0.9783
Hypothyroidism	25.2	25.2	24.6	25.0	0.01	0.4475	0.01	0.1670
Thrombocytopenia	2.9	2.9	3.1	2.3	0.04	<.0001	-0.01	0.4981
Collagen Vascular Disease	6.8	6.8	6.1	7.7	-0.04	<.0001	0.03	0.0082
AIDS	0.1	0.1	0.1	0.1	0.01	0.0569	0.00	1.0000
Chronic Peptic Ulcer	0.2	0.2	0.2	0.2	0.01	0.2543	-0.01	0.7307
Coagulopathy	0.4	0.4	0.5	0.5	-0.01	0.1639	-0.02	0.1724
Other Coagulopathy	4.5	4.5	4.5	3.9	0.03	0.0002	0.00	0.9797
Cushing's Disease	0.1	0.1	0.1	0.1	0.00	0.7697	-0.01	0.6899
Graves' Disease	0.4	0.4	0.3	0.3	0.00	0.7414	0.01	0.4106
Hemoglobin Disorder	--*	--*	--*	0.0	0.00	1.0000	-0.03	0.1459

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 10a. General Surgery Risk Factor Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	9,940	9,940	9,940	72,068				
Year of admission (mean)	2011.5	2011.5	2011.3	2010.9	0.48	<.0001	0.12	<.0001
Principal Procedure Categories								
Adrenalectomy	0.3	0.3	0.3	0.3	0.00	0.8358	0.00	1.0000
Appendectomy	5.3	5.3	5.3	3.9	0.07	<.0001	0.00	1.0000
Bariatric	0.5	0.5	0.5	0.6	-0.01	0.2398	0.00	1.0000
Biliary common duct	--*	--*	--*	0.1	-0.01	0.6182	0.00	1.0000
Biliary other	--*	--*	--*	0.4	-0.06	<.0001	0.00	1.0000
Cholecystectomy	29.8	29.8	29.8	25.4	0.10	<.0001	0.00	1.0000
Colectomy Partial – Lap	9.1	9.1	9.1	10.0	-0.03	0.0044	0.00	1.0000
Colectomy Partial – Open	18.0	18.0	18.0	17.7	0.01	0.4414	0.00	1.0000
Colectomy Total – Lap	0.3	0.3	0.3	0.2	0.02	0.0570	0.00	1.0000
Colectomy Total – Open	1.2	1.2	1.2	1.0	0.02	0.1033	0.00	1.0000
Esophagectomy	--*	--*	--*	0.2	-0.03	0.0157	0.00	1.0000
Esophagomyotomy	--*	--*	--*	0.2	-0.02	0.0563	0.00	1.0000
Hernia Abdominal – Lap	1.5	1.5	1.5	1.3	0.01	0.3790	0.00	1.0000
Hernia Abdominal – Open	3.3	3.3	3.3	5.3	-0.10	<.0001	0.00	1.0000
Hernia Groin – Lap	0.4	0.4	0.4	0.5	-0.01	0.2948	0.00	1.0000
Hernia Groin – Open	3.6	3.6	3.6	3.2	0.02	0.0608	0.00	1.0000
Large Bowel Other	0.8	0.8	0.8	0.8	0.00	1.0000	0.00	1.0000
Liver Other	--*	--*	--*	0.1	-0.03	0.0188	0.00	1.0000
Liver Partial Hepatectomy	0.3	0.3	0.3	0.7	-0.05	<.0001	0.00	1.0000
