

Hospital Visits after General Surgery Procedures Performed at  
Ambulatory Surgical Centers

**Measure Technical Report: Public Comment**

**Submitted by:**

Yale New Haven Health Services Corporation – Center for Outcomes Research and  
Evaluation (CORE)

**Prepared for:**

Centers for Medicare & Medicaid Services (CMS)

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## 5. Executive Summary

This report presents for public comment a new quality measure of general surgery procedures performed at ambulatory surgical centers (ASC). The measure assesses the quality of general surgery ASC procedures using the outcome of hospital visits – including emergency department (ED) visits, observation stays, and unplanned inpatient admissions – within 7 days of the ASC procedure. Yale New Haven Health Services Corporation—Center for Outcomes Research and Evaluation (CORE) is developing the measure for the Centers for Medicare & Medicaid Services (CMS). At this time, CMS is seeking public comment to further inform measure development.

This report presents for comment the rationale for the measure, the specific technical approach to the measure, the draft measure specifications, the measure testing results, and the national distribution of measure scores across ASC facilities. As part of the development process, CMS invites public comment on all aspects of the measure and the results. Instructions on how to submit comments are available at the following webpage:

<https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/CallforPublicComment.html>.

### 5.1 Rationale for Assessing Hospital Visits after Ambulatory Surgery

Ambulatory surgery is increasingly common in the United States (US). Nearly 70% of all surgeries in the US are performed in an outpatient setting with an expanding number and variety of procedures being performed at stand-alone ASCs.<sup>1</sup> While ambulatory surgery is considered low-risk for complications, there are well-described and potentially preventable adverse events that can occur after ambulatory surgery leading to unplanned care at a hospital. These events include uncontrolled pain, urinary retention, infection, bleeding, and venous thromboembolism.

Hospital visits following same-day surgery are an important and accepted patient-centered outcome reported in the literature.<sup>2-9</sup> National estimates of hospital visit rates following outpatient surgery vary from 0.5-9.0%, based on the type of surgery, outcome measured (admissions alone or admissions and ED visits), and timeframe for measurement after surgery. Such events also vary among ASCs, suggesting possible variation in surgical care, post-surgical care, and the care and support provided to patients post-discharge.<sup>6,10-18</sup>

We estimated the unadjusted rate of hospital visits as defined for this measure following general surgery ASC procedures. In our analysis of a national 100% dataset of Medicare Fee-for-Service (FFS) claims from Calendar Year (CY) 2015 (January 1, 2015 – December 31, 2015), the median national observed facility rate of hospital visits following general surgery procedures performed at ASCs was 2.2% (the 25<sup>th</sup> and 75<sup>th</sup> percentiles were 0.0% and 3.7%, respectively).

Of these hospital visits, 1.6% were emergency department (ED) or observation stay visits, and 0.6% were unplanned inpatient admissions. These results suggest a performance gap and opportunity for quality improvement.

Providers at ASCs are often unaware of patients' subsequent acute care visits given that patients tend to present to the ED or to hospitals unaffiliated with the ASC.<sup>19</sup> For these reasons, a quality measure of hospital visits following ASC surgery will serve to improve transparency, inform patients and providers, and foster quality improvement.

## **5.2 Measure Development**

CORE is developing this measure consistent with CMS's measure development guidance, using a multidisciplinary team of clinicians, health services researchers, and statisticians. Our work is supported and informed by a national technical expert panel (TEP) consisting of patients, surgeons, methodologists, researchers, and providers. With input from our experts and CMS, the Project Team has defined the measure cohort and outcome; selected and tested the risk-adjustment model; and calculated the ASC-level measure score.

## **5.3 Draft Measure Specifications**

The population included in the measure is Medicare FFS patients aged 65 years and older undergoing outpatient general surgery procedures at ASCs.

The measure's outcome is any unplanned hospital visit (ED visit, observation stay, or unplanned inpatient admission) by a patient occurring within 7 days of an index ASC procedure (a patient's initial ASC procedure).

The measure is risk-adjusted in order to help ensure that differences in the measure score do not reflect differences in the mix of patients and procedures across ASCs, the model adjusts for patient demographics (age), surgical procedural complexity, type of general surgery procedure, and patient comorbidities. We adjust for these characteristics because they vary across ASC patient populations and influence the outcome.

The measure score is an ASC-level risk-standardized hospital visit rate (RSHVR). The RSHVR is calculated as the ratio of the predicted to the expected number of post-surgical unplanned hospital visits among an ASC's patients, multiplied by the national observed rate of unplanned hospital visits. For each ASC, the numerator of the ratio is the number of hospital visits predicted for the ASC's patients, accounting for its observed rate, the number and complexity of general surgery procedures performed at the ASC, and the case mix. The denominator is the number of hospital visits expected nationally for the ASC's case/procedure mix. To calculate an ASC's predicted-to-expected (P/E) ratio, the measure uses a two-level hierarchical logistic

regression model (see [Appendix D](#)). The log-odds of the outcome for an index procedure is modeled as a function of the patient demographic, comorbidity, and procedure characteristics, and a random ASC-specific intercept. A ratio greater than one indicates that the ASC's patients have more hospital visits than expected, compared to an average ASC with similar patient and procedural complexity. A ratio less than one indicates that the ASC's patients have fewer post-surgical hospital visits than expected, compared to an average ASC with similar patient and procedural complexity. An ASC's P/E ratio is then multiplied by the overall national rate of unplanned hospital visits to calculate the ASC-level RSHVR. This approach is analogous to an observed-to-expected ratio, but accounts for within-facility correlation of the observed outcome and sample size differences and accommodates the assumption that underlying differences in quality across ASCs lead to systematic differences in outcomes.

#### **5.4 Distribution of Measure Scores**

There was variation in risk-standardized scores across ASCs nationally. In a national Medicare FFS claims dataset for 2014 and 2015 that included 304,139 procedures at 3,662 ASCs, the facility measure scores ranged from 0.94% to 4.55%, with a median RSHVR of 2.19% (the 25<sup>th</sup> and 75<sup>th</sup> percentiles were 2.03% and 2.46%, respectively).

#### **5.5 Summary**

This report describes the measure specifications and preliminary results for a risk-standardized quality measure of 7-day unplanned hospital visits following general surgery procedures performed at ASCs. Stakeholder and expert input has informed measure development throughout. The purpose of this measure is to illuminate variation in quality of care for general surgery procedures across ASCs, inform patient choice, and drive quality improvement. CMS invites comments on the measure's purpose, design, and potential implementation.

## **6. Introduction and Call for Public Comment**

### **6.1 Background**

National efforts to measure the quality of ambulatory surgical care are essential given the increasing number of ambulatory surgical centers (ASCs) in the United States (US), and the growing variety of procedures performed at ASCs. ASCs have become an increasingly common setting for the provision of low-risk surgical and medical procedures in the US, including the provision of many types of general surgical care.<sup>1</sup> ASCs have gained favor among patients given their tendency toward shorter wait times, decreased need for hospitalization, and more rapid return to work when compared with patients managed in hospital settings.<sup>1</sup> In 2014 alone, more than 3.4 million Medicare Fee-for-Service (FFS) beneficiaries were treated at ASCs. Associated Medicare spending for all types of ASC procedures per beneficiary increased by an average of 2.8% per year between 2010 and 2014, and by 5.2% in 2015, resulting in total expenditures of \$4.1 billion on ASC services in 2015.<sup>20</sup> Due to advances in surgical and anesthetic techniques, nearly 70% of all surgical procedures in the US are performed in ambulatory settings, with many of these procedures taking place as same-day surgeries at ASCs.<sup>1</sup> The resultant shift in ASC utilization has led to an increase not only in ASCs' operative volume, but also in the average age and complexity of patients managed at ASCs.<sup>20,21</sup>

General surgery procedures are commonly performed at ASCs. Based on our analyses of Medicare FFS patients aged 65 years and older, from January 1, 2015 through December 31, 2015, 3,256 ASCs performed 149,932 general surgery procedures of the types included in this measure (see Section 3.3 for cohort definition); 1,157 (35.5%) of those ASCs performed at least 25 cases.

### **6.2 Definition of an Ambulatory Surgical Center (ASC)**

Medicare defines ASCs as healthcare facilities that operate “exclusively for the purpose of providing surgical services to patients not requiring hospitalization and in which the expected duration of services [does] not exceed 24 hours following an admission” (42 CFR 416.2).<sup>22</sup> ASCs vary in their organizational and financial structures. Many ASCs are hospital-owned; most are run by groups of physicians in the same specialty area and are limited to a single type of procedure, such as eye or orthopedic surgery. Other ASCs conduct procedures in two or more specialty areas.

The types of general surgery procedures performed at ASCs range from very minor procedures, such as skin sutures, to more major operations, such as gastric bypass. These procedures typically have less than 90-minute operating times and 4- to 6-hour same-day recovery periods. The surgeries performed usually do not (1) involve major or prolonged invasion of body

cavities; (2) require active medical monitoring and care overnight; (3) result in extensive blood loss; (4) directly involve major blood vessels; or (5) involve care that is either emergent or life-threatening (42 CFR 416.65).<sup>22</sup>

### **6.3 Importance of Assessing Unplanned Hospital Visits after ASC Procedures**

Despite the increasing availability and utilization of ASCs, there are few quality measures to gauge ASC performance. Existing ASC quality measures tend to focus on very rare, patient safety-related events. For example, one measure counts cases in which wrong site, wrong side, wrong patient, wrong procedure, or wrong implant events occurred.<sup>22</sup> Understanding that such rare, patient safety-related events are important to assess, generally lacking at this time are measures designed to capture more common adverse outcomes that patients experience, such as pain, bleeding, urinary retention, and other complications requiring acute care hospital visits or admissions.

Measuring ASC outcomes is an important strategy for improving transparency and fostering quality improvement. Facilities and surgical teams may be unaware of their patients' adverse events and hospitalizations following ASC procedures because separate providers (for example, emergency room physicians) tend to provide post-surgical care when it is required. For this reason, measuring unanticipated hospital visits following ASC procedures can more broadly reflect the quality of ASC care. Such visits are an unexpected and potentially preventable outcome for patients with a low anticipated perioperative risk.

In the literature, hospital visit rates following outpatient surgery vary from 0.5-9.0%, based on the type of surgery, outcome measured (admissions alone or admissions and ED visits), and timeframe for measurement after surgery.<sup>2-9</sup> These hospital visits can occur due to a range of well-described adverse events, including major adverse events, such as bleeding, wound infection, septicemia, and venous thromboembolism. Patients also frequently report minor adverse events – for example, uncontrolled pain, nausea, and vomiting – that may result in unplanned acute care visits following surgery.

Several factors make unanticipated hospital visits a priority quality indicator. Because ASC providers are not aware of all post-surgical hospital visits that occur among their patients, reporting this outcome will help to illuminate problems that may not be currently visible. In addition, the outcome of hospital visits is a broad, patient-centered outcome that reflects the full range of reasons leading to hospital use among patients undergoing same-day surgery. Public reporting of this outcome measure will provide ASCs with critical information and incentives to implement strategies to reduce unplanned hospital visits.

CMS is developing this measure for general surgery procedures at ASCs because:

1. The procedures lead to related and preventable complications resulting in unplanned hospital visits;
2. Hospital visit rates are elevated within the first week following the procedures; and
3. Thousands of facilities in the US perform general surgery procedures.

#### **6.4 Related Measures Under Development**

We have developed four other risk-adjusted outpatient procedure measures that use the same 7-day unplanned hospital visit outcome, two of which have been endorsed by the National Quality Forum (NQF) and two of which are currently under development:

- Facility 7-Day Risk-Standardized Hospital Visit Rate after Outpatient Colonoscopy (NQF endorsed #2539)
- Hospital Visits after Hospital Outpatient Surgery (NQF endorsed #2687)
- Hospital Visits after ASC Orthopedic Procedures
- Hospital Visits after ASC Urology Procedures

## **7. Measure Development Methods**

### **7.1 Overview of Measure Development Process**

CORE is leading the development of the general surgery ASC measure under the guidance of CMS. The CORE Project Team consists of a multidisciplinary group of clinicians, health services researchers, and statisticians with expertise in outcome measure development. We are obtaining clinical input from general surgery consultants. Additionally, we convened, through a public process, a national TEP to advise us on this measure and two other related ASC measures. The TEP is comprised of individuals with diverse perspectives and backgrounds, and includes clinicians, surgeons, patients, patient advocates, and other stakeholders with expertise in ambulatory surgery, performance measurement, quality improvement, and patient safety. Details of the TEP's input are available for download at: <https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/MMS/CallforPublicComment.html>. At this time, we are soliciting additional stakeholder input through this public comment period. After the public comment period closes, we will revise this measure as appropriate in response to comments.

### **7.2 Data Sources**

The measure requires a data source that allows us to link patient data across care settings to identify appropriate surgical procedures for inclusion, comorbidities for risk adjustment, and the outcome of hospital visits. Therefore, claims data are used to calculate the measure results, as they support these linkages, are available for the patient population of interest, and do not require ASCs to submit any data to CMS.

To develop and test the patient-level model, we used a national dataset of Calendar Year (CY) 2015 (January 1, 2015 – December 31, 2015) claims data from the Health Account Joint Information (HAJI) database that included Medicare Inpatient, Outpatient, and Carrier (Part B Physician) claims (hereinafter, Medicare FFS CY 2015 Dataset). Outpatient general surgery procedures performed at ASCs were identified using the full set of Medicare beneficiaries' claims from the Carrier non-institutional claims, which includes the ASC facility claim (with a unique facility identifier). The outcomes of ED visits and observation stays after general surgery ASC procedures were identified from the hospital outpatient institutional claims and inpatient hospital admissions from the inpatient institutional claims. The measure cohort included patients who underwent general surgery ASC procedures in CY 2015. Inpatient and outpatient claims data from the year prior (CY 2014) were used to identify comorbidities for risk adjustment for these patients.

To align with CMS's intention to use more than 1 year of data for public reporting to ensure reliable estimates, we calculated ASCs' measure scores and the measure score reliability for a two-year reporting period. Specifically, to calculate ASCs' measure scores, we used two years of claims data from 2014 and 2015 (January 1, 2014 – December 31, 2015; hereinafter, Medicare FFS 2014-2015 Dataset). To calculate measure score reliability for a two-year reporting period, we used split samples of four years of claims data from 2012-2015 (January 1, 2012 – December 31, 2015).

### **7.3 Cohort Definition**

The target population for this measure is Medicare FFS patients aged 65 years and older, undergoing outpatient general surgery procedures that are within the scope of general surgery training. Specifically, the cohort of procedures includes the following types of procedures: abdominal, alimentary tract, breast, skin/soft tissue, wound, and varicose vein. The Medicare FFS population was chosen because of the availability of a national dataset (Medicare claims) that could be used to develop, test, and publicly report the measure. The target population is defined based on the following inclusion and exclusion criteria.

#### *7.3.1 Inclusion Criteria*

##### Included patients

- Medicare FFS patients aged 65 years and older.

Rationale: Medicare beneficiaries under age 65 typically are a highly diverse group with a higher burden of disability, and it is therefore difficult to adequately risk adjust for the under-65 population.

- Patients with continuous enrollment in Medicare FFS Parts A and B in the 12 months prior to the surgery.

Rationale: Patients with full enrollment have claims available for identifying comorbidities for risk adjustment.

##### Included procedures

- The target group of procedures was surgical procedures that (1) are routinely performed at ASCs, (2) involve risk of post-surgery hospital visits, and (3) are within the scope of general surgery training. See [Appendix A](#) for a complete listing of all Current Procedural Terminology (CPT®) procedure codes included in the measure cohort.



- The measure includes a subset of procedures (indicated below) on Medicare’s list of covered ASC procedures for 2014 and 2015. This list of surgeries is publicly available at: [https://www.cms.gov/medicare/medicare-fee-for-service-payment/ascpayment/11\\_addenda\\_updates.html](https://www.cms.gov/medicare/medicare-fee-for-service-payment/ascpayment/11_addenda_updates.html) (download April 2017 ASC Approved HCPCS Code and Payment Rates, Addendum AA). Surgeries on the ASC list of covered procedures do not involve or require major or prolonged invasion of body cavities, extensive blood loss, major blood vessels, or care that is emergent or life threatening.<sup>1</sup>
- To focus the measure only on the subset of surgeries on Medicare’s list of covered ASC procedures that impose a meaningful risk of post-procedure hospital visits, the measure includes only “major” and “minor” procedures, as indicated by the Medicare Physician Fee Schedule global surgery indicator (GSI) values of 090 and 010, respectively. The GSI code reflects the number of post-operative days that are included in a given procedure’s global surgical payment and identifies surgical procedures of greater complexity and follow-up care. This list of GSI values is publicly available at: <https://www.cms.gov/Medicare/Medicare-fee-for-service-payment/physicianfeesched/pfs-federal-regulation-notices-items/cms-1590-fc.html> (download CY 2013 PFS Addenda, Addendum B).

Rationale: Ambulatory procedures include a heterogeneous mix of non-surgical procedures, minor surgeries, and more substantive surgeries. We aim to include major and minor surgeries but not very low-risk (very minor) surgeries or non-surgical procedures that typically have a high volume and a very low outcome rate.

- To identify the subset of ASC general surgery procedures, we obtained input from clinical consultants and TEP members to identify procedures within the scope of general surgery using the Clinical Classifications Software (CCS) developed by the Agency for Healthcare Research and Quality (AHRQ). We did not include gastrointestinal endoscopy, endocrine, or vascular procedures, other than varicose vein procedures, because reasons for hospital visits are typically related to patients’ underlying comorbidities. See [Table A1](#) for a complete list of all CPT® procedure codes included in the measure cohort.