Lysis of Adhesions	5.6	5.6	5.6	5.1	0.02	0.0274	0.00	1.0000
Mastectomy	1.4	1.4	1.4	2.6	-0.09	<.0001	0.00	1.0000
Pancreatectomy	0.7	0.7	0.7	1.8	-0.09	<.0001	0.00	1.0000
Parathyroidectomy	0.3	0.3	0.3	0.8	-0.06	<.0001	0.00	1.0000
PD Access Procedure	0.3	0.3	0.3	0.3	0.01	0.4042	0.00	1.0000
Proctectomy	2.9	2.9	2.9	3.1	-0.01	0.2904	0.00	1.0000
Proctopexy	0.1	0.1	0.1	0.1	0.00	0.8702	0.00	1.0000
Pyloroplasty	0.2	0.2	0.2	0.1	0.01	0.3695	0.00	1.0000
Small Bowel Other	0.8	0.8	0.8	0.7	0.00	0.6610	0.00	1.0000
Small Bowel Resection	8.3	8.3	8.3	6.6	0.07	<.0001	0.00	1.0000
Splenectomy	0.7	0.7	0.7	0.8	-0.01	0.2853	0.00	1.0000
Stomach Anti-Reflux	0.3	0.3	0.3	1.0	-0.09	<.0001	0.00	1.0000
Stomach Gastric Bypass (non-bariatric)	0.3	0.3	0.3	0.5	-0.03	0.0090	0.00	1.0000
Stomach Other	0.3	0.3	0.3	0.3	-0.01	0.5090	0.00	1.0000
Stomach Partial Gastrectomy	1.0	1.0	1.0	1.5	-0.04	0.0002	0.00	1.0000
Stomach Total Gastrectomy	--*	--*	--*	0.4	-0.07	<.0001	0.00	1.0000
Thyroidectomy Partial	0.3	0.3	0.3	0.6	-0.06	<.0001	0.00	1.0000
Thyroidectomy Substernal	--*	--*	--*	0.1	-0.01	0.4359	0.00	1.0000
Thyroidectomy Total	0.5	0.5	0.5	0.8	-0.04	0.0001	0.00	1.0000
Ulcer	1.4	1.4	1.4	1.0	0.04	0.0004	0.00	1.0000
Emergent Admission	52.7	52.7	52.7	39.7	0.26	<.0001	0.00	1.0000
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	77.0	77.0	77.0	76.8	0.03	0.0131	0.00	0.8794
Age 65-69	21.6	21.6	21.7	22.3	-0.02	0.1161	0.00	0.7961
Age 70-74	23.6	23.6	23.2	23.7	0.00	0.8503	0.01	0.4923
Age 75-79	20.4	20.4	20.9	21.1	-0.02	0.1448	-0.01	0.4203
Age 80-84	17.9	17.9	17.9	17.4	0.01	0.2200	0.00	1.0000
Age 85+	16.5	16.5	16.3	15.6	0.03	0.0172	0.01	0.7161
Sex (% female)	56.5	56.5	56.8	57.2	-0.01	0.1946	-0.01	0.6470
Transfer-in	3.5	3.5	3.5	2.9	0.04	0.0007	0.00	0.9693
Past Admission in Last 6 Months	28.7	28.7	27.2	27.7	0.02	0.0346	0.03	0.0194
Admission after 9/30/2010	86.3	86.3	86.3	67.3	0.46	<.0001	0.00	1.0000
Admission in 2012 or 2013	53.8	53.8	46.9	34.7	0.39	<.0001	0.14	<.0001

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Probability of 30-day Death	6.2	6.2	6.0	5.2	0.12	<.0001	0.03	0.0484
Comorbidity Count (mean)	4.3	4.3	4.2	4.2	0.04	0.0002	0.04	0.0344
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	43.5	43.5	42.0	41.4	0.04	0.0001	0.03	0.0404
Congestive Heart Failure	22.8	22.8	21.1	20.0	0.07	<.0001	0.04	0.0038
Past Myocardial Infarction	11.2	11.2	9.6	10.5	0.02	0.0196	0.05	0.0001
Past Arrhythmia	30.7	30.7	29.4	29.9	0.02	0.1383	0.03	0.0531
Angina	4.4	4.4	3.1	4.5	0.00	0.7182	0.06	<.0001
Valvular Disease	23.5	23.5	21.7	22.1	0.03	0.0011	0.04	0.0022
Unstable Angina	2.3	2.3	1.8	2.5	-0.01	0.2117	0.03	0.0450
Hypertension	85.3	85.3	85.1	84.4	0.03	0.0141	0.01	0.7040
Diabetes	35.4	35.4	35.7	34.5	0.02	0.0559	0.00	0.7670
Renal Dysfunction	28.2	28.2	27.2	22.9	0.12	<.0001	0.02	0.1202
Renal Failure	6.5	6.5	5.8	5.8	0.03	0.0052	0.03	0.0312
Liver Disease	16.3	16.3	16.1	16.3	0.00	0.9769	0.01	0.6032
Cancer	43.7	43.7	46.8	50.0	-0.13	<.0001	-0.06	<.0001
Specific Abdominal Cancer	3.1	3.1	3.8	5.3	-0.11	<.0001	-0.03	0.0052
Dementia	13.3	13.3	11.6	10.8	0.08	<.0001	0.05	0.0005
Stroke	14.0	14.0	12.1	12.4	0.05	<.0001	0.06	0.0001
Seizure	2.1	2.1	1.4	1.9	0.02	0.0767	0.05	0.0001
Paraplegia	2.7	2.7	1.7	2.3	0.03	0.0128	0.06	<.0001
COPD	28.6	28.6	27.6	27.6	0.02	0.0295	0.02	0.1259
Asthma	9.4	9.4	9.9	9.9	-0.02	0.1263	-0.02	0.2483
Post-inflammatory Pulmonary Fibrosis	3.9	3.9	3.7	3.7	0.01	0.2327	0.01	0.4806
Hypothyroidism	23.3	23.3	24.8	23.4	0.00	0.8596	-0.03	0.0169
Thrombocytopenia	3.1	3.1	3.6	3.2	-0.01	0.5041	-0.03	0.0687
Collagen Vascular Disease	6.1	6.1	6.4	6.3	-0.01	0.2906	-0.01	0.3328
AIDS	--*	--*	--*	0.1	0.00	1.0000	0.00	1.0000
Chronic Peptic Ulcer	0.3	0.3	0.3	0.3	-0.01	0.5748	-0.01	0.7978
Coagulopathy	0.4	0.4	0.5	0.4	0.00	0.8702	-0.01	0.4741
Other Coagulopathy	4.9	4.9	5.1	4.5	0.02	0.0796	-0.01	0.5348
Cushing's Disease	--*	--*	0.1	0.1	-0.01	0.3436	-0.01	0.6474
Graves' Disease	0.4	0.4	0.4	0.4	-0.01	0.6195	0.00	1.0000
Hemoglobin Disorder	--*	--*	--*	0.0	-0.01	0.5015	-0.01	0.6250