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<sup>1</sup> This list of surgeries was used for several reasons. The ASC list is publicly available, is annually reviewed and updated by Medicare, and includes a transparent public comment submission and review process for addition and/or removal of procedures. Using an existing, defined list of same-day surgical procedures, rather than defining surgical procedures de novo, is useful for long-term measure maintenance. Procedures included on Medicare’s list of covered ASC procedures are defined using Healthcare Common Procedure Coding System (HCPCS) and CPT® codes.

### *7.3.2 Exclusion Criteria*

- Procedures for patients who survived at least 7 days, but were not continuously enrolled in Medicare FFS Parts A and B in the 7 days after the surgery are excluded.

Rationale: These patients are excluded to ensure all patients have full data available for outcome assessment.

## **7.4 Outcome**

### *7.4.1 Definition of Outcome*

The outcome is any unplanned hospital visit within 7 days of an outpatient general surgery. The outcome of hospital visits is the focus of this measure because this is a broad, patient-centered outcome that captures the full range of hospital visits resulting from adverse events or poor care coordination following outpatient surgery. This measure's goal is to assess and illuminate variation in risk-adjusted hospital visits following surgery for quality improvement purposes.

A hospital visit is defined as any ED visit, observation stay, or unplanned inpatient admission occurring after the ASC procedure; "planned" admissions for follow-up care are not included, as these hospital visits do not reflect quality differences. Hospital acute care visits and admissions are well-described and recognized indicators of quality for outpatient surgery at ASCs (see [Section 6.3](#)).

ED visits and observation stays are defined using billing codes identified in Medicare Part B outpatient hospital claims (see [Appendix B](#)).

### *7.4.2 Outcome Timeframe*

The outcome of hospital visits is limited to 7 days since existing literature suggests that the vast majority of adverse events after outpatient surgery occur within the first 7 days following the surgery.<sup>4,23</sup> In addition, our data analysis showed the highest rates of hospital visits occurring within 7 days of outpatient general surgery. As the results in [Figure 1](#) show, among general surgery procedures, the daily rate of unplanned hospital visits was highest immediately following the procedure and leveled off to a baseline rate of approximately 2.0 visits per 1,000 procedures after 7 days. Based on empiric analyses and expert input from our surgical consultants and TEP members, we conclude that unplanned hospital visits within 7 days is the optimal timeframe to ensure capture of surgery-related adverse events and to minimize capture of hospital visits unrelated to the surgery.

### *7.4.3 Multiple Qualifying Procedures within a 7-Day Period*

In rare instances (3.8%), an index procedure is followed by another qualifying ASC general surgery procedure within 7 days. When there are 2 or more qualifying surgical procedures within a 7-day period, the measure considers all procedures as index procedures; however, the timeframe for outcome assessment is defined as the interval between procedures (including the day of the next procedure) for the first procedure and then 7 days after the last procedure. If the timeframe for outcome assessment were 7 days after each procedure that occurs within a 7-day period, it would be possible for a single outcome to be attributed to 2 or more index procedures. For example, consider the following scenario: Procedure #1 on Day 1, Procedure #2 on Day 4, and ED visit on Day 6. Using the standard 7-day timeframe, the outcome on Day 6 would get attributed to both procedures. Using the refined coding, however, the outcome on Day 6 would get attributed to only Procedure #2, and Procedure #1 would not have an outcome because there was no unplanned hospital visit between Procedures #1 and #2.

#### *7.4.4 All-Cause Hospital Visits*

We measure all-cause, unplanned hospital visits to encourage facilities to minimize all types of risks that may lead to the need for a hospital visit after ASC surgery. Measuring only hospital visits that are overtly related to a procedure, such as pain and bleeding, would limit the measure's impact on quality improvement efforts. Measuring all-cause patient outcomes encourages facilities to minimize the risk of a broad range of outcomes, including the risk of dehydration, nausea and vomiting, dizziness, and urinary retention. These are common problems that may or may not be related to a recent ASC surgery. Thus, the measure is structured so that facilities that most effectively minimize patient risk of these outcomes will perform better on the measure.

The rate of hospital visits is not expected to be zero since some patients will have visits for reasons completely unrelated to the procedure. The measure is risk adjusted for patient demographics, clinical characteristics, and surgical procedural complexity so that facilities that experience more unrelated visits due to a generally higher-risk patient mix are not disadvantaged.

#### *7.4.5 Removal of Planned Admissions from the Outcome*

For inpatient admissions occurring after general surgery procedures performed at ASCs, only unplanned admissions are included in the measure outcome. "Planned" admissions are those planned by providers for anticipated medical treatment or procedures that must be provided in the inpatient setting; these are not included in the outcome because variation in planned admissions would not reflect quality of care differences.

To identify admissions as planned or unplanned, we applied an algorithm previously developed for CMS's hospital readmission measures, the CMS Planned Readmission Algorithm Version 4.0. In brief, the algorithm uses the procedure codes and principal discharge diagnosis code on each hospital claim to identify admissions that are typically planned. A few specific, limited types of care are always considered planned (for example, major organ transplant, rehabilitation, or maintenance chemotherapy). Otherwise, a planned admission is defined as a non-acute admission for a scheduled procedure (for example, total hip replacement or cholecystectomy). Post-discharge admissions for an acute illness or for complications of care are never considered planned.

See [Appendix B](#) for the detailed planned admission algorithm.

## **7.5 Model Development**

### **7.5.1 Overview**

The measure adjusts for ASC case-mix differences across facilities based on patient demographics, clinical characteristics, surgical procedural complexity, and procedure type. Risk adjustment is necessary to ensure that variation in the measure score among ASCs is due to differences in quality of care rather than differences in case mix.

The measure score is an ASC-level risk-standardized hospital visit rate (RSHVR). The RSHVR is calculated as the ratio of the predicted to the expected number of post-surgical unplanned hospital visits among ASC's patients, multiplied by the national observed rate of unplanned hospital visits. For each ASC, the numerator of the ratio is the number of hospital visits predicted for the ASC's patients, accounting for its observed rate, the number and complexity of general surgery procedures performed at the ASC, the procedure type, and the case mix. The denominator is the number of hospital visits expected nationally for the ASC's case/procedure mix. To calculate an ASC's predicted-to-expected (P/E) ratio, the measure uses a two-level hierarchical logistic regression model (see [Appendix D](#)). The log-odds of the outcome for an index procedure is modeled as a function of the patient demographic, comorbidity, and procedure characteristics, and a random ASC-specific intercept. A ratio greater than one indicates that the ASC's patients have more visits than expected, compared to an average ASC with similar patient and procedural complexity. A ratio less than one indicates that the ASC's patients have fewer post-surgical visits than expected, compared to an average ASC with similar patient and procedural complexity. An ASC's P/E ratio is then multiplied by the overall national rate of unplanned hospital visits to calculate the ASC-level RSHVR. This approach is analogous to an observed-to-expected ratio, but accounts for within-facility correlation of the observed outcome and sample size differences and accommodates the assumption that underlying differences in quality across ASCs lead to systematic differences in outcomes, and is tailored to

and appropriate for a publicly reported outcome measure as articulated in published scientific guidelines.<sup>24-26</sup>

### *7.5.2 Candidate Risk Factors for Patient-Level Risk Adjustment*

The measure adjusts for differences in patient comorbidities, demographics, and in procedure-related differences in risk across ASCs. We identified potential candidate risk factors through: 1) prior work on related quality measures (including the related urology and orthopedic ASC measures); 2) a focused literature review; and 3) TEP and expert input.

Candidate risk factors identified from work on related measures included opioid abuse, chronic anticoagulant use, tobacco use disorder, benign prostatic hyperplasia, morbid obesity, Work RVU, number of qualifying procedures, and procedure type. We used work RVU of the procedure to address surgical procedural complexity, an approach employed by the American College of Surgeons National Surgical Quality Improvement Program (NSQIP).<sup>27</sup>

To identify additional clinical and procedural risk factors, we searched the literature for relevant peer-reviewed publications of variables that predicted hospital visits after outpatient general surgery procedures using Ovid MEDLINE and PubMed. The search yielded a total of 138 studies potentially relevant to the general surgery measure. Of these studies, 131 were excluded after review of the abstract, and 3 were excluded after full-text review. We added variables identified in the literature to our list of candidate risk factors if they were significantly associated with unplanned hospital visits in bivariate or multivariable analyses at the 0.05 level. From the 4 studies, we identified two variables not already included: anesthesia type and operating time.<sup>28,29</sup> However, we did not include anesthesia type or operating time because we do not risk adjust for discretionary procedure differences (such as approach to anesthesia or surgical techniques).

To define the clinical risk factors in claims data, we used CMS's Version 22 hierarchical condition categories (HCCs) to operationalize the candidate clinical comorbidities. The HCCs classify 68,000 International Classification of Diseases, Tenth Revision (ICD-10-CM) and over 15,000 ICD-9-CM diagnosis codes into clinically coherent condition categories. Then, to consolidate similar risk factors into fewer, broader risk variables, we examined the frequency, bivariate direction and strength of association with the outcome of the individual risk factors defined by condition categories or ICD-10-CM codes, and then combined risk factor diagnoses into clinically coherent comorbidity variables. For example, we created a "cancer" variable that combined several individual cancer diagnoses.

Our expert clinical consultants and the TEP reviewed this preliminary list of risk variables and suggested additional variables: failure to thrive (poor nutritional status), history of falling, sleep

apnea, and history of steroid use. We added all suggested candidate variables; the final list included 80 candidate risk variables and is shown in [Appendix D, Table D1](#). The CCs that are not risk adjusted for if they occur only at the time of the procedure are in [Appendix D, Table D2](#).

### *7.5.3 Final Risk-Adjustment Variable Selection*

To select the final set of variables for the risk-adjustment model, risk variables were entered into logistic regression analyses predicting the outcome of hospital visits within 7 days in the 2015 Development Sample. The Development Sample is a randomly selected 50% sample of our 2015 Medicare cohort. To develop a parsimonious risk model, non-significant variables were iteratively removed from the model using a stepwise purposeful selection approach described by Hosmer and Lemeshow.<sup>30</sup> All variables significant at  $p < 0.05$  were retained in the final model.

In addition, we tested interaction terms and retained those that were both significant at  $p < 0.05$  and demonstrated a clinically plausible relationship to the outcome.

### *7.5.4 Model Performance and Validation*

To assess performance of the patient-level risk-adjustment model in the 2015 Development Sample, the area under the receiver operating characteristic curve as measured by the c-statistic was calculated. Observed hospital visit rates were compared to predicted hospital visit probabilities in the predicted risk deciles, and the range of predicted probabilities from lowest to highest risk decile was evaluated to examine model discrimination.

Several analyses to validate the patient-level risk-adjustment model were performed. First, we compared model performance in the 2015 Development Sample with its performance in the 2015 Validation Sample. The c-statistic and model discrimination (predictive ability) were compared.<sup>31</sup> Second, we examined the stability of the risk variable frequencies and regression coefficients across the development and validation datasets. Third, we calculated over-fitting indices in the 2015 Validation Sample. Over-fitting refers to the phenomenon in which a model describes the relationship between predictive variables and outcome well in the development dataset but fails to provide valid predictions in a new sample of patients (in this case, our validation dataset). Estimated calibration values of  $\gamma_0$  far from 0 and estimated values of  $\gamma_1$  far from 1 provide evidence of over-fitting.

### *7.5.5 Selection of Random Effects Term Distribution*

We examined different distributions (Normal, T, Exponential and Gamma distributions) of random effects in the hierarchical logistic regression model by evaluating model DIC (Deviance Information Criteria). The hierarchical model with normally distributed random effects had the lowest DIC and was used to calculate ASC-level measure scores.

### *7.5.6 Calculation of ASC-Level Measure Score Variation and Outlier Status*

ASCs' measure scores were calculated using a combined Medicare FFS 2014-2015 Dataset. As noted above in [Section 7.5.1](#), we calculated the RSHVR for each ASC by computing the ratio of the number of predicted unplanned hospital visits to the number of expected unplanned hospital visits and then multiplying the ratio by the national outcome rate in the Medicare FFS 2014-2015 Dataset. Then, we evaluated variation in the risk-adjusted measure scores among ASCs in two ways. First, we described the distribution of the RSHVR. Second, we assigned ASCs to one of three performance categories: 'better than national rate', 'no different than national rate' and 'worse than national rate'. To do this, we computed a 95% interval estimate of the RSHVR for each ASC to characterize the level of uncertainty around the specific point estimate. ASCs with 95% interval estimates that did not include the national rate were deemed either worse than or better than national rate; ASCs with 95% interval estimates that include the national rate were deemed no different than the national rate.

### *7.5.7 ASC-Level Measure Score Reliability Testing*

To calculate measure score reliability for a 2-year reporting period, we used split samples of four years of claims data from 2012-2015. Reliability of the ASC-level measure score was tested by calculating the intra-class correlation coefficient (ICC). To calculate the ICC, the 2012-2015 data were split into two samples. For ASCs with two or more general surgery procedures, these procedures were randomly split into the two samples within each facility. The ASCs with one procedure were randomly split into the two samples. The ICC evaluated the agreement between the RSHVR calculated in the two randomly selected samples.<sup>32</sup>

### *7.5.8 Statistical Software*

All statistical analyses were performed using Statistical Analysis System (SAS) version 9.4 (SAS Institute Inc., Cary, NC). We used both GLIMMIX and MCMC procedures in SAS for identifying the optimal model for this measure. The final hierarchical logistic regression model was estimated using the GLIMMIX procedure in SAS.

## 8. Results

### 8.1 Cohort Size and Unadjusted Outcome Rates in the 2015 Data

#### 8.1.1 Cohort

After applying all inclusion and exclusion criteria, the 2015 100% FFS dataset included 149,932 outpatient general surgeries performed at 3,256 ASCs. The 2015 Development and Validation Samples consisted of 74,966 and 74,966 general surgery procedures performed at 2,989 and 2,951 ASCs, respectively. In both the Development and Validation Samples, the average age of patients was 76.3 years, and the comorbidity frequencies were similar ([Table 1](#)).

[Table 2](#) presents the top 20 most common surgeries included in the Medicare FFS CY 2015 Dataset (CY 2015 general surgery ASC measure cohort); they represent 57.6% of all surgeries in the cohort.

Across ASCs in the Medicare FFS 2015 dataset, the median volume of general surgery procedure cases in the cohort was 12 and ranged from 1 to 1,620 procedures per ASC (the 25<sup>th</sup> and 75<sup>th</sup> percentiles were 4 and 43 procedures, respectively). These results show that there were many ASCs with few cases in the Medicare FFS CY 2015 dataset; 1,157 ASCs had more than 25 cases.

#### 8.1.2 Outcome Rates and Distribution

In the 2015 100% FFS dataset, the overall national 7-day unplanned hospital visit rate was 2.2%. Of these hospital visits, 1.6% were ED or observation stay visits and 0.6% were unplanned inpatient admissions ([Table 3](#)).

The distribution of unadjusted outcome rates was skewed, suggesting variation in quality. Among the 1,157 ASCs with at least 25 cases in the Medicare FFS CY 2015 dataset, the unadjusted rate of unplanned hospital visits ranged from 0% to 13.2%. Among these ASCs with 25 or more cases, 25.2% had a rate of 0%; however, the top 10% had rates exceeding 5.7%. The results show important variation in performance across ASC facilities. While many achieve very low rates, there is a wide range of outcome rates, suggesting room for improvement.

Hospital visits after general surgery ASC procedures were for a diverse array of reasons. Potentially preventable causes, such as urinary retention, pain, nausea, vomiting, syncope, and other surgery-related complications, were common diagnoses associated with unplanned hospital visits across the AHRQ clinical categories included in the measure cohort ([Table 4](#)).



## 8.2 Patient-Level Risk-Adjustment Model

### 8.2.1 Candidate and Final Variables

Candidate variables for risk adjustment included patient demographic, clinical, and procedural-related characteristics ([see Appendix D, Table D1](#)). After performing the stepwise variable selection procedure described in [Section 7.5.3](#) above, the final risk-adjustment model included age, 20 comorbidities, work RVUs to adjust for surgical procedural complexity, number of qualifying procedures, procedure type (abdomen vs. alimentary tract vs. breast vs. skin/soft tissue vs. wound vs. varicose vein), and one interaction term. [Table 1](#) shows the frequency of the final risk-adjustment variables in the Development and Validation Samples.

### 8.2.2 Model Performance and Validation

As the results in [Table 5](#) show, the c-statistic in both the 2015 Development and Validation Sample final models was 0.702, which indicated good model discrimination. Additionally, the risk decile plots showed good discrimination; the model performed well in each of the risk deciles in both the Development Sample ([Figure 2](#)) and the Validation Sample ([Figure 3](#)). The mean observed unplanned hospital visit rate in the 2015 Development Sample ranged from 0.74% in the lowest decile of predicted general surgery hospital visit rate to 6.42% in the highest predicted risk decile, a range of 5.68%; the mean observed unplanned hospital visit rate in the 2015 Validation Sample ranged from 0.69% in the lowest predicted risk decile to 6.51% in the highest predicted risk decile, a range of 5.82% ([Table 5](#)).

The regression coefficients of the model variables were stable across the Development and Validation Samples ([Table 6](#)).