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.

P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.



**eTable 10b. Orthopedic Surgery Risk-Factor Match**

Covariate (percent unless noted)	All New Surgeon Patients before Match	Matched New Surgeon Patients	Matched Exp. Surgeon Patients	All Exp. Surgeon Patients before Match	Stand Diff before Match	P before Match	Stand Diff after Match	P after Match
Number of Surgeons								
Number of Patients	8,260	8,260	8,260	131,045				
Year of admission (mean)	2011.6	2011.6	2011.5	2011.0	0.48	<.0001	0.08	<.0001
Principal Procedure Categories								
Hip Repair	29.7	29.7	29.7	10.4	0.50	<.0001	0.00	1.0000
Hip Replacement	50.1	50.1	50.1	35.5	0.30	<.0001	0.00	1.0000
Hip Replacement Revision	2.0	2.0	2.0	3.5	-0.09	<.0001	0.00	1.0000
Knee Replacement	16.8	16.8	16.8	47.3	-0.69	<.0001	0.00	1.0000
Knee Replacement Revision	1.5	1.5	1.5	3.4	-0.13	<.0001	0.00	1.0000
Emergent Admission	55.3	55.3	55.3	18.2	0.83	<.0001	0.00	1.0000
Risk Factors & Patient Demographics								
Age at Admission (years, mean)	81.3	81.3	81.7	77.1	0.53	<.0001	-0.05	0.0041
Age 65-69	11.9	11.9	11.2	21.3	-0.25	<.0001	0.02	0.1506
Age 70-74	15.0	15.0	14.3	24.0	-0.23	<.0001	0.02	0.2093
Age 75-79	16.6	16.6	16.2	21.3	-0.12	<.0001	0.01	0.5563
Age 80-84	19.7	19.7	19.2	16.8	0.08	<.0001	0.01	0.4203
Age 85+	36.9	36.9	39.2	16.6	0.47	<.0001	-0.05	0.0026
Sex (% female)	70.9	70.9	70.7	65.9	0.11	<.0001	0.00	0.7974
Transfer-in	1.3	1.3	1.3	0.7	0.07	<.0001	0.00	1.0000
Past Admission in Last 6 Months	21.9	21.9	20.4	14.7	0.19	<.0001	0.04	0.0147
Admission after 9/30/2010	88.7	88.7	88.7	69.2	0.49	<.0001	0.00	1.0000
Admission in 2012 or 2013	56.3	56.3	53.1	37.7	0.38	<.0001	0.06	<.0001
Probability of 30-day Death	4.8	4.8	4.9	1.8	0.54	<.0001	-0.03	0.2610
Comorbidity Count (mean)	4.0	4.0	3.9	3.2	0.36	<.0001	0.04	0.1025
Same-Day Secondary Procedures								
Major Operative Therapeutic Comorbidities	6.6	6.6	5.9	7.7	-0.04	0.0002	0.02	0.1078
Congestive Heart Failure	21.5	21.5	21.9	12.5	0.24	<.0001	-0.01	0.5585
Past Myocardial Infarction	9.4	9.4	8.6	7.1	0.08	<.0001	0.03	0.0921
Past Arrhythmia	30.3	30.3	30.2	25.3	0.11	<.0001	0.00	0.8257
Angina	3.4	3.4	2.7	2.9	0.03	0.0159	0.04	0.0086
Valvular Disease	24.3	24.3	24.3	18.3	0.15	<.0001	0.00	0.9566
Unstable Angina	1.3	1.3	0.8	1.0	0.03	0.0067	0.05	0.0032
Hypertension	86.8	86.8	87.1	84.9	0.06	<.0001	-0.01	0.5329
Diabetes	29.0	29.0	29.7	27.7	0.03	0.0121	-0.02	0.3300
Renal Dysfunction	21.6	21.6	21.9	12.8	0.23	<.0001	-0.01	0.5715
Renal Failure	4.4	4.4	4.0	2.6	0.10	<.0001	0.02	0.1888
Liver Disease	3.9	3.9	3.2	3.1	0.05	<.0001	0.04	0.0185
Cancer	26.7	26.7	27.1	25.8	0.02	0.0782	-0.01	0.5509
Specific Abdominal Cancer	0.5	0.5	0.4	0.2	0.05	<.0001	0.02	0.3070
Dementia	30.8	30.8	31.3	12.2	0.47	<.0001	-0.01	0.5449
Stroke	18.1	18.1	17.2	10.3	0.22	<.0001	0.03	0.1306
Seizure	2.6	2.6	1.8	1.5	0.08	<.0001	0.06	0.0005
Paraplegia	3.1	3.1	2.4	1.3	0.12	<.0001	0.04	0.0132
COPD	25.8	25.8	25.0	18.5	0.18	<.0001	0.02	0.2527
Asthma	8.8	8.8	8.7	9.8	-0.03	0.0028	0.00	0.8470
Post-inflammatory Pulmonary Fibrosis	3.8	3.8	4.0	2.4	0.08	<.0001	-0.01	0.4957
Hypothyroidism	27.5	27.5	24.3	25.8	0.04	0.0008	0.07	<.0001
Thrombocytopenia	2.7	2.7	2.4	1.7	0.07	<.0001	0.02	0.2589
Collagen Vascular Disease	7.7	7.7	5.8	8.5	-0.03	0.0120	0.07	<.0001
AIDS	--*	--*	--*	0.0	0.02	0.0156	0.00	1.0000
Chronic Peptic Ulcer	--*	--*	--*	0.1	0.01	0.5189	0.00	1.0000
Coagulopathy	0.3	0.3	0.4	0.5	-0.03	0.0287	-0.02	0.2442
Other Coagulopathy	4.0	4.0	3.8	3.6	0.02	0.0677	0.01	0.4925
Cushing's Disease	--*	--*	--*	0.1	0.00	1.0000	0.00	1.0000
Graves' Disease	0.3	0.3	0.2	0.3	0.01	0.6043	0.02	0.2321

<b>Covariate (percent unless noted)</b>	<b>All New Surgeon Patients before Match</b>	<b>Matched New Surgeon Patients</b>	<b>Matched Exp. Surgeon Patients</b>	<b>All Exp. Surgeon Patients before Match</b>	<b>Stand Diff before Match</b>	<b>P before Match</b>	<b>Stand Diff after Match</b>	<b>P after Match</b>
Hemoglobin Disorder	--*	--*	--*	0.0	0.01	0.3563	-0.04	0.2889

Cells marked "--\*" are masked to comply with CMS cell size suppression rules.  
P-values calculated using group tests, with Fisher's exact test used for binary and Wilcoxon rank sum used for continuous variables.

**eTable 11. Outcomes by Surgery Type**  
**eTable 11a. Outcomes for General Surgery**

Outcome (Percent unless noted)	Cohort	Estimate	Odds Ratio or Paired Difference	New Vs. Exp. P-value	Exterior Match P-Value
Number of Pairs		9,940	--	--	--
30-day all Location Mortality	New Surgeons	6.9	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	6.8	1.01 (0.90, 1.14)	0.8380	0.1160
	Exp. Surg Baseline + Opx + Emerg	6.4	1.08 (0.96, 1.22)	0.1883	0.2389
	Exp. Surg Baseline + Opx	6.2	1.12 (1.00, 1.26)	0.0499	0.1969
	Exp. Surg Baseline	5.9	1.19 (1.06, 1.34)	0.0033	--
30-day Failure-to- Rescue	New Surgeons	10.3	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	10.5	0.97 (0.85, 1.11)	0.6609	0.4778
	Exp. Surg Baseline + Opx + Emerg	10.0	1.05 (0.92, 1.20)	0.4770	0.3997
	Exp. Surg Baseline + Opx	9.9	1.05 (0.91, 1.20)	0.5391	0.6819
	Exp. Surg Baseline	9.7	1.03 (0.89, 1.19)	0.7450	--
30-day Readmission or death	New Surgeons	21.3	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	20.8	1.03 (0.96, 1.10)	0.4707	0.0262
	Exp. Surg Baseline + Opx + Emerg	20.0	1.09 (1.01, 1.17)	0.0235	0.7597
	Exp. Surg Baseline + Opx	19.9	1.09 (1.02, 1.17)	0.0154	0.8504
	Exp. Surg Baseline	19.8	1.09 (1.02, 1.17)	0.0107	--
Prolonged Length of Stay	New Surgeons	70.1	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	68.2	1.10 (1.03, 1.18)	0.0028	0.5842
	Exp. Surg Baseline + Opx + Emerg	68.0	1.11 (1.05, 1.19)	0.0008	<.0001
	Exp. Surg Baseline + Opx	66.6	1.19 (1.12, 1.27)	<.0001	0.0001
	Exp. Surg Baseline	64.7	1.30 (1.22, 1.38)	<.0001	--
Anesthesia Time (min., m-est.)	New Surgeons	165.0	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	145.6	18.3 (16.0, 20.6)	<.0001	0.3959
	Exp. Surg Baseline + Opx + Emerg	145.1	18.4 (16.1, 20.6)	<.0001	0.0006
	Exp. Surg Baseline + Opx	146.4	16.7 (14.4, 19.0)	<.0001	<.0001
	Exp. Surg Baseline	149.6	12.8 (10.5, 15.1)	<.0001	--
ICU Usage	New Surgeons	33.2	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	30.6	1.17 (1.09, 1.26)	<.0001	0.0768
	Exp. Surg Baseline + Opx + Emerg	29.9	1.22 (1.14, 1.31)	<.0001	0.1541
	Exp. Surg Baseline + Opx	29.4	1.25 (1.16, 1.33)	<.0001	0.6450
	Exp. Surg Baseline	29.2	1.23 (1.15, 1.31)	<.0001	--
Length of Stay (days, m-est.)	New Surgeons	8.8	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	8.5	0.2 (0.0, 0.4)	0.0277	0.1202
	Exp. Surg Baseline + Opx + Emerg	8.4	0.3 (0.1, 0.5)	0.0003	0.0007
	Exp. Surg Baseline + Opx	8.2	0.4 (0.3, 0.6)	<.0001	0.0644
	Exp. Surg Baseline	8.3	0.5 (0.3, 0.7)	<.0001	--
30-day Resource Cost (\$, m-est.)	New Surgeons	27,996	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	26,203	1,650 (1,035, 2,268)	<.0001	0.1307
	Exp. Surg Baseline + Opx + Emerg	25,877	1,891 (1,281, 2,503)	<.0001	0.0145
	Exp. Surg Baseline + Opx	25,459	2,218 (1,607, 2,827)	<.0001	0.5185
	Exp. Surg Baseline	25,317	2,398 (1,781, 3,014)	<.0001	--
Baseline = Matched for year; Opx = Matched for Operation; Emerg = Matched for Emergent Status; Risk Factors = Matched for patient demographics and comorbidity risk factors. Binary outcomes were compared using McNemar's test while continuous outcomes were tested using m-estimation. The exterior match p-value compares a given group of experienced surgeon controls to those in the row below. Cost is reported using 2013 USD.					