## 8.3 ASC-Level Measure Score

### 8.3.1 ASC-Level Measure Score Variation and Outlier Status

The risk-standardized measure scores estimated using two full years of Medicare FFS data (2014 and 2015) showed variation across ASCs. Among ASCs performing at least 25 procedures ([Figure 4](#)), the median RSHVR was 2.19%, ranging from 0.92% to 4.67% (the 25th and 75th percentiles were 2.02% and 3.07%, respectively). Using a bootstrapped 95% interval estimate, we found 30 significant outliers among 1,651 ASCs meeting the volume threshold of at least 25 cases; 14 were categorized as better than national rate, 1,621 as no different than national rate, and 16 as worse than the national rate.

### *8.3.2 ASC-Level Measure Score Reliability Testing*

The results of reliability testing are consistent with existing measures of patient outcomes in the ambulatory surgery setting. The agreement between the two RSHVR values for each ASC was calculated for two years to be ICC [2,1] = 0.526, indicating moderate measure score reliability.<sup>32</sup>

## 9. Summary and Discussion

Hospital visits following general surgery procedures performed at ASCs are unexpected by patients, currently largely invisible to providers, and costly to the healthcare system. The ASC general surgery measure, as specified, has the potential to illuminate these quality differences, inform patient choice, drive quality improvement, and enhance care coordination, with the ultimate goal of reducing unplanned hospital visits following general surgery procedures performed at ASCs.

Medicare beneficiaries commonly undergo outpatient general surgery procedures at ASCs. Using a national 100% Medicare FFS dataset, we estimated that approximately 149,932 outpatient general surgery procedures were performed in 2015 at 3,256 ASCs using the cohort definition for the measure. Our analysis suggests that 2.2% of general surgery procedures at ASCs among Medicare FFS patients aged 65 years and older are followed by unplanned hospital visits within 7 days. Hospital visits often occur due to potentially preventable adverse events, such as urinary retention, bleeding, postoperative pain, and nausea and vomiting. Our results also show significant variation in unplanned hospital visits among ASCs after adjusting for case mix, which suggests variation in quality of care.

The many small-volume ASCs make development and use of outcome measures to assess quality of care challenging. ASCs with few cases in a given year do not provide enough information about quality and limit our ability to estimate risk-adjusted facility-level measure scores. However, as mentioned above in [Section 7.2](#), for public reporting, CMS is considering using more than 1 year of data to ensure reliable estimates.

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## 11.Tables

**Table 1. Frequency of risk model variables in the Medicare Development and Validation Samples (dataset: Medicare FFS CY 2015)**

| Variable (definition)   | 2015<br>Development Sample<br>(50%) |       | 2015<br>Validation Sample (50%) |       |
|---|-------------------------------------|-------|---------------------------------|-------|
|   | #                                   | %     | #                               | %     |
| <b>N</b>  | 74,966                              |       | 74,966                          |       |
| Age: mean (standard deviation [SD])   | 76.3                                | 7.2%  | 76.3                            | 7.2%  |
| Number of qualifying procedures: 1  | 56,840                              | 75.8% | 57,228                          | 76.3% |
| Number of qualifying procedures: 2  | 13,910                              | 18.6% | 13,839                          | 18.5% |
| Number of qualifying procedures: ≥3   | 4,216                               | 5.6%  | 3,899                           | 5.2%  |
| Procedure Type: Abdomen and its contents  | 9,512                               | 12.7% | 9,468                           | 12.6% |
| Procedure Type: Alimentary tract  | 4,990                               | 6.7%  | 5,094                           | 6.8%  |
| Procedure Type: Breast  | 5,082                               | 6.8%  | 5,101                           | 6.8%  |
| Procedure Type: Skin/soft tissue  | 41,554                              | 55.4% | 41,570                          | 55.5% |
| Procedure Type: Wound   | 13,243                              | 17.7% | 13,152                          | 17.5% |
| Procedure Type: Vascular  | 585                                 | 0.8%  | 581                             | 0.8%  |
| Work Relative Value Units: mean (SD)  | 7.0                                 | 3.9%  | 7.0                             | 3.9%  |
| <b>Comorbidities</b>  |                                     |       |                                 |       |
| Other benign tumors (CC 15, 16)   | 60,004                              | 80.0% | 59,966                          | 80.0% |
| Liver or biliary disease (CC 27, 28, 29, 30, 31)                                    | 6,621                               | 8.8%  | 6,676                           | 8.9%  |
| Disorders of immunity (CC 47)   | 1,648                               | 2.2%  | 1,765                           | 2.4%  |
| Dementia or senility (CC 51, 52, 53)  | 5,697                               | 7.6%  | 5,661                           | 7.6%  |
| Psychiatric disorders (CC 57, 58, 59, 60, 61, 62, 63)                               | 16,007                              | 21.4% | 15,925                          | 21.2% |
| Other significant central nervous system (CNS) disease (CC 77, 78, 79, 80)          | 2,716                               | 3.6%  | 2,795                           | 3.7%  |
| Ischemic heart disease (CC 86, 87, 88, 89)  | 21,595                              | 28.8% | 21,504                          | 28.7% |
| Other and unspecified heart diseases (CC 90, 92, 93, 98)                            | 8,805                               | 11.7% | 8,936                           | 11.9% |
| Specified arrhythmias and other heart rhythm disorders (CC 96, 97)                  | 21,064                              | 28.1% | 21,143                          | 28.2% |
| Vascular or circulatory disease (CC 106, 107, 108, 109)                             | 24,136                              | 32.2% | 24,282                          | 32.4% |
| Chronic lung disease (CC 110, 111, 112, 113)  | 15,216                              | 20.3% | 15,048                          | 20.1% |
| Pneumonia (CC 114, 115, 116)  | 4,898                               | 6.5%  | 4,851                           | 6.5%  |
| Dialysis or sever chronic kidney disease (CC 134, 136, 137)                         | 2,077                               | 2.8%  | 2,046                           | 2.7%  |
| Urinary tract infection and other urinary tract disorders (CC 144, 145)             | 21,166                              | 28.2% | 21,293                          | 28.4% |
| Benign prostatic hyperplasia (ICD-9 codes: 60000, 60001, 60020, 60021, 60090, 6091; | 14,733                              | 19.7% | 14,672                          | 19.6% |

| Variable (definition)  | 2015<br>Development Sample<br>(50%) |       | 2015<br>Validation Sample (50%) |       |
|--|-------------------------------------|-------|---------------------------------|-------|
|  | #                                   | %     | #                               | %     |
| ICD-10 codes: N40.0, N40.1, N40.2, N40.3)  |                                     |       |                                 |       |
| Cellulitis, local skin infection (CC 164)  | 10,497                              | 14.0% | 10,471                          | 14.0% |
| Other dermatological disorders (CC 165)  | 57,448                              | 76.6% | 57,567                          | 76.8% |
| Major traumatic fracture or internal injury (CC 169, 170, 171, 172, 173, 174)  | 25,326                              | 33.8% | 25,601                          | 34.2% |
| Chronic anticoagulant use (ICD-9 code: V5861; ICD-10 code: Z7901 [long-term <sup>19</sup> use of anticoagulants])  | 7,653                               | 10.2% | 7,712                           | 10.3% |
| Opioid abuse (ICD-9 codes: 30400, 30401, 30402, 30403, 30470, 30471, 30472, 30403, 30550, 30551, 30552, 30553;<br>ICD-10: codes: F11.10, F11.120, F11.121, F11.122, F11.129, F11.14, F11.150, F11.151, F11.159, F11.181, F11.182, F11.188, F11.19, F11.20, F11.21, F11.220, F11.221, F11.222, F11.229, F11.23, F11.24, F11.250, F11.251, F11.259, F11.281, F11.282, F11.288, F11.29) | 377                                 | 0.5%  | 357                             | 0.5%  |

**Table 2. Top 20 procedures in the general surgery cohort (dataset: Medicare FFS CY 2015)**

| CPT® code | CPT® code short description | Number of procedures | % of all surgeries |
|-----------|-----------------------------|----------------------|--------------------|
| 14060     | Skin tissue rearrangement   | 11409                | 7.6%               |
| 13132     | Repair of wound or lesion   | 11207                | 7.5%               |
| 15260     | Skin full graft een & lips  | 7996                 | 5.3%               |
| 14040     | Skin tissue rearrangement   | 7212                 | 4.8%               |
| 49505     | Prp i/hern init reduc >5 yr | 7072                 | 4.7%               |
| 46221     | Ligation of hemorrhoid(s)   | 4485                 | 3.0%               |
| 13121     | Repair of wound or lesion   | 3941                 | 2.6%               |
| 14041     | Skin tissue rearrangement   | 3910                 | 2.6%               |
| 19301     | Partical mastectomy         | 3521                 | 2.3%               |
| 14301     | Skin tissue rearrangement   | 3353                 | 2.2%               |
| 14061     | Skin tissue rearrangement   | 3240                 | 2.2%               |
| 13101     | Repair of wound or lesion   | 2735                 | 1.8%               |
| 15732     | Muscle-skin graft head/neck | 2707                 | 1.8%               |
| 47562     | Laparoscopic choletectomy   | 2357                 | 1.6%               |
| 49650     | Lap ing hernia repair init  | 2348                 | 1.6%               |
| 14020     | Skin tissue rearrangement   | 2186                 | 1.5%               |
| 14021     | Skin tissue rearrangement   | 1670                 | 1.1%               |
| 11606     | Exc tr-ext mal+marg > 4 cm  | 1668                 | 1.1%               |
| 12032     | Intmd wnd repair s/a/t/ext  | 1647                 | 1.1%               |



| CPT® code | CPT® code short description | Number of procedures | % of all surgeries |
|-----------|-----------------------------|----------------------|--------------------|
| 19125     | Excision breast lesion      | 1625                 | 1.1%               |

**Table 3. Number and frequency of emergency department visits, observation stays, and unplanned inpatient admissions (dataset: Medicare FFS CY 2015)**

| Number of general surgery procedures           | Number with unplanned hospital visits outcome | Overall 7-day unplanned hospital visit rate |
|--|---|---|
| 149,932  | 3,299   | 2.2   |
| Outcome type                                   | #   | %   |
| Emergency department or observation stay visit | 2,445   | 1.6   |
| Unplanned inpatient admission                  | 854   | 0.6   |

**Table 4. Top hospital visit diagnoses for any hospital visit within 7 days of general surgery procedures (dataset: Medicare FFS CY 2015)**

| AHRQ clinical category  | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
| 53 – Varicose vein stripping, lower limb                      | 1,166                                     | 21                                  | 1.8%                                  | 99811                                   | Hemorrhage complic proc     | 3                            | M79651                                   | Pain in right thigh   | 1                             |
|   |   |                                     |                                       | 78659                                   | Chest pain NEC              | 2                            | T426X2A                                  | Poisoning by other antiepileptic and sedative-hypnotic drugs, intentional self-harm, initial encounter    | 1                             |
|   |   |                                     |                                       | 99832                                   | Disrup-external op wound    | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 9162                                    | Blister hip & leg           | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 87342                                   | Open wound of forehead      | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 78829                                   | Oth spcf retention urine    | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 78060                                   | Fever NOS                   | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 59080                                   | Pyelonephritis NOS          | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 5770                                    | Acute pancreatitis          | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 99859                                   | Other postop infection      | 1                            | -  | -   | -                             |
| 67 – Other therapeutic procedures, hemic and lymphatic system | 1,876                                     | 54                                  | 2.9%                                  | 99811                                   | Hemorrhage complic proc     | 4                            | L7621                                    | Postprocedural hemorrhage and hematoma of skin and subcutaneous tissue following a dermatologic procedure | 3                             |

| AHRQ clinical category                    | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description                                   | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
|   |   |                                     |                                       | 43491                                   | Crbl art ocl NOS w infrc    | 3                            | A419                                     | Sepsis, unspecified organism                                   | 2                             |
|   |   |                                     |                                       | 99859                                   | Other postop infection      | 2                            | A408                                     | Other streptococcal sepsis                                     | 1                             |
|   |   |                                     |                                       | 7231                                    | Cervicalgia                 | 2                            | C8387                                    | Other non-follicular lymphoma, spleen                          | 1                             |
|   |   |                                     |                                       | 20281                                   | Lymphomas NEC head          | 2                            | C8510                                    | Unspecified B-cell lymphoma, unspecified site                  | 1                             |
|   |   |                                     |                                       | 56400                                   | Constipation NOS            | 1                            | C8593                                    | Non-Hodgkin lymphoma, unspecified, intra-abdominal lymph nodes | 1                             |
|   |   |                                     |                                       | 56089                                   | Intestinal obstruct NEC     | 1                            | N952                                     | Postmenopausal atrophic vaginitis                              | 1                             |
|   |   |                                     |                                       | 490                                     | Bronchitis NOS              | 1                            | R339                                     | Retention of urine, unspecified                                | 1                             |
|   |   |                                     |                                       | 42833                                   | Ac on chr diast hrt fail    | 1                            | R55                                      | Syncope and collapse   | 1                             |
|   |   |                                     |                                       | 42731                                   | Atrial fibrillation         | 1                            | Z4889                                    | Encounter for other specified surgical aftercare               | 1                             |
| 71 – Gastrostomy, temporary and permanent | 5   | 0                                   | 0.0%                                  | -                                       | -                           | -                            | -  | -  | -                             |
| 72 – Colostomy, temporary and permanent   | 11  | 0                                   | 0.0%                                  | -                                       | -                           | -                            | -  | -  | -                             |
| 73 – Ileostomy and                        | 4   | 0                                   | 0.0%                                  | -                                       | -                           | -                            | -  | -  | -                             |

| AHRQ clinical category                | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|---------------------------------------|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
| other enterostomy                     |   |                                     |                                       |   |                             |                              |  |  |                               |
| 76 – Colonoscopy and biopsy           | 49  | 5                                   | 10.2%                                 | 78820                                   | Retention urine NOS         | 2                            | D649                                     | Anemia, unspecified  | 1                             |
|                                       |   |                                     |                                       | 8409                                    | Sprain shoulder/arm NOS     | 1                            |  |  |                               |
|                                       |   |                                     |                                       | 78079                                   | Malaise and fatigue NEC     | 1                            |  |  |                               |
| 77 – Proctoscopy and anorectal biopsy | 120                                       | 1                                   | 0.8%                                  | -                                       | -                           | -                            | J189                                     | Pneumonia, unspecified organism  | 1                             |
| 78 – Colorectal resection             | 442                                       | 20                                  | 4.5%                                  | 5693                                    | Rectal & anal hemorrhage    | 3                            | I5043                                    | Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure | 1                             |
|                                       |   |                                     |                                       | 99811                                   | Hemorrhage complic proc     | 2                            | N179                                     | Acute kidney failure, unspecified  | 1                             |
|                                       |   |                                     |                                       | 78820                                   | Retention urine NOS         | 2                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 8021                                    | Nasal bone fx-open          | 1                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 7823                                    | Edema                       | 1                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 605                                     | Redun prepuce & phimosis    | 1                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 5849                                    | Acute kidney failure NOS    | 1                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 78760                                   | Full incontinence-feces     | 1                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 56400                                   | Constipation NOS            | 1                            | -  | -  | -                             |
|                                       |   |                                     |                                       | 4558                                    | Hemorrhoid NOS w comp NEC   | 1                            | -  | -  | -                             |
| 81 – Hemorrhoid procedures            | 7,784                                     | 244                                 | 2.9%                                  | 78820                                   | Retention urine NOS         | 46                           | R339                                     | Retention of urine, unspecified  | 14                            |

| AHRQ clinical category                      | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
|   |   |                                     |                                       | 99811                                   | Hemorrhage complic proc     | 6                            | K5900                                    | Constipation, unspecified  | 2                             |
|   |   |                                     |                                       | 9975                                    | Surg compl-urinary tract    | 6                            | K644                                     | Residual hemorrhoidal skin tags                                      | 2                             |
|   |   |                                     |                                       | 78659                                   | Chest pain NEC              | 6                            | I4891                                    | Unspecified atrial fibrillation                                      | 1                             |
|   |   |                                     |                                       | 5693                                    | Rectal & anal hemorrhage    | 5                            | I639                                     | Cerebral infarction, unspecified                                     | 1                             |
|   |   |                                     |                                       | 7802                                    | Syncope and collapse        | 4                            | J189                                     | Pneumonia, unspecified organism                                      | 1                             |
|   |   |                                     |                                       | 56942                                   | Anal or rectal pain         | 4                            | J205                                     | Acute bronchitis due to respiratory syncytial virus                  | 1                             |
|   |   |                                     |                                       | 56400                                   | Constipation NOS            | 4                            | J690                                     | Pneumonitis due to inhalation of food and vomit                      | 1                             |
|   |   |                                     |                                       | 78900                                   | Abdmnal pain unspcf site    | 3                            | K626                                     | Ulcer of anus and rectum   | 1                             |
|   |   |                                     |                                       | 78701                                   | Nausea with vomiting        | 3                            | K8000                                    | Calculus of gallbladder with acute choletitis without obstruction    | 1                             |
| 84 – Cholectomy and common duct exploration | 3,472                                     | 223                                 | 6.4%                                  | 78820                                   | Retention urine NOS         | 18                           | R339                                     | Retention of urine, unspecified                                      | 11                            |
|   |   |                                     |                                       | 33818                                   | Acute postop pain NEC       | 11                           | G8918                                    | Other acute postprocedural pain                                      | 5                             |
|   |   |                                     |                                       | 99749                                   | Oth digestv system comp     | 9                            | K9189                                    | Other postprocedural complications and disorders of digestive system | 4                             |

| AHRQ clinical category                  | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
|   |   |                                     |                                       | 99859                                   | Other postop infection      | 5                            | K91840                                   | Postprocedural hemorrhage and hematoma of a digestive system organ or structure following a digestive system procedure | 3                             |
|   |   |                                     |                                       | 0389                                    | Septicemia NOS              | 5                            | J189                                     | Pneumonia, unspecified organism  | 2                             |
|   |   |                                     |                                       | 78900                                   | Abdmnal pain unspcf site    | 4                            | J95821                                   | Acute postprocedural respiratory failure   | 2                             |
|   |   |                                     |                                       | 78829                                   | Oth spcf retention urine    | 4                            | K913                                     | Postprocedural intestinal obstruction  | 2                             |
|   |   |                                     |                                       | 78701                                   | Nausea with vomiting        | 4                            | R109                                     | Unspecified abdominal pain   | 2                             |
|   |   |                                     |                                       | 9975                                    | Surg compl-urinary tract    | 3                            | A09                                      | Infectious gastroenteritis and colitis, unspecified  | 1                             |
|   |   |                                     |                                       | 78901                                   | Abdmnal pain rt upr quad    | 3                            | A4151                                    | Sepsis due to Escherichia coli [E. coli]   | 1                             |
| 85 – Inguinal and femoral hernia repair | 11,441                                    | 498                                 | 4.4%                                  | 78820                                   | Retention urine NOS         | 84                           | R339                                     | Retention of urine, unspecified  | 25                            |
|   |   |                                     |                                       | 9975                                    | Surg compl-urinary tract    | 13                           | G8918                                    | Other acute postprocedural pain  | 6                             |
|   |   |                                     |                                       | 56400                                   | Constipation NOS            | 13                           | K5900                                    | Constipation, unspecified  | 5                             |
|   |   |                                     |                                       | 99812                                   | Hematoma complic proc       | 11                           | R55                                      | Syncope and collapse   | 5                             |
|   |   |                                     |                                       | 99811                                   | Hemorrhage complic          | 8                            | R338                                     | Other retention of   | 4                             |

| AHRQ clinical category   | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|--------------------------|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
|                          |   |                                     |                                       |   | proc                        |                              |  | urine   |                               |
|                          |   |                                     |                                       | 33818                                   | Acute postop pain NEC       | 8                            | K91841                                   | Postprocedural hemorrhage and hematoma of a digestive system organ or structure following other procedure | 3                             |
|                          |   |                                     |                                       | 99749                                   | Oth digestv system comp     | 7                            | R319                                     | Hematuria, unspecified  | 3                             |
|                          |   |                                     |                                       | 78900                                   | Abdmnal pain unspcf site    | 7                            | A419                                     | Sepsis, unspecified organism  | 2                             |
|                          |   |                                     |                                       | 60886                                   | Edema, male genital orgn    | 6                            | H8110                                    | Benign paroxysmal vertigo, unspecified ear  | 2                             |
|                          |   |                                     |                                       | 60001                                   | BPH w urinary obs/LUTS      | 6                            | I9789                                    | Other postprocedural complications and disorders of the circulatory system, not elsewhere classified      | 2                             |
| 86 – Other hernia repair | 3,797                                     | 147                                 | 3.9%                                  | 78820                                   | Retention urine NOS         | 13                           | R339                                     | Retention of urine, unspecified   | 6                             |
|                          |   |                                     |                                       | 99749                                   | Oth digestv system comp     | 11                           | K5900                                    | Constipation, unspecified   | 2                             |
|                          |   |                                     |                                       | 56400                                   | Constipation NOS            | 6                            | K913                                     | Postprocedural intestinal obstruction   | 2                             |
|                          |   |                                     |                                       | 9975                                    | Surg compl-urinary tract    | 5                            | L7622                                    | Postprocedural hemorrhage and hematoma of skin and subcutaneous tissue                                    | 2                             |

| AHRQ clinical category | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|------------------------|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
|                        |   |                                     |                                       |   |                             |                              |  | following other procedure  |                               |
|                        |   |                                     |                                       | 78900                                   | Abdmnal pain unspcf site    | 5                            | G8918                                    | Other acute postprocedural pain  | 1                             |
|                        |   |                                     |                                       | 99811                                   | Hemorrhage complic proc     | 3                            | I481                                     | Persistent atrial fibrillation   | 1                             |
|                        |   |                                     |                                       | 5609                                    | Intestinal obstruct NOS     | 3                            | I4891                                    | Unspecified atrial fibrillation  | 1                             |
|                        |   |                                     |                                       | 33818                                   | Acute postop pain NEC       | 3                            | I890                                     | Lymphedema, not elsewhere classified   | 1                             |
|                        |   |                                     |                                       | 99859                                   | Other postop infection      | 2                            | J180                                     | Bronchopneumonia, unspecified organism                                       | 1                             |
|                        |   |                                     |                                       | 9982                                    | Accidental op laceration    | 2                            | J440                                     | Chronic obstructive pulmonary disease with acute lower respiratory infection | 1                             |
| 87 – Laparoscopy       | 184                                       | 18                                  | 9.8%                                  | 99673                                   | Comp-ren dialys dev/grft    | 2                            | C801                                     | Malignant (primary) neoplasm, unspecified                                    | 1                             |
|                        |   |                                     |                                       | 78820                                   | Retention urine NOS         | 2                            | K659                                     | Peritonitis, unspecified   | 1                             |
|                        |   |                                     |                                       | 9982                                    | Accidental op laceration    | 1                            | R072                                     | Precordial pain  | 1                             |
|                        |   |                                     |                                       | 78900                                   | Abdmnal pain unspcf site    | 1                            | T8241XA                                  | Breakdown (mechanical) of vascular dialysis catheter, initial encounter      | 1                             |
|                        |   |                                     |                                       | 78951                                   | Malignant ascites           | 1                            | -  | -  | -                             |
|                        |   |                                     |                                       | 7861                                    | Stridor                     | 1                            | -  | -  | -                             |



| AHRQ clinical category                            | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
|   |   |                                     |                                       | 56400                                   | Constipation NOS            | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 51189                                   | Effusion NEC exc tb         | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 45341                                   | Ac DVT/emb prox low ext     | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 41071                                   | Subendo infarct, initial    | 1                            | -  | -   | -                             |
| 94 – Other OR upper GI therapeutic procedures     | 11  | 2                                   | 18.2%                                 | 42789                                   | Cardiac dysrhythmias NEC    | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 42731                                   | Atrial fibrillation         | 1                            | -  | -   | -                             |
| 95 – Other non-OR lower GI therapeutic procedures | 346                                       | 7                                   | 2.0%                                  | 78060                                   | Fever NOS                   | 2                            | G40409                                   | Other generalized epilepsy and epileptic syndromes, not intractable, without status epilepticus | 1                             |
|   |   |                                     |                                       | 78659                                   | Chest pain NEC              | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 7820                                    | Skin sensation disturb      | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 7089                                    | Urticaria NOS               | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 5693                                    | Rectal & anal hemorrhage    | 1                            | -  | -   | -                             |
| 96 – Other OR lower GI therapeutic procedures     | 1,309                                     | 39                                  | 3.0%                                  | 78820                                   | Retention urine NOS         | 4                            | J45901                                   | Unspecified asthma with (acute) exacerbation  | 1                             |
|   |   |                                     |                                       | 56942                                   | Anal or rectal pain         | 2                            | K5641                                    | Fecal impaction   | 1                             |
|   |   |                                     |                                       | 566                                     | Anal & rectal abscess       | 2                            | K5900                                    | Constipation, unspecified   | 1                             |
|   |   |                                     |                                       | 78652                                   | Painful respiration         | 1                            | K603                                     | Anal fistula  | 1                             |
|   |   |                                     |                                       | 78605                                   | Shortness of breath         | 1                            | K611                                     | Rectal abscess  | 1                             |
|   |   |                                     |                                       | 78097                                   | Altered mental status       | 1                            | K625                                     | Hemorrhage of anus  | 1                             |

| AHRQ clinical category                                | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
|   |   |                                     |                                       |   |                             |                              |  | and rectum   |                               |
|   |   |                                     |                                       | 7242                                    | Lumbago                     | 1                            | K6289                                    | Other specified diseases of anus and rectum  | 1                             |
|   |   |                                     |                                       | 6826                                    | Cellulitis of leg           | 1                            | L0231                                    | Cutaneous abscess of buttock   | 1                             |
|   |   |                                     |                                       | 5990                                    | Urin tract infection NOS    | 1                            | R109                                     | Unspecified abdominal pain   | 1                             |
|   |   |                                     |                                       | 5849                                    | Acute kidney failure NOS    | 1                            | -  | -  | -                             |
| 99 – Other OR gastrointestinal therapeutic procedures | 86  | 10                                  | 11.6%                                 | V5831                                   | Attn rem surg dressing      | 1                            | L7622                                    | Postprocedural hemorrhage and hematoma of skin and subcutaneous tissue following other procedure | 1                             |
|   |   |                                     |                                       | 99932                                   | Blood inf dt cen ven cth    | 1                            | R109                                     | Unspecified abdominal pain   | 1                             |
|   |   |                                     |                                       | 99812                                   | Hematoma complic proc       | 1                            | -  | -  | -                             |
|   |   |                                     |                                       | 79902                                   | Hypoxemia                   | 1                            | -  | -  | -                             |
|   |   |                                     |                                       | 78605                                   | Shortness of breath         | 1                            | -  | -  | -                             |
|   |   |                                     |                                       | 7821                                    | Nonspecif skin erupt NEC    | 1                            | -  | -  | -                             |
|   |   |                                     |                                       | 42831                                   | Ac diastolic hrt failure    | 1                            | -  | -  | -                             |
|   |   |                                     |                                       | 25080                                   | DMII oth nt st uncntrld     | 1                            | -  | -  | -                             |
| 165 – Breast biopsy and other diagnostic              | 94  | 4                                   | 4.3%                                  | 56400                                   | Constipation NOS            | 2                            | R110                                     | Nausea   | 1                             |
|   |   |                                     |                                       | -                                       | -                           | -                            | R531                                     | Weakness   | 1                             |

| AHRQ clinical category                     | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|--|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
| procedures on breast                       |   |                                     |                                       |   |                             |                              |  |  |                               |
| 166 – Lumpectomy, quadrantectomy of breast | 6,792                                     | 112                                 | 1.6%                                  | 99812                                   | Hematoma complic proc       | 11                           | I639                                     | Cerebral infarction, unspecified   | 2                             |
|  |   |                                     |                                       | 78659                                   | Chest pain NEC              | 3                            | C50911                                   | Malignant neoplasm of unspecified site of right female breast  | 1                             |
|  |   |                                     |                                       | 56400                                   | Constipation NOS            | 3                            | C50912                                   | Malignant neoplasm of unspecified site of left female breast   | 1                             |
|  |   |                                     |                                       | 5589                                    | Noninf gastroenterit NEC    | 3                            | G453                                     | Amaurosis fugax  | 1                             |
|  |   |                                     |                                       | 1749                                    | Malign neopl breast NOS     | 3                            | I9789                                    | Other postprocedural complications and disorders of the circulatory system, not elsewhere classified | 1                             |
|  |   |                                     |                                       | 4019                                    | Hypertension NOS            | 2                            | J069                                     | Acute upper respiratory infection, unspecified   | 1                             |
|  |   |                                     |                                       | 78650                                   | Chest pain NOS              | 2                            | J9621                                    | Acute and chronic respiratory failure with hypoxia   | 1                             |
|  |   |                                     |                                       | 78079                                   | Malaise and fatigue NEC     | 2                            | J9622                                    | Acute and chronic respiratory failure with hypercapnia   | 1                             |
|  |   |                                     |                                       | 41071                                   | Subendo infarct, initial    | 2                            | K559                                     | Vascular disorder of intestine, unspecified  | 1                             |
|  |   |                                     |                                       | 42789                                   | Cardiac dysrhythmias NEC    | 2                            | L259                                     | Unspecified contact dermatitis, unspecified  | 1                             |

| AHRQ clinical category                                    | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
|   |   |                                     |                                       |   |                             |                              |  | cause  |                               |
| 167 – Mastectomy  | 294                                       | 10                                  | 3.4%                                  | V5831                                   | Attn rem surg dressing      | 2                            | K5641                                    | Fecal impaction  | 1                             |
|   |   |                                     |                                       | V4571                                   | Acq absnce breast/nipple    | 1                            | K5900                                    | Constipation, unspecified  | 1                             |
|   |   |                                     |                                       | 99811                                   | Hemorrhage complic proc     | 1                            | K9419                                    | Other complications of enterostomy                                   | 1                             |
|   |   |                                     |                                       | 99679                                   | Comp-int prost devic NEC    | 1                            | M7989                                    | Other specified soft tissue disorders                                | 1                             |
|   |   |                                     |                                       | 9221                                    | Contusion of chest wall     | 1                            |  |  |                               |
| 168 – Incision and drainage, skin and subcutaneous tissue | 1,251                                     | 76                                  | 6.1%                                  | 99859                                   | Other postop infection      | 6                            | L02512                                   | Cutaneous abscess of left hand                                       | 2                             |
|   |   |                                     |                                       | 99811                                   | Hemorrhage complic proc     | 5                            | A419                                     | Sepsis, unspecified organism   | 1                             |
|   |   |                                     |                                       | 6110                                    | Inflam disease of breast    | 2                            | G8918                                    | Other acute postprocedural pain                                      | 1                             |
|   |   |                                     |                                       | 4019                                    | Hypertension NOS            | 2                            | I63422                                   | Cerebral infarction due to embolism of left anterior cerebral artery | 1                             |
|   |   |                                     |                                       | 5990                                    | Urin tract infection NOS    | 2                            | I959                                     | Hypotension, unspecified   | 1                             |
|   |   |                                     |                                       | 78659                                   | Chest pain NEC              | 2                            | K5900                                    | Constipation, unspecified  | 1                             |
|   |   |                                     |                                       | 68100                                   | Cellulitis, finger NOS      | 2                            | L02511                                   | Cutaneous abscess of right hand                                      | 1                             |
|   |   |                                     |                                       | 99666                                   | React-inter joint prost     | 2                            | L03011                                   | Cellulitis of right finger   | 1                             |
|   |   |                                     |                                       | 43301                                   | Ocl bslr art w infrc        | 1                            | L03114                                   | Cellulitis of left upper limb  | 1                             |

| AHRQ clinical category                        | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|---|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
|   |   |                                     |                                       | 4275                                    | Cardiac arrest              | 1                            | L03116                                   | Cellulitis of left lower limb   | 1                             |
| 169 – Debridement of wound, infection or burn | 72  | 4                                   | 5.6%                                  | 83400                                   | Disl finger NOS-closed      | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 81612                                   | Fx distal phal, hand-opn    | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 81611                                   | Fx mid/prx phal, hand-op    | 1                            | -  | -   | -                             |
|   |   |                                     |                                       | 79029                                   | Abnormal glucose NEC        | 1                            | -  | -   | -                             |
| 170 – Excision of skin lesion                 | 27,276                                    | 434                                 | 1.6%                                  | 99811                                   | Hemorrhage complic proc     | 27                           | L7621                                    | Postprocedural hemorrhage and hematoma of skin and subcutaneous tissue following a dermatologic procedure | 7                             |
|   |   |                                     |                                       | 99859                                   | Other postop infection      | 12                           | R55                                      | Syncope and collapse  | 6                             |
|   |   |                                     |                                       | 99832                                   | Disrup-external op wound    | 8                            | N390                                     | Urinary tract infection, site not specified   | 5                             |
|   |   |                                     |                                       | 7802                                    | Syncope and collapse        | 7                            | T814XXA                                  | Infection following a procedure, initial encounter  | 5                             |
|   |   |                                     |                                       | 78820                                   | Retention urine NOS         | 6                            | A419                                     | Sepsis, unspecified organism  | 2                             |
|   |   |                                     |                                       | 78097                                   | Altered mental status       | 6                            | G8918                                    | Other acute postprocedural pain   | 2                             |
|   |   |                                     |                                       | 7804                                    | Dizziness and giddiness     | 6                            | H9542                                    | Postprocedural hemorrhage and hematoma of ear and   | 2                             |
|   |   |                                     |                                       |   |                             |                              |  |   |                               |

| AHRQ clinical category                       | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|--|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
|  |   |                                     |                                       |   |                             |                              |  | mastoid process following other procedure   |                               |
|  |   |                                     |                                       | 56400                                   | Constipation NOS            | 6                            | J441                                     | Chronic obstructive pulmonary disease with (acute) exacerbation   | 2                             |
|  |   |                                     |                                       | 5589                                    | Noninf gastroenterit NEC    | 5                            | K529                                     | Noninfective gastroenteritis and colitis, unspecified   | 2                             |
|  |   |                                     |                                       | 0389                                    | Septicemia NOS              | 5                            | K5792                                    | Diverticulitis of intestine, part unspecified, without perforation or abscess without bleeding            | 2                             |
| 171 – Suture of skin and subcutaneous tissue | 24,865                                    | 313                                 | 1.3%                                  | 99811                                   | Hemorrhage complic proc     | 17                           | L7621                                    | Postprocedural hemorrhage and hematoma of skin and subcutaneous tissue following a dermatologic procedure | 6                             |
|  |   |                                     |                                       | 99859                                   | Other postop infection      | 10                           | R42                                      | Dizziness and giddiness   | 4                             |
|  |   |                                     |                                       | 99832                                   | Disrup-external op wound    | 7                            | A419                                     | Sepsis, unspecified organism  | 3                             |
|  |   |                                     |                                       | 486                                     | Pneumonia, organism NOS     | 6                            | R0789                                    | Other chest pain  | 3                             |
|  |   |                                     |                                       | 42731                                   | Atrial fibrillation         | 5                            | R55                                      | Syncope and collapse  | 3                             |
|  |   |                                     |                                       | 0389                                    | Septicemia NOS              | 5                            | J189                                     | Pneumonia,  | 2                             |

| AHRQ clinical category | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|------------------------|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
|                        |   |                                     |                                       |   |                             |                              |  | unspecified organism  |                               |
|                        |   |                                     |                                       | 95901                                   | Head injury NOS             | 4                            | K5900                                    | Constipation, unspecified   | 2                             |
|                        |   |                                     |                                       | 920                                     | Contusion face/scalp/nck    | 4                            | M549                                     | Dorsalgia, unspecified  | 2                             |
|                        |   |                                     |                                       | 41071                                   | Subendo infarct, initial    | 4                            | R112                                     | Nausea with vomiting, unspecified   | 2                             |
|                        |   |                                     |                                       | 8910                                    | Open wnd knee/leg/ankle     | 3                            | T814XXA                                  | Infection following a procedure, initial encounter  | 2                             |
| 172 – Skin graft       | 51,165                                    | 963                                 | 1.9%                                  | 99811                                   | Hemorrhage complic proc     | 96                           | L7621                                    | Postprocedural hemorrhage and hematoma of skin and subcutaneous tissue following a dermatologic procedure | 22                            |
|                        |   |                                     |                                       | 42731                                   | Atrial fibrillation         | 18                           | N390                                     | Urinary tract infection, site not specified   | 8                             |
|                        |   |                                     |                                       | 78820                                   | Retention urine NOS         | 17                           | J189                                     | Pneumonia, unspecified organism   | 6                             |
|                        |   |                                     |                                       | 7802                                    | Syncope and collapse        | 17                           | R0789                                    | Other chest pain  | 6                             |
|                        |   |                                     |                                       | 78659                                   | Chest pain NEC              | 15                           | R339                                     | Retention of urine, unspecified   | 6                             |
|                        |   |                                     |                                       | 78079                                   | Malaise and fatigue NEC     | 14                           | R55                                      | Syncope and collapse  | 6                             |
|                        |   |                                     |                                       | 5990                                    | Urin tract infection NOS    | 14                           | S0990XA                                  | Unspecified injury of head, initial encounter   | 6                             |

| AHRQ clinical category                                       | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description  | Frequency of ICD-10 diagnosis |
|--|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|---|-------------------------------|
|  |   |                                     |                                       | 4019                                    | Hypertension NOS            | 14                           | A419                                     | Sepsis, unspecified organism  | 5                             |
|  |   |                                     |                                       | 99859                                   | Other postop infection      | 12                           | E871                                     | Hypo-osmolality and hyponatremia  | 5                             |
|  |   |                                     |                                       | 0389                                    | Septicemia NOS              | 9                            | G459                                     | Transient cerebral ischemic attack, unspecified                                 | 4                             |
| 174 – Other non-OR therapeutic procedures on skin and breast | 2,203                                     | 39                                  | 1.8%                                  | 7802                                    | Syncope and collapse        | 2                            | A419                                     | Sepsis, unspecified organism  | 1                             |
|  |   |                                     |                                       | 4019                                    | Hypertension NOS            | 2                            | K5720                                    | Diverticulitis of large intestine with perforation and abscess without bleeding | 1                             |
|  |   |                                     |                                       | 0389                                    | Septicemia NOS              | 2                            | L03115                                   | Cellulitis of right lower limb  | 1                             |
|  |   |                                     |                                       | 51881                                   | Acute respiratory failure   | 1                            | R51                                      | Headache  | 1                             |
|  |   |                                     |                                       | 5070                                    | Food/vomit pneumonitis      | 1                            | R55                                      | Syncope and collapse  | 1                             |
|  |   |                                     |                                       | 486                                     | Pneumonia, organism NOS     | 1                            | S9032XA                                  | Contusion of left foot, initial encounter                                       | 1                             |
|  |   |                                     |                                       | 45111                                   | Femoral vein phlebitis      | 1                            | T814XXA                                  | Infection following a procedure, initial encounter                              | 1                             |
|  |   |                                     |                                       | 4271                                    | Parox ventric tachycard     | 1                            | -  | -   | -                             |
|  |   |                                     |                                       | 3549                                    | Mononeuritis arm NOS        | 1                            | -  | -   | -                             |
|  |   |                                     |                                       | 33818                                   | Acute postop pain NEC       | 1                            | -  | -   | -                             |



| AHRQ clinical category                                   | Number of procedures in clinical category | Number of unplanned hospital visits | Rate of unplanned hospital visits (%) | Top 10 primary ICD-9 hospital diagnoses | ICD-9 diagnosis description | Frequency of ICD-9 diagnosis | Top 10 primary ICD-10 hospital diagnoses | ICD-10 diagnosis description   | Frequency of ICD-10 diagnosis |
|--|---|-------------------------------------|---------------------------------------|---|-----------------------------|------------------------------|--|--|-------------------------------|
| 175 – Other OR therapeutic procedures on skin and breast | 3,814                                     | 74                                  | 1.9%                                  | 99749                                   | Oth digestv system comp     | 3                            | T814XXA                                  | Infection following a procedure, initial encounter                             | 2                             |
|  |   |                                     |                                       | 9953                                    | Allergy, unspecified        | 3                            | A419                                     | Sepsis, unspecified organism   | 1                             |
|  |   |                                     |                                       | 99812                                   | Hematoma complic proc       | 2                            | C50911                                   | Malignant neoplasm of unspecified site of right female breast                  | 1                             |
|  |   |                                     |                                       | 78097                                   | Altered mental status       | 2                            | J189                                     | Pneumonia, unspecified organism  | 1                             |
|  |   |                                     |                                       | 7804                                    | Dizziness and giddiness     | 2                            | K565                                     | Intestinal adhesions [bands] with obstruction (postprocedural) (postinfection) | 1                             |
|  |   |                                     |                                       | 486                                     | Pneumonia, organism NOS     | 2                            | K859                                     | Acute pancreatitis, unspecified  | 1                             |
|  |   |                                     |                                       | 43491                                   | Crbl art ocl NOS w infrc    | 2                            | L03221                                   | Cellulitis of neck   | 1                             |
|  |   |                                     |                                       | 29281                                   | Drug-induced delirium       | 2                            | M797                                     | Fibromyalgia   | 1                             |
|  |   |                                     |                                       | 4870                                    | Influenza with pneumonia    | 1                            | M7989                                    | Other specified soft tissue disorders  | 1                             |
|  |   |                                     |                                       | 4359                                    | Trans cereb ischemia NOS    | 1                            | R0600                                    | Dyspnea, unspecified   | 1                             |
| 244 – Gastric bypass and volume reduction                | 3   | 1                                   | 33.3%                                 | 53909                                   | Oth cmp gastrc band proc    | 1                            | -  | -  | -                             |

**Table 5. Risk-adjustment model performance summaries in the Medicare Development and Validation Samples (dataset: Medicare FFS CY 2015)**

| Characteristic                                  | 2015 Development Sample | 2015 Validation Sample |
|---|-------------------------|------------------------|
| N   | 74,966 (50%)            | 74,966 (50%)           |
| # of hospital visits in 7 days                  | 1,650 (2.2%)            | 1,649 (2.2%)           |
| Calibration ( $\gamma_0$ , $\gamma_1$ )         | (0, 1)                  | (-0.09, 0.97)          |
| c-statistic                                     | 0.702                   | 0.702                  |
| Predictive ability (lowest-highest risk decile) | 0.74%-6.42%             | 0.69%-6.51%            |

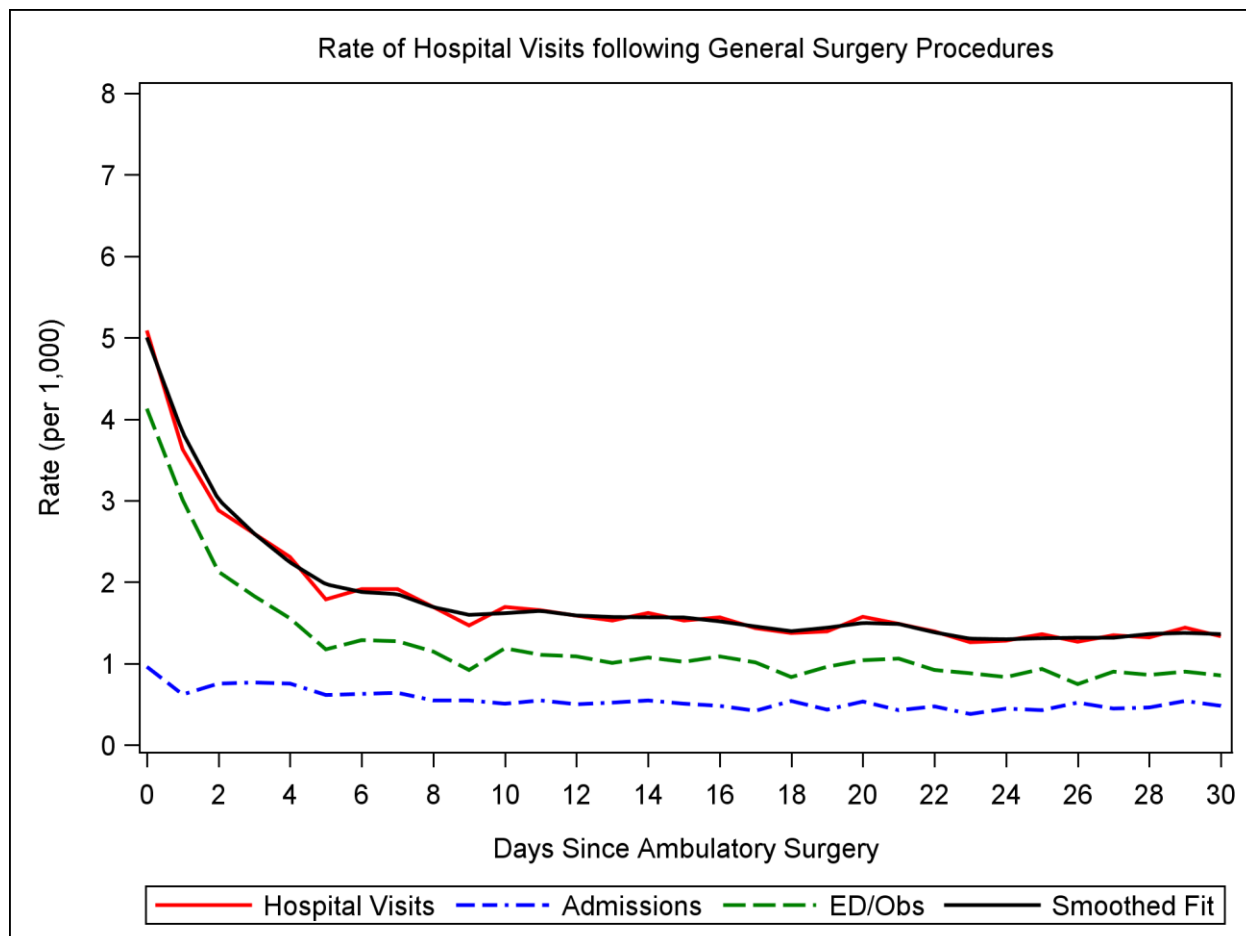
**Table 6. Model parameter estimates and odds ratios in the Medicare Development and Validation Samples (dataset: Medicare FFS CY 2015)**

|   | 2015 Development Sample |                     | 2015 Validation Sample |                     |
|---|-------------------------|---------------------|------------------------|---------------------|
|   | Estimate                | Odds ratio (95% CI) | Estimate               | Odds ratio (95% CI) |
| Intercept   | -3.728                  | -                   | -3.871                 | -                   |
| Age   | 0.029                   | 1.03 (1.02-1.04)    | 0.028                  | 1.03 (1.02-1.04)    |
| Number of qualifying procedures: 1 (reference)            | -                       | -                   | -                      | -                   |
| Number of qualifying procedures: 2                        | 0.118                   | 1.13 (0.98-1.29)    | 0.125                  | 1.13 (0.99-1.30)    |
| Number of qualifying procedures: ≥ 3                      | 0.252                   | 1.29 (1.04-1.60)    | 0.094                  | 1.10 (0.87-1.39)    |
| Procedure type: Abdomen and its content (reference)       | -                       | -                   | -                      | -                   |
| Procedure type: Alimentary tract                          | -0.853                  | -                   | -1.009                 | -                   |
| Procedure type: Breast                                    | -0.708                  | -                   | -1.368                 | -                   |
| Procedure type: Skin/Soft Tissue                          | -1.092                  | -                   | -1.023                 | -                   |
| Procedure type: Wound                                     | -0.889                  | -                   | -1.345                 | -                   |
| Procedure type: Varicose vein procedures                  | 0.707                   | -                   | 0.481                  | -                   |
| Work RVU  | 0.013                   | -                   | 0.021                  | -                   |
| Other benign tumors                                       | -0.275                  | 0.76 (0.66-0.87)    | -0.209                 | 0.81 (0.71-0.93)    |
| Liver or biliary disease                                  | 0.201                   | 1.22 (1.05-1.42)    | 0.340                  | 1.41 (1.22-1.62)    |
| Disorders of immunity                                     | 0.338                   | 1.40 (1.08-1.82)    | -0.049                 | 0.95 (0.71-1.29)    |
| Dementia or senility                                      | 0.177                   | 1.19 (1.07-1.33)    | 0.171                  | 1.19 (1.10-1.40)    |
| Psychiatric disorders                                     | 0.120                   | 1.13 (1.00-1.27)    | 0.272                  | 1.31 (1.17-1.47)    |
| Other significant central nervous system (CNS) disease    | 0.407                   | 1.50 (1.22-1.85)    | 0.180                  | 1.20 (0.96-1.50)    |
| Ischemic heart disease                                    | 0.175                   | 1.19 (1.07-1.33)    | 0.138                  | 1.15 (1.03-1.28)    |
| Other and unspecified heart disease                       | 0.151                   | 1.16 (1.01-1.34)    | -0.017                 | 0.98 (0.85-1.14)    |
| Specified arrhythmias and other heart rhythm disorders    | 0.157                   | 1.17 (1.04-1.32)    | 0.257                  | 1.29 (1.15-1.45)    |
| Vascular or circulatory disease                           | 0.126                   | 1.13 (1.02-1.27)    | 0.036                  | 1.04 (0.93-1.16)    |
| Chronic lung disease                                      | 0.162                   | 1.18 (1.05-1.32)    | 0.255                  | 1.29 (1.15-1.45)    |
| Pneumonia   | 0.260                   | 1.30 (1.10-1.53)    | 0.115                  | 1.12 (0.94-1.33)    |
| Dialysis or severe chronic kidney disease                 | 0.524                   | 1.69 (1.37-2.09)    | 0.496                  | 1.64 (1.32-2.05)    |
| Urinary tract infection and other urinary tract disorders | 0.112                   | 1.12 (1.00-1.25)    | 0.231                  | 1.26 (1.13-1.40)    |
| Benign prostatic hyperplasia                              | 0.149                   | 1.16 (1.03-1.30)    | 0.177                  | 1.19 (1.06-1.34)    |

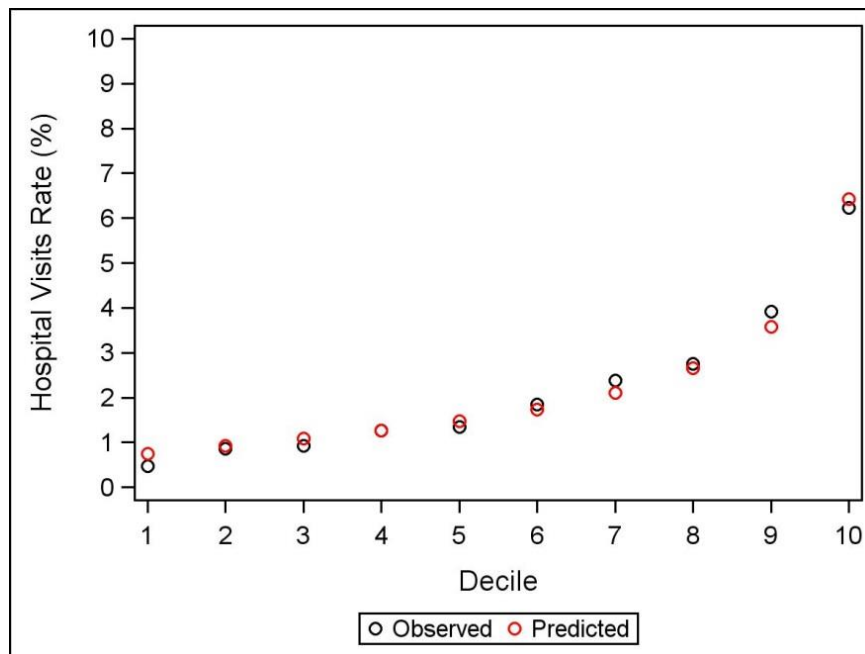
|   | 2015 Development Sample |                     | 2015 Validation Sample |                     |
|---|-------------------------|---------------------|------------------------|---------------------|
|   | Estimate                | Odds ratio (95% CI) | Estimate               | Odds ratio (95% CI) |
| Cellulitis, local skin infection                  | 0.202                   | 1.22 (1.07-1.40)    | 0.160                  | 1.17 (1.02-1.34)    |
| Other dermatological disorders                    | -0.198                  | 0.82 (0.73-0.93)    | -0.106                 | 0.90 (0.80-1.02)    |
| Major traumatic fracture or internal injury       | 0.205                   | 1.23 (1.10-1.36)    | 0.215                  | 1.24 (1.12-1.38)    |
| Chronic anticoagulant use                         | 0.212                   | 1.24 (1.07-1.43)    | 0.196                  | 1.22 (1.05-1.41)    |
| Opioid abuse                                      | 0.593                   | 1.81 (1.14-2.88)    | 0.293                  | 1.34 (0.79-2.28)    |
| Interaction: Alimentary tract and RVU             | 0.119                   | -                   | 0.137                  | -                   |
| Interaction: Breast and RVU                       | -0.024                  | -                   | 0.055                  | -                   |
| Interaction: Skin/soft tissue and RVU             | 0.008                   | -                   | -0.005                 | -                   |
| Interaction: Wound and RVU                        | -0.048                  | -                   | 0.019                  | -                   |
| Interaction: Varicose vein procedures and RVU     | -0.175                  | -                   | -0.205                 | -                   |
| Odds ratios: Work RVU in abdomen and its contents | 0.013                   | 1.01 (0.97-1.06)    | 0.021                  | 1.02 (0.98-1.07)    |
| Odds ratios: Work RVU in alimentary tract         | 0.133                   | 1.14 (1.09-1.20)    | 0.158                  | 1.17 (1.12-1.23)    |
| Odds ratios: Work RVU in breast                   | -0.011                  | 0.99 (0.93-1.06)    | 0.076                  | 1.08 (1.02-1.14)    |
| Odds ratios: Work RVU in skin/soft tissue         | 0.021                   | 1.02 (1.00-1.04)    | 0.016                  | 1.02 (1.00-1.03)    |
| Odds ratios: Work RVU in wound                    | -0.034                  | 0.97 (0.91-1.03)    | 0.041                  | 1.04 (0.98-1.11)    |
| Odds ratios: Work RVU in varicose vein procedures | -0.161                  | 0.85 (0.65-1.12)    | -0.184                 | 0.83 (0.58-1.20)    |

## 12.Figures

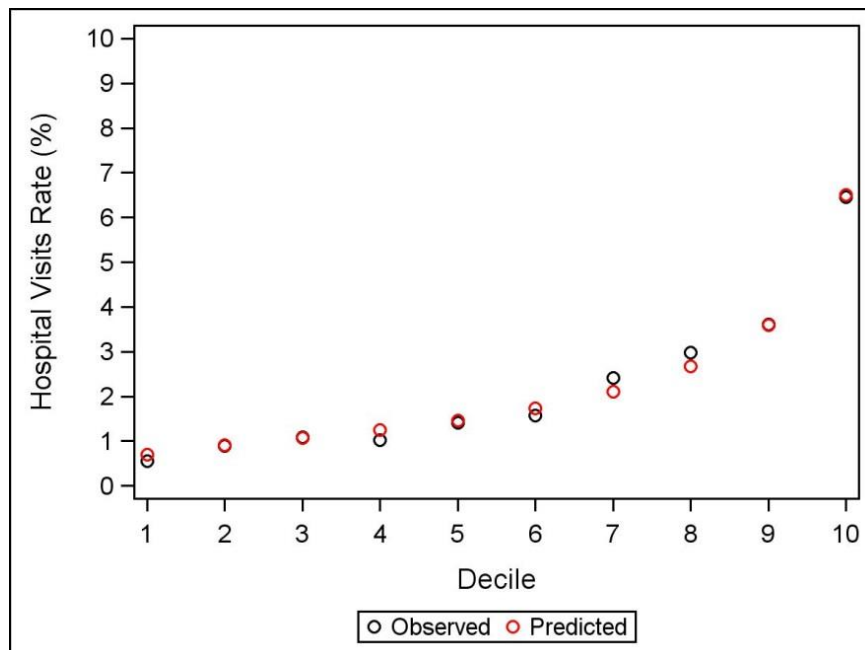
**Figure 1. Timing of hospital visits within 30 days of general surgery ASC procedures (event rate per day post discharge for 0- through 30-day period; dataset: Medicare FFS CY 2015)**



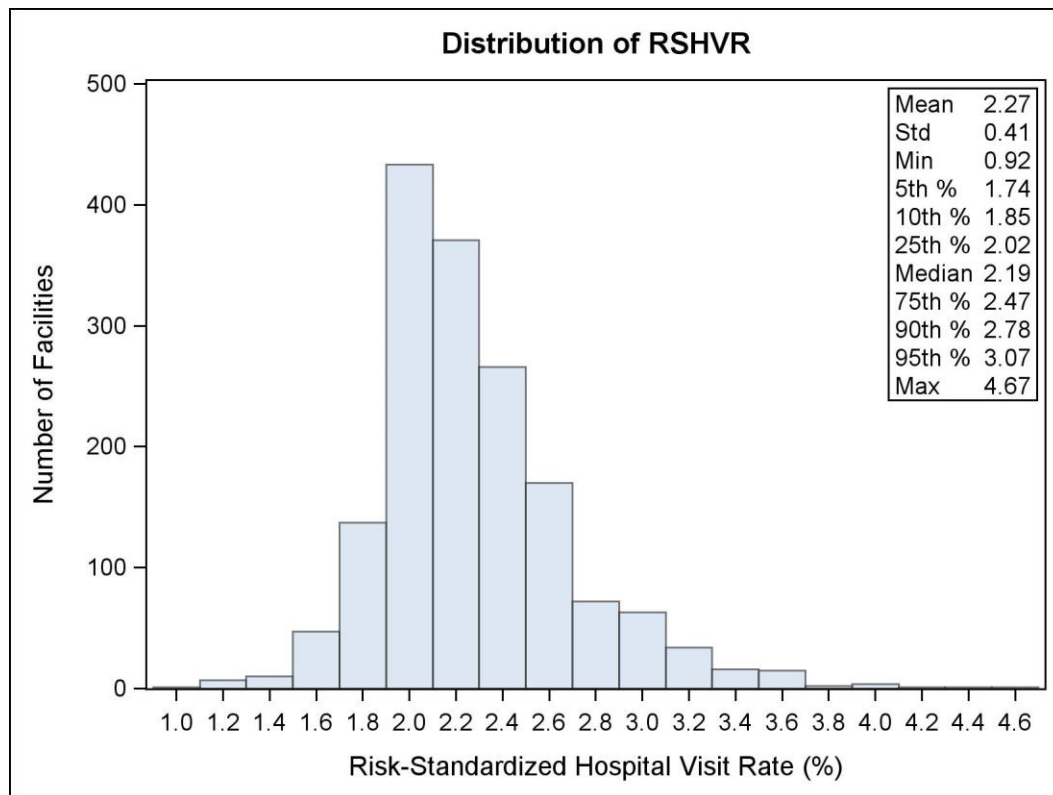
**Figure 2. Calibration plot of predicted versus observed outcomes across deciles of patient risk in the CY 2015 Development Sample (dataset: Medicare FFS CY 2015)**



**Figure 3. Calibration plot of predicted versus observed outcomes across deciles of patient risk in the CY 2015 Validation Sample (dataset: Medicare FFS CY 2015)**



**Figure 4. Distribution of risk-standardized hospital visit rates (RSHVRs) following general surgery ASC procedures (dataset: Medicare FFS 2014-2015) for ASCs with  $\geq 25$  cases**



## 13.Appendices

### 13.1 Appendix A: List of all CPT® Procedure Codes Included in the Measure Cohort

**Table A1. List of included Current Procedural Terminology (CPT®) codes defining general surgery procedures (codes used to define the general surgery measure cohort)**

| AHRQ clinical category | AHRQ clinical category description                       | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status  |
|------------------------|--|--|--------------------------------|---|
|                        |  |  |                                | 090 = major procedure (90-day post-operative period)<br>010 = minor procedure (10-day post-operative period)<br>000 = minor procedure (0-day post-operative period) |
| 53                     | Varicose vein stripping, lower limb                      | 37766                                      | Phleb veins - extrem 20+       | 090   |
|                        |  | 37765                                      | Stab phleb veins xtr 10-20     | 090   |
|                        |  | 37785                                      | Ligate/divide/excise vein      | 090   |
|                        |  | 37722                                      | Ligate/strip long leg vein     | 090   |
|                        |  | 37700                                      | Revise leg vein                | 090   |
|                        |  | 37761                                      | Ligate leg veins open          | 090   |
|                        |  | 37718                                      | Ligate/strip short leg vein    | 090   |
|                        |  | 37760                                      | Ligate leg veins radical       | 090   |
|                        |  | 37735                                      | Removal of leg veins/lesion    | 090   |
|                        |  | 37780                                      | Revision of leg vein           | 090   |
| 67                     | Other therapeutic procedures, hemic and lymphatic system | 38525                                      | Biopsy/removal lymph nodes     | 090   |
|                        |  | 38500                                      | Biopsy/removal lymph nodes     | 010   |
|                        |  | 38510                                      | Biopsy/removal lymph nodes     | 010   |
|                        |  | 38745                                      | Remove armpit lymph nodes      | 090   |
|                        |  | 38740                                      | Remove armpit lymph nodes      | 090   |
|                        |  | 38760                                      | Remove groin lymph nodes       | 090   |
|                        |  | 38542                                      | Explore deep node(s) neck      | 090   |
|                        |  | 38520                                      | Biopsy/removal lymph nodes     | 090   |



| AHRQ clinical category | AHRQ clinical category description   | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status   |
|------------------------|--------------------------------------|--|--------------------------------|--|
|                        |                                      |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                      | 38700                                      | Removal of lymph nodes neck    | 090  |
|                        |                                      | 38570                                      | Laparoscopy lymph node biop    | 010  |
|                        |                                      | 38308                                      | Incision of lymph channels     | 090  |
|                        |                                      | 38300                                      | Drainage lymph node lesion     | 010  |
|                        |                                      | 38305                                      | Drainage lymph node lesion     | 090  |
|                        |                                      | 38530                                      | Biopsy/removal lymph nodes     | 090  |
|                        |                                      | 38550                                      | Removal neck/armpit lesion     | 090  |
|                        |                                      | 38571                                      | Laparoscopy lymphadenectomy    | 010  |
|                        |                                      | 38555                                      | Removal neck/armpit lesion     | 090  |
|                        |                                      | 38572                                      | Laparoscopy lymphadenectomy    | 010  |
|                        |                                      | 38794                                      | Access thoracic lymph duct     | 090  |
| 71                     | Gastrostomy, temporary and permanent | 49440                                      | Place gastrostomy tube perc    | 010  |
|                        |                                      | 43653                                      | Laparoscopy gastrostomy        | 090  |
| 72                     | Colostomy, temporary and permanent   | 44340                                      | Revision of colostomy          | 090  |
| 73                     | Ileostomy and other enterostomy      | 44312                                      | Revision of ileostomy          | 090  |
|                        |                                      | 49441                                      | Place duod/jej tube perc       | 010  |
|                        |                                      | 49442                                      | Place cecostomy tube perc      | 010  |
| 76                     | Colonoscopy and biopsy               | 45500                                      | Repair of rectum               | 090  |
|                        |                                      | 45505                                      | Repair of rectum               | 090  |
| 77                     | Proctoscopy and anorectal biopsy     | 45100                                      | Biopsy of rectum               | 090  |
| 78                     | Colorectal resection                 | 45171                                      | Exc rect tum transanal part    | 090  |
|                        |                                      | 45172                                      | Exc rect tum transanal full    | 090  |
|                        |                                      | 45160                                      | Excision of rectal lesion      | 090  |

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|------------------------|---|--|--------------------------------|---|
|                        |   |  |                                | 090 = major procedure (90-day post-operative period)<br>010 = minor procedure (10-day post-operative period)<br>000 = minor procedure (0-day post-operative period) |
| 81                     | Hemorrhoid procedures                       | 46221                                      | Ligation of hemorrhoid(s)      | 010   |
|                        |   | 46930                                      | Destroy internal hemorrhoids   | 090   |
|                        |   | 46260                                      | Remove in/ex hem groups 2+     | 090   |
|                        |   | 46946                                      | Remove by ligat int hem grps   | 090   |
|                        |   | 46255                                      | Remove int/ext hem 1 group     | 090   |
|                        |   | 46947                                      | Hemorrhoidopexy by stapling    | 090   |
|                        |   | 46230                                      | Removal of anal tags           | 010   |
|                        |   | 46250                                      | Remove ext hem groups 2+       | 090   |
|                        |   | 46945                                      | Remove by ligat int hem grp    | 090   |
|                        |   | 46320                                      | Removal of hemorrhoid clot     | 010   |
|                        |   | 46500                                      | Injection into hemorrhoid(s)   | 010   |
|                        |   | 46261                                      | Remove in/ex hem grps & fiss   | 090   |
|                        |   | 46083                                      | Incise external hemorrhoid     | 010   |
|                        |   | 46257                                      | Remove in/ex hem grp & fiss    | 090   |
|                        |   | 46262                                      | Remove in/ex hem grps w/fist   | 090   |
|                        |   | 46258                                      | Remove in/ex hem grp w/fistu   | 090   |
| 84                     | Cholecystectomy and common duct exploration | 47562                                      | Laparoscopic cholecystectomy   | 090   |
|                        |   | 47563                                      | Laparo cholecystectomy/graph   | 090   |
|                        |   | 47564                                      | Laparo cholecystectomy/explr   | 090   |
|                        |   | 47630                                      | Remove bile duct stone         | 090   |
| 85                     | Inguinal and femoral hernia repair          | 49505                                      | Prp i/hern init reduc >5 yr    | 090   |
|                        |   | 49650                                      | Lap ing hernia repair init     | 090   |
|                        |   | 49520                                      | Rerepair ing hernia reduce     | 090   |
|                        |   | 49507                                      | Prp i/hern init block >5 yr    | 090   |
|                        |   | 49651                                      | Lap ing hernia repair recur    | 090   |

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|------------------------|------------------------------------|--|--------------------------------|---|
|                        |                                    | 49525                                      | Repair ing hernia sliding      | 090   |
|                        |                                    | 49521                                      | Rerepair ing hernia blocked    | 090   |
|                        |                                    | 49550                                      | Rpr rem hernia init reduce     | 090   |
|                        |                                    | 49553                                      | Rpr fem hernia init blocked    | 090   |
|                        |                                    | 49557                                      | Rerepair fem hernia blocked    | 090   |
|                        |                                    | 49555                                      | Rerepair fem hernia reduce     | 090   |
|                        |                                    | 49495                                      | Rpr ing hernia baby reduc      | 090   |
|                        |                                    | 49496                                      | Rpr ing hernia baby blocked    | 090   |
|                        |                                    | 49500                                      | Rpr ing hernia init reduce     | 090   |
|                        |                                    | 49501                                      | Rpr ing hernia init blocked    | 090   |
| 86                     | Other hernia repair                | 49585                                      | Rpr umbil hern reduc > 5 yr    | 090   |
|                        |                                    | 49560                                      | Rpr ventral hern init reduc    | 090   |
|                        |                                    | 49587                                      | Rpr umbil hern block > 5 yr    | 090   |
|                        |                                    | 49561                                      | Rpr ventral hern init block    | 090   |
|                        |                                    | 49652                                      | Lap vent/abd hernia repair     | 090   |
|                        |                                    | 49565                                      | Rerepair ventrl hern reduce    | 090   |
|                        |                                    | 49653                                      | Lap vent/abd hern proc comp    | 090   |
|                        |                                    | 49570                                      | Rpr epigastric hern reduce     | 090   |
|                        |                                    | 49654                                      | Lap inc hernia repair          | 090   |
|                        |                                    | 49655                                      | Lap inc hern repair comp       | 090   |
|                        |                                    | 49590                                      | Repair spigelian hernia        | 090   |
|                        |                                    | 49566                                      | Rerepair ventrl hern block     | 090   |
|                        |                                    | 49572                                      | Rpr epigastric hern blocked    | 090   |
|                        |                                    | 49656                                      | Lap inc hernia repair recur    | 090   |

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|                        |  |  |                                | 090 = major procedure (90-day post-operative period)<br>010 = minor procedure (10-day post-operative period)<br>000 = minor procedure (0-day post-operative period) |
|                        |  | 49657                                      | Lap inc hern recur comp        | 090   |
|                        |  | 55540                                      | Revise hernia & sperm veins    | 090   |
|                        |  | 49540                                      | Repair lumbar hernia           | 090   |
|                        |  | 49580                                      | Rpr umbil hern reduc < 5 yr    | 090   |
|                        |  | 49582                                      | Rpr umbil hern block < 5 yr    | 090   |
|                        |  | 49600                                      | Repair umbilical lesion        | 090   |
| 87                     | Laparoscopy                                  | 49320                                      | Diag laparo separate proc      | 010   |
|                        |  | 49324                                      | Lap insert tunnel ip cath      | 010   |
|                        |  | 49321                                      | Laparoscopy biopsy             | 010   |
|                        |  | 49325                                      | Lap revision perm ip cath      | 010   |
|                        |  | 49322                                      | Laparoscopy aspiration         | 010   |
| 94                     | Other OR upper GI therapeutic procedures     | 43870                                      | Repair stomach opening         | 090   |
|                        |  | 43130                                      | Removal of esophagus pouch     | 090   |
| 95                     | Other non-OR lower GI therapeutic procedures | 46922                                      | Excision of anal lesion(s)     | 010   |
|                        |  | 46924                                      | Destruction anal lesion(s)     | 010   |
|                        |  | 46220                                      | Excise anal ext tag/papilla    | 010   |
|                        |  | 46910                                      | Destruction anal lesion(s)     | 010   |
|                        |  | 45190                                      | Destruction rectal tumor       | 090   |
|                        |  | 46940                                      | Treatment of anal fissure      | 010   |
|                        |  | 46917                                      | Laser surgery anal lesions     | 010   |
|                        |  | 46900                                      | Destruction anal lesion(s)     | 010   |
|                        |  | 46916                                      | Cryosurgery anal lesion(s)     | 010   |
|                        |  | 46942                                      | Treatment of anal fissure      | 010   |
| 96                     | Other OR lower GI therapeutic procedures     | 46200                                      | Removal of anal fissure        | 090   |
|                        |  | 46270                                      | Remove anal fist subq          | 090   |

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|------------------------|------------------------------------|--|--------------------------------|--|
|                        |                                    |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                    | 46275                                      | Remove anal fist inter         | 090  |
|                        |                                    | 46080                                      | Incision of anal sphincter     | 010  |
|                        |                                    | 46280                                      | Remove anal fist complex       | 090  |
|                        |                                    | 45541                                      | Correct rectal prolapse        | 090  |
|                        |                                    | 46040                                      | Incision of rectal abscess     | 090  |
|                        |                                    | 46020                                      | Placement of seton             | 010  |
|                        |                                    | 45910                                      | Dilation of rectal narrowing   | 010  |
|                        |                                    | 45905                                      | Dilation of anal sphincter     | 010  |
|                        |                                    | 46060                                      | Incision of rectal abscess     | 090  |
|                        |                                    | 46505                                      | Chemodenervation anal musc     | 010  |
|                        |                                    | 46700                                      | Repair of anal stricture       | 090  |
|                        |                                    | 45915                                      | Remove rectal obstruction      | 010  |
|                        |                                    | 46050                                      | Incision of anal abscess       | 010  |
|                        |                                    | 46288                                      | Repair anal fistula            | 090  |
|                        |                                    | 46285                                      | Remove anal fist 2 stage       | 090  |
|                        |                                    | 46045                                      | Incision of rectal abscess     | 090  |
|                        |                                    | 46030                                      | Removal of rectal marker       | 010  |
|                        |                                    | 46707                                      | Repair anorectal fist w/plug   | 090  |
|                        |                                    | 46750                                      | Repair of anal sphincter       | 090  |
|                        |                                    | 45000                                      | Drainage of pelvic abscess     | 090  |
|                        |                                    | 45005                                      | Drainage of rectal abscess     | 010  |
|                        |                                    | 45020                                      | Drainage of rectal abscess     | 090  |
|                        |                                    | 45150                                      | Excision of rectal stricture   | 090  |
|                        |                                    | 46706                                      | Repr of anal fistula w/glue    | 010  |
|                        |                                    | 46753                                      | Reconstruction of anus         | 090  |

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|------------------------|---|--|--------------------------------|--|
|                        |   | 45108                                      | Removal of anorectal lesion    | 090  |
|                        |   | 45900                                      | Reduction of rectal prolapse   | 010  |
|                        |   | 46070                                      | Incision of anal septum        | 090  |
|                        |   | 46754                                      | Removal of suture from anus    | 010  |
|                        |   | 46760                                      | Repair of anal sphincter       | 090  |
|                        |   | 46761                                      | Repair of anal sphincter       | 090  |
|                        |   | 46762                                      | Implant artificial sphincter   | 090  |
| 97                     | Other gastrointestinal diagnostic procedures            | 48102                                      | Needle biopsy pancreas         | 010  |
| 98                     | Other non-OR gastrointestinal therapeutic procedures    | 47530                                      | Revise/reinsert bile tube      | 090  |
| 99                     | Other OR gastrointestinal therapeutic procedures        | 49422                                      | Remove tunneled ip cath        | 010  |
|                        |   | 49250                                      | Excision of umbilicus          | 090  |
|                        |   | 49436                                      | Embedded ip cath exit-site     | 010  |
|                        |   | 49402                                      | Remove foreign body abdomen    | 090  |
|                        |   | 47382                                      | Percut ablate liver rf         | 010  |
|                        |   | 47383                                      | Perq abltj lvr cryoablation    | 010  |
|                        |   | 47510                                      | Insert catheter bile duct      | 090  |
|                        |   | 47511                                      | Insert bile duct drain         | 090  |
|                        |   | 49419                                      | Insert tun ip cath w/port      | 090  |
|                        |   | 49426                                      | Revise abdomen-venous shunt    | 090  |
|                        |   | 49429                                      | Removal of shunt               | 010  |
| 165                    | Breast biopsy and other diagnostic procedures on breast | 19101                                      | Biopsy of breast open          | 010  |
| 166                    | Lumpectomy, quadrantectomy                              | 19301                                      | Partial mastectomy             | 090  |

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|------------------------|---|--|--------------------------------|--|
|                        | of breast   | 19125                                      | Excision breast lesion         | 090  |
|                        |   | 19120                                      | Removal of breast lesion       | 090  |
|                        |   | 19302                                      | P-mastectomy w/ln removal      | 090  |
| 167                    | Mastectomy  | 19303                                      | Mast simple complete           | 090  |
|                        |   | 19300                                      | Removal of breast tissue       | 090  |
|                        |   | 19304                                      | Mast subq                      | 090  |
| 168                    | Incision and drainage, skin and subcutaneous tissue | 10140                                      | Drainage of hematoma/fluid     | 010  |
|                        |   | 10060                                      | Drainage of skin abscess       | 010  |
|                        |   | 10061                                      | Drainage of skin abscess       | 010  |
|                        |   | 10180                                      | Complex drainage wound         | 010  |
|                        |   | 26011                                      | Drainage of finger abscess     | 010  |
|                        |   | 26010                                      | Drainage of finger abscess     | 010  |
|                        |   | 21501                                      | Drain neck/chest lesion        | 090  |
|                        |   | 10040                                      | Acne surgery                   | 010  |
| 169                    | Debridement of wound, infection or burn             | 11010                                      | Debride skin at fx site        | 010  |
|                        |   | 69222                                      | Clean out mastoid cavity       | 010  |
| 170                    | Excision of skin lesion                             | 11642                                      | Exc f/e/e/n/l mal+mrg 1.1-2    | 010  |
|                        |   | 11602                                      | Exc tr-ext mal+marg 1.1-2 cm   | 010  |
|                        |   | 11603                                      | Exc tr-ext mal+marg 2.1-3 cm   | 010  |
|                        |   | 11643                                      | Exc f/e/e/n/l mal+mrg 2.1-3    | 010  |
|                        |   | 11606                                      | Exc tr-ext mal+marg > 4 cm     | 010  |
|                        |   | 11402                                      | Exc tr-ext b9+marg 1.1-2 cm    | 010  |
|                        |   | 11442                                      | Exc face-mm b9+marg 1.1-2 cm   | 010  |
|                        |   | 11604                                      | Exc tr-ext mal+marg 3.1-4 cm   | 010  |
|                        |   | 11440                                      | Exc face-mm b9+marg 0.5 < cm   | 010  |

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|                        |                                    | 11644                                      | Exc f/e/e/n/l mal+mrg 3.1-4    | 010  |
|                        |                                    | 11403                                      | Exc tr-ext b9+marg 2.1-3 cm    | 010  |
|                        |                                    | 11641                                      | Exc f/e/e/n/l mal+mrg 0.6-1    | 010  |
|                        |                                    | 11441                                      | Exc face-mm b9+marg 0.6-1 cm   | 010  |
|                        |                                    | 11406                                      | Exc tr-ext b9+marg > 4.0 cm    | 010  |
|                        |                                    | 11422                                      | Exc h-f-nk-sp b9+marg 1.1-2    | 010  |
|                        |                                    | 26115                                      | Exc hand les sc < 1.5 cm       | 090  |
|                        |                                    | 11622                                      | Exc s/n/h/f/g mal+mrg 1.1-2    | 010  |
|                        |                                    | 11623                                      | Exc s/n/h/f/g mal+mrg 2.1-3    | 010  |
|                        |                                    | 11646                                      | Exc f/e/e/n/l mal+mrg > 4 cm   | 010  |
|                        |                                    | 11404                                      | Exc tr-ext b9+marg 3.1-4 cm    | 010  |
|                        |                                    | 11624                                      | Exc s/n/h/f/g mal+mrg 3.1-4    | 010  |
|                        |                                    | 11626                                      | Exc s/n/h/f/g mal+mrg > 4 cm   | 010  |
|                        |                                    | 17000                                      | Destruct premalg lesion        | 010  |
|                        |                                    | 11423                                      | Exc h-f-nk-sp b9+marg 2.1-3    | 010  |
|                        |                                    | 11401                                      | Exc tr-ext b9+marg 0.6-1 cm    | 010  |
|                        |                                    | 21931                                      | Exc back les sc 3 cm/>         | 090  |
|                        |                                    | 11421                                      | Exc h-f-nk-sp b9+marg 0.6-1    | 010  |
|                        |                                    | 11443                                      | Exc face-mm b9+marg 2.1-3 cm   | 010  |
|                        |                                    | 21552                                      | Exc neck les sc 3 cm/>         | 090  |
|                        |                                    | 11420                                      | Exc h-f-nk-sp b9+marg 0.5 <    | 010  |
|                        |                                    | 21555                                      | Exc neck les sc < 3 cm         | 090  |
|                        |                                    | 25075                                      | Exc forearm les sc < 3 cm      | 090  |
|                        |                                    | 26111                                      | Exc hand les sc 1.5 cm/>       | 090  |
|                        |                                    | 28043                                      | Exc foot/toe tum sc < 1.5 cm   | 090  |



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|------------------------|------------------------------------|--|--------------------------------|--|
|                        |                                    |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                    | 11640                                      | Exc f/e/e/n/l mal+mrg 0.5cm<   | 010  |
|                        |                                    | 11400                                      | Exc tr-ext b9+marg 0.5 < cm    | 010  |
|                        |                                    | 11424                                      | Exc h-f-nk-sp b9+marg 3.1-4    | 010  |
|                        |                                    | 11426                                      | Exc h-f-nk-sp b9+marg > 4 cm   | 010  |
|                        |                                    | 29893                                      | Scope plantar fasciotomy       | 090  |
|                        |                                    | 24071                                      | Exc arm/elbow les sc 3 cm/>    | 090  |
|                        |                                    | 28039                                      | Exc foot/toe tum sc 1.5 cm/>   | 090  |
|                        |                                    | 24075                                      | Exc arm/elbow les sc < 3 cm    | 090  |
|                        |                                    | 23071                                      | Exc shoulder les sc 3 cm/>     | 090  |
|                        |                                    | 11444                                      | Exc face-mm b9+marg 3.1-4 cm   | 010  |
|                        |                                    | 21012                                      | Exc face les sbq 2 cm/>        | 090  |
|                        |                                    | 25071                                      | Exc forearm les sc 3 cm/>      | 090  |
|                        |                                    | 11601                                      | Exc tr-ext mal+marg 0.6-1 cm   | 010  |
|                        |                                    | 27337                                      | Exc thigh/knee les sc 3 cm/>   | 090  |
|                        |                                    | 11200                                      | Removal of skin tags           | 010  |
|                        |                                    | 11621                                      | Exc s/n/h/f/g mal+mrg 0.6-1    | 010  |
|                        |                                    | 21011                                      | Exc face les sc < 2 cm         | 090  |
|                        |                                    | 11446                                      | Exc face-mm b9+marg > 4 cm     | 010  |
|                        |                                    | 27327                                      | Exc thigh/knee les sc < 3 cm   | 090  |
|                        |                                    | 17110                                      | Destruct b9 lesion 1-14        | 010  |
|                        |                                    | 22903                                      | Exc abd les sc 3 cm/>          | 090  |
|                        |                                    | 27618                                      | Exc leg/ankle tum < 3 cm       | 090  |
|                        |                                    | 27043                                      | Exc hip pelvis les sc 3 cm/>   | 090  |
|                        |                                    | 17262                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 27632                                      | Exc leg/ankle les sc 3 cm/>    | 090  |

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|------------------------|------------------------------------|--|--------------------------------|--|
|                        |                                    |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                    | 11600                                      | Exc tr-ext mal+marg 0.5 < cm   | 010  |
|                        |                                    | 17004                                      | Destroy premal lesions 15/>    | 010  |
|                        |                                    | 23075                                      | Exc shoulder les sc < 3 cm     | 090  |
|                        |                                    | 11620                                      | Exc h-f-nk-sp mal+marg 0.5 <   | 010  |
|                        |                                    | 17272                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 22902                                      | Exc abd les sc < 3 cm          | 090  |
|                        |                                    | 17281                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 27047                                      | Exc hip/pelvis les sc < 3 cm   | 090  |
|                        |                                    | 17282                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 10160                                      | Puncture drainage of lesion    | 010  |
|                        |                                    | 17271                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 17261                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 17263                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 17106                                      | Destruction of skin lesions    | 090  |
|                        |                                    | 17111                                      | Destruct lesion 15 or more     | 010  |
|                        |                                    | 17273                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 11450                                      | Removal sweat gland lesion     | 090  |
|                        |                                    | 11470                                      | Removal sweat gland lesion     | 090  |
|                        |                                    | 17280                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 17283                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 17276                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 11462                                      | Removal sweat gland lesion     | 090  |
|                        |                                    | 17286                                      | Destruction of skin lesions    | 010  |
|                        |                                    | 15936                                      | Remove sacrum pressure sore    | 090  |
|                        |                                    | 17264                                      | Destruction of skin lesions    | 010  |

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|------------------------|--|--|--------------------------------|---|
|                        |  | 17266                                      | Destruction of skin lesions    | 010   |
|                        |  | 17274                                      | Destruction of skin lesions    | 010   |
|                        |  | 11451                                      | Removal sweat gland lesion     | 090   |
|                        |  | 11463                                      | Removal sweat gland lesion     | 090   |
|                        |  | 11471                                      | Removal sweat gland lesion     | 090   |
|                        |  | 15931                                      | Remove sacrum pressure sore    | 090   |
|                        |  | 17107                                      | Destruction of skin lesions    | 090   |
|                        |  | 17270                                      | Destruction of skin lesions    | 010   |
|                        |  | 17284                                      | Destruction of skin lesions    | 010   |
|                        |  | 17340                                      | Cryotherapy of skin            | 010   |
|                        |  | 15944                                      | Remove hip pressure sore       | 090   |
|                        |  | 15950                                      | Remove thigh pressure sore     | 090   |
|                        |  | 15934                                      | Remove sacrum pressure sore    | 090   |
|                        |  | 15940                                      | Remove hip pressure sore       | 090   |
|                        |  | 17108                                      | Destruction of skin lesions    | 090   |
|                        |  | 17260                                      | Destruction of skin lesions    | 010   |
|                        |  | 31830                                      | Revise windpipe scar           | 090   |
|                        |  | 15952                                      | Remove thigh pressure sore     | 090   |
|                        |  | 15956                                      | Remove thigh pressure sore     | 090   |
|                        |  | 17360                                      | Skin peel therapy              | 010   |
| 171                    | Suture of skin and subcutaneous tissue | 13132                                      | Repair of wound or lesion      | 010   |
|                        |  | 13121                                      | Repair of wound or lesion      | 010   |
|                        |  | 13101                                      | Repair of wound or lesion      | 010   |
|                        |  | 12032                                      | Intmd wnd repair s/a/t/ext     | 010   |
|                        |  | 12051                                      | Intmd wnd repair face/mm       | 010   |

| AHRQ clinical category | AHRQ clinical category description | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status   |
|------------------------|------------------------------------|--|--------------------------------|--|
|                        |                                    |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                    | 13131                                      | Repair of wound or lesion      | 010  |
|                        |                                    | 12052                                      | Intmd wnd repair face/mm       | 010  |
|                        |                                    | 12031                                      | Intmd wnd repair s/a/t/ext     | 010  |
|                        |                                    | 12042                                      | Intmd wnd repair n-hf/genit    | 010  |
|                        |                                    | 12034                                      | Intmd wnd repair s/tr/ext      | 010  |
|                        |                                    | 13160                                      | Late closure of wound          | 090  |
|                        |                                    | 13120                                      | Repair of wound or lesion      | 010  |
|                        |                                    | 12041                                      | Intmd wnd repair n-hf/genit    | 010  |
|                        |                                    | 12053                                      | Intmd wnd repair face/mm       | 010  |
|                        |                                    | 13100                                      | Repair of wound or lesion      | 010  |
|                        |                                    | 12035                                      | Intmd wnd repair s/a/t/ext     | 010  |
|                        |                                    | 12020                                      | Closure of split wound         | 010  |
|                        |                                    | 12054                                      | Intmd wnd repair face/mm       | 010  |
|                        |                                    | 12044                                      | Intmd wnd repair n-hf/genit    | 010  |
|                        |                                    | 12036                                      | Intmd wnd repair s/a/t/ext     | 010  |
|                        |                                    | 12021                                      | Closure of split wound         | 010  |
|                        |                                    | 12055                                      | Intmd wnd repair face/mm       | 010  |
|                        |                                    | 12045                                      | Intmd wnd repair n-hf/genit    | 010  |
|                        |                                    | 12037                                      | Intmd wnd repair s/tr/ext      | 010  |
|                        |                                    | 12046                                      | Intmd wnd repair n-hf/genit    | 010  |
|                        |                                    | 12047                                      | Intmd wnd repair n-hf/genit    | 010  |
|                        |                                    | 12056                                      | Intmd wnd repair face/mm       | 010  |
|                        |                                    | 12057                                      | Intmd rpr face/mm >30.0 cm     | 010  |
| 172                    | Skin graft                         | 14060                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 15260                                      | Skin full graft een & lips     | 090  |

| AHRQ clinical category | AHRQ clinical category description | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status   |
|------------------------|------------------------------------|--|--------------------------------|--|
|                        |                                    |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                    | 14040                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 14041                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 14301                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 14061                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 15732                                      | Muscle-skin graft head/neck    | 090  |
|                        |                                    | 14020                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 14021                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 15240                                      | Skin full grft face/genit/hf   | 090  |
|                        |                                    | 15220                                      | Skin full graft sclp/arm/leg   | 090  |
|                        |                                    | 14000                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 15576                                      | Form skin pedicle flap         | 090  |
|                        |                                    | 15630                                      | Skin graft                     | 090  |
|                        |                                    | 15120                                      | Skn splt a-grft fac/nck/hf/g   | 090  |
|                        |                                    | 14001                                      | Skin tissue rearrangement      | 090  |
|                        |                                    | 15100                                      | Skin splt grft trnk/arm/leg    | 090  |
|                        |                                    | 15731                                      | Forehead flap w/vasc pedicle   | 090  |
|                        |                                    | 15574                                      | Form skin pedicle flap         | 090  |
|                        |                                    | 15736                                      | Muscle-skin graft arm          | 090  |
|                        |                                    | 15734                                      | Muscle-skin graft trunk        | 090  |
|                        |                                    | 15770                                      | Derma-fat-fascia graft         | 090  |
|                        |                                    | 15738                                      | Muscle-skin graft leg          | 090  |
|                        |                                    | 15620                                      | Skin graft                     | 090  |
|                        |                                    | 15760                                      | Composite skin graft           | 090  |
|                        |                                    | 15572                                      | Form skin pedicle flap         | 090  |
|                        |                                    | 15570                                      | Form skin pedicle flap         | 090  |

| AHRQ clinical category | AHRQ clinical category description                     | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status   |
|------------------------|--|--|--------------------------------|--|
|                        |  |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |  | 15200                                      | Skin full graft trunk          | 090  |
|                        |  | 15115                                      | Epidrm a-grft face/nck/hf/g    | 090  |
|                        |  | 40818                                      | Excise oral mucosa for graft   | 090  |
|                        |  | 15135                                      | Derm autograft face/nck/hf/g   | 090  |
|                        |  | 15845                                      | Skin and muscle repair face    | 090  |
|                        |  | 15050                                      | Skin pinch graft               | 090  |
|                        |  | 15110                                      | Epidrm autogrft trnk/arm/leg   | 090  |
|                        |  | 15650                                      | Transfer skin pedicle flap     | 090  |
|                        |  | 15840                                      | Graft for face nerve palsy     | 090  |
|                        |  | 15610                                      | Skin graft                     | 090  |
|                        |  | 14350                                      | Skin tissue rearrangement      | 090  |
|                        |  | 15600                                      | Skin graft                     | 090  |
|                        |  | 15150                                      | Cult skin grft t/arm/leg       | 090  |
|                        |  | 15155                                      | Cult skin graft f/n/hf/g       | 090  |
|                        |  | 15130                                      | Derm autograft trnk/arm/leg    | 090  |
|                        |  | 15841                                      | Graft for face nerve palsy     | 090  |
|                        |  | 15842                                      | Nerve palsy microsurg graft    | 090  |
| 174                    | Other non-OR therapeutic procedures on skin and breast | 11750                                      | Removal of nail bed            | 010  |
|                        |  | 10120                                      | Remove foreign body            | 010  |
|                        |  | 10121                                      | Remove foreign body            | 010  |
|                        |  | 11752                                      | Remove nail bed/finger tip     | 010  |
|                        |  | 19110                                      | Nipple exploration             | 090  |
|                        |  | 61885                                      | Insrt/redo neurostim 1 array   | 090  |
|                        |  | 11765                                      | Excision of nail fold toe      | 010  |
|                        |  | 61886                                      | Implant neurostim arrays       | 090  |

| AHRQ clinical category | AHRQ clinical category description                 | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status   |
|------------------------|--|--|--------------------------------|--|
|                        |  |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |  | 61888                                      | Revise/remove neuroreceiver    | 010  |
|                        |  | 23330                                      | Remove shoulder foreign body   | 010  |
|                        |  | 24200                                      | Removal of arm foreign body    | 010  |
|                        |  | 15788                                      | Chemical peel face epiderm     | 090  |
|                        |  | 15789                                      | Chemical peel face dermal      | 090  |
|                        |  | 10081                                      | Drainage of pilonidal t        | 010  |
|                        |  | 10080                                      | Drainage of pilonidal t        | 010  |
|                        |  | 15793                                      | Chemical peel nonfacial        | 090  |
|                        |  | 15792                                      | Chemical peel nonfacial        | 090  |
| 175                    | Other OR therapeutic procedures on skin and breast | 20926                                      | Removal of tissue for graft    | 090  |
|                        |  | 19380                                      | Revise breast reconstruction   | 090  |
|                        |  | 19371                                      | Removal of breast capsule      | 090  |
|                        |  | 19318                                      | Reduction of large breast      | 090  |
|                        |  | 15740                                      | Island pedicle flap graft      | 090  |
|                        |  | 11760                                      | Repair of nail bed             | 010  |
|                        |  | 19340                                      | Immediate breast prosthesis    | 090  |
|                        |  | 11970                                      | Replace tissue expander        | 090  |
|                        |  | 19342                                      | Delayed breast prosthesis      | 090  |
|                        |  | 19316                                      | Suspension of breast           | 090  |
|                        |  | 19350                                      | Breast reconstruction          | 090  |
|                        |  | 19328                                      | Removal of breast implant      | 090  |
|                        |  | 19370                                      | Surgery of breast capsule      | 090  |
|                        |  | 19330                                      | Removal of implant material    | 090  |
|                        |  | 19366                                      | Breast reconstruction          | 090  |
|                        |  | 11960                                      | Insert tissue expander(s)      | 090  |

| AHRQ clinical category | AHRQ clinical category description | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status   |
|------------------------|------------------------------------|--|--------------------------------|--|
|                        |                                    |  |                                | <i>090 = major procedure (90-day post-operative period)</i><br><i>010 = minor procedure (10-day post-operative period)</i><br><i>000 = minor procedure (0-day post-operative period)</i> |
|                        |                                    | 19357                                      | Breast reconstruction          | 090  |
|                        |                                    | 28190                                      | Removal of foot foreign body   | 010  |
|                        |                                    | 19325                                      | Enlarge breast with implant    | 090  |
|                        |                                    | 11971                                      | Remove tissue expander(s)      | 090  |
|                        |                                    | 20103                                      | Explore wound extremity        | 010  |
|                        |                                    | 19020                                      | Incision of breast lesion      | 090  |
|                        |                                    | 11762                                      | Reconstruction of nail bed     | 010  |
|                        |                                    | 15830                                      | Exc skin abd                   | 090  |
|                        |                                    | 15839                                      | Excise excessive skin tissue   | 090  |
|                        |                                    | 11771                                      | Removal of pilonidal lesion    | 090  |
|                        |                                    | 15781                                      | Abrasion treatment of skin     | 090  |
|                        |                                    | 11770                                      | Removal of pilonidal lesion    | 010  |
|                        |                                    | 11772                                      | Removal of pilonidal lesion    | 090  |
|                        |                                    | 19355                                      | Correct inverted nipple(s)     | 090  |
|                        |                                    | 15780                                      | Abrasion treatment of skin     | 090  |
|                        |                                    | 15836                                      | Excise excessive skin tissue   | 090  |
|                        |                                    | 27086                                      | Remove hip foreign body        | 010  |
|                        |                                    | 30124                                      | Removal of nose lesion         | 090  |
|                        |                                    | 15786                                      | Abrasion lesion single         | 010  |
|                        |                                    | 15837                                      | Excise excessive skin tissue   | 090  |
|                        |                                    | 19112                                      | Excise breast duct fistula     | 090  |
|                        |                                    | 15832                                      | Excise excessive skin tissue   | 090  |
|                        |                                    | 15838                                      | Excise excessive skin tissue   | 090  |
|                        |                                    | 19324                                      | Enlarge breast                 | 090  |
|                        |                                    | 26596                                      | Excision constricting tissue   | 090  |



| AHRQ clinical category | AHRQ clinical category description  | Current Procedural Terminology (CPT®) code | Short description of CPT® code | Global Surgical Package Status  |
|------------------------|-------------------------------------|--|--------------------------------|---|
|                        |                                     |  |                                | 090 = major procedure (90-day post-operative period)<br>010 = minor procedure (10-day post-operative period)<br>000 = minor procedure (0-day post-operative period) |
|                        |                                     | 15819                                      | Plastic surgery neck           | 090   |
|                        |                                     | 15783                                      | Dermabrasion suprfl any site   | 090   |
|                        |                                     | 15782                                      | Dermabrasion other than face   | 090   |
|                        |                                     | 15833                                      | Excise excessive skin leg      | 090   |
|                        |                                     | 15834                                      | Excise excessive skin hip      | 090   |
|                        |                                     | 15835                                      | Excise excessive skin buttck   | 090   |
| 244                    | Gastric bypass and volume reduction | 43888                                      | Change gastric port open       | 090   |
|                        |                                     | 43886                                      | Revise gastric port open       | 090   |
|                        |                                     | 43887                                      | Remove gastric port open       | 090   |

## 13.2 Appendix B: Emergency Department Visits and Observation Stays Definition

**Table B1. HCPCS codes or revenue center codes that define emergency department visits and observation stays**

| Billing (HCPCS) or Revenue Code* | Description                             |
|----------------------------------|---|
| 0450                             | Emergency Room                          |
| 0451                             | Emergency Room: EM/EMTALA               |
| 0452                             | Emergency Room: ER/Beyond EMTALA        |
| 0456                             | Emergency Room: Urgent care             |
| 0459                             | Emergency Room: Other emergency room    |
| 0981                             | Professional fees (096x) Emergency room |
| G0378†                           | Hospital observation service, per hour  |

\*Identified in Medicare Part B Outpatient hospital claims.

†Denotes HCPCS Codes, all other codes are revenue center codes.

## 13.3 Appendix C: Planned Admission Algorithm

### C1. Planned Admission Algorithm Overview

The planned admission algorithm is adapted from the CMS Planned Readmission Algorithm Version 4.0. The algorithm is a set of criteria for classifying hospital inpatient admissions occurring after an ASC general surgery as planned or unplanned using Medicare claims. CMS seeks to count only unplanned admissions in the measure outcome because variation in planned admissions does not reflect quality differences. CORE developed the Planned Readmission Algorithm under contract to CMS based on a hospital-wide (not condition-specific) cohort of patients.<sup>33</sup>

The algorithm classifies admissions as planned or unplanned using a flow chart ([Figure PA1](#)) and 4 tables of procedures and conditions ([Table PA1–Table PA4](#)). [Table PA1](#) identifies procedures that, if present in an admission, classify the admission as planned. [Table PA2](#) identifies principal discharge diagnoses that classify admissions as planned. [Table PA3](#) identifies procedures that, if present, classify an admission as planned as long as that admission does not have an acute (unplanned) principal discharge diagnosis. [Table PA4](#) lists the acute (unplanned) principal discharge diagnoses that disqualify admissions with a potentially planned procedure in [Table PA3](#) as planned.

The algorithm uses the Agency for Healthcare Research and Quality's (AHRQ's) Clinical Classifications Software (CCS) (<http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp>) codes

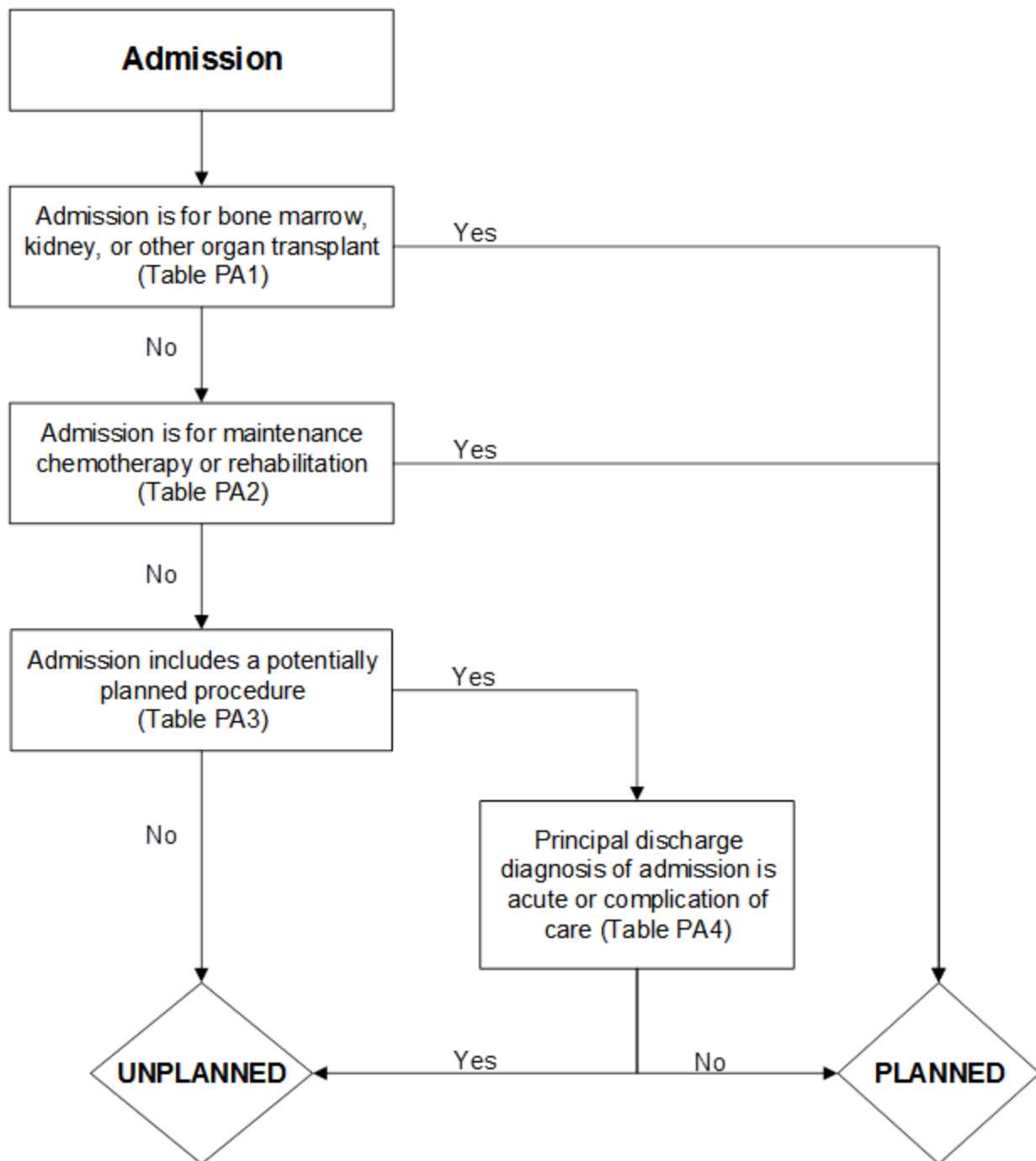
to group thousands of individual procedure and diagnosis ICD-9-CM codes into clinically coherent, mutually exclusive procedure CCS categories and mutually exclusive diagnosis CCS categories, respectively.

## *C2. Detailed Description of Planned Readmission Algorithm Version 4.0 – General Surgery ASC Measure*

The planned admission algorithm uses the flow chart ([Figure PA1](#)) and [Table PA1–Table PA4](#), adapted for the general surgery ASC procedure population, to identify specific procedure categories and discharge diagnosis categories to classify admissions as planned or unplanned. As illustrated in the flow chart ([Figure PA1](#)), admissions that include certain procedures ([Table PA1](#)) or are for certain diagnoses [Table PA2](#) are always considered planned. If the admission does not include a procedure or diagnosis in [Table PA1](#) or [Table PA2](#) that is always considered planned, the algorithm checks whether the admission has at least 1 procedure that is considered potentially planned ([Table PA3](#)). If the admission has no procedures from [Table PA3](#), the admission is considered unplanned. [Table PA3](#) includes AHRQ procedure CCS categories and individual ICD-9-CM procedure codes. Examples of potentially planned procedures are total hip replacement (Procedure CCS 153) and hernia repair (Procedure CCS 85).

If the admission has at least 1 potentially planned procedure from [Table PA3](#), the algorithm checks for a principal discharge diagnosis that is considered acute ([Table PA4](#)). If the admission has an acute principal discharge diagnosis from [Table PA4](#), the admission is considered unplanned. Otherwise, it is considered planned. The list of acute principal discharge diagnoses includes diagnosis groups from AHRQ condition categories and groupings of individual ICD-9-CM diagnosis codes that represent cardiac diagnoses that would not be associated with a planned admission. Examples of acute principal discharge diagnoses that identify admissions with potentially planned procedures as unplanned are pneumonia (Diagnosis CCS 122) and cardiac arrest (Diagnosis CCS 107).

Figure PA1. Planned admission algorithm flowchart



**Table PA1. Procedure categories that are always planned (Planned Readmission Algorithm Version 4.0 – adapted for General Surgery ASC Measure Version 1.0)**

| Procedure CCS