**eTable 11b.Outcomes for Orthopedic Surgery**

Outcome (Percent unless noted)	Cohort	Estimate	Odds Ratio or Paired Difference	New Vs. Exp. P-value	Exterior Match P-Value
Number of Pairs		8,260	--	--	--
30-day all Location Mortality	New Surgeons	5.3	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	4.7	1.12 (0.97, 1.30)	0.1149	0.4300
	Exp. Surg Baseline + Opx + Emerg	4.5	1.18 (1.02, 1.36)	0.0273	<.0001
	Exp. Surg Baseline + Opx	3.7	1.45 (1.24, 1.69)	<.0001	<.0001
	Exp. Surg Baseline	2.8	1.90 (1.61, 2.25)	<.0001	--
30-day Failure-to- Rescue	New Surgeons	8.5	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	7.8	1.03 (0.86, 1.23)	0.7923	0.6678
	Exp. Surg Baseline + Opx + Emerg	7.7	1.10 (0.92, 1.31)	0.3276	<.0001
	Exp. Surg Baseline + Opx	6.5	1.41 (1.16, 1.70)	0.0004	0.0181
	Exp. Surg Baseline	5.4	1.72 (1.39, 2.12)	<.0001	--
30-day Readmission or death	New Surgeons	17.3	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	15.8	1.11 (1.02, 1.21)	0.0132	0.5560
	Exp. Surg Baseline + Opx + Emerg	16.1	1.09 (1.00, 1.18)	0.0467	<.0001
	Exp. Surg Baseline + Opx	14.3	1.26 (1.16, 1.38)	<.0001	<.0001
	Exp. Surg Baseline	12.2	1.52 (1.39, 1.66)	<.0001	--
Prolonged Length of Stay	New Surgeons	41.1	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	37.9	1.18 (1.10, 1.27)	<.0001	0.0143
	Exp. Surg Baseline + Opx + Emerg	36.7	1.26 (1.17, 1.35)	<.0001	<.0001
	Exp. Surg Baseline + Opx	31.3	1.64 (1.52, 1.76)	<.0001	<.0001
	Exp. Surg Baseline	25.9	2.12 (1.97, 2.28)	<.0001	--
Anesthesia Time (min., m-est.)	New Surgeons	147.7	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	127.7	19.2 (17.7, 20.8)	<.0001	0.1358
	Exp. Surg Baseline + Opx + Emerg	128.4	18.5 (17.1, 20.1)	<.0001	<.0001
	Exp. Surg Baseline + Opx	132.1	15.9 (14.3, 17.4)	<.0001	<.0001
	Exp. Surg Baseline	136.4	11.9 (10.3, 13.5)	<.0001	--
ICU Usage	New Surgeons	10.2	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	8.5	1.26 (1.12, 1.40)	0.0001	0.8187
	Exp. Surg Baseline + Opx + Emerg	8.4	1.27 (1.13, 1.42)	<.0001	0.0001
	Exp. Surg Baseline + Opx	7.6	1.42 (1.27, 1.59)	<.0001	<.0001
	Exp. Surg Baseline	6.4	1.70 (1.51, 1.92)	<.0001	--
Length of Stay (days, m-est.)	New Surgeons	5.9	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	5.8	0.1 (0.0, 0.2)	0.0017	0.0059
	Exp. Surg Baseline + Opx + Emerg	5.7	0.2 (0.1, 0.2)	<.0001	<.0001
	Exp. Surg Baseline + Opx	5.4	0.4 (0.3, 0.5)	<.0001	<.0001
	Exp. Surg Baseline	5.0	0.8 (0.7, 0.8)	<.0001	--
30-day Resource Cost (\$, m-est.)	New Surgeons	17,044	--	--	--
	Exp. Surg Baseline + Opx + Emerg + Risk Factors	16,042	916 (654, 1,177)	<.0001	0.4145
	Exp. Surg Baseline + Opx + Emerg	15,978	981 (724, 1,239)	<.0001	<.0001
	Exp. Surg Baseline + Opx	15,137	1,652 (1,405, 1,899)	<.0001	<.0001
	Exp. Surg Baseline	13,969	2,601 (2,359, 2,843)	<.0001	--

Baseline = Matched for year; Opx = Matched for Operation; Emerg = Matched for Emergent Status; Risk Factors = Matched for patient demographics and comorbidity risk factors.  
 Binary outcomes were compared using McNemar's test while continuous outcomes were tested using m-estimation.  
 The exterior match p-value compares a given group of experienced surgeon controls to those in the row below.  
 Cost is reported using 2013 USD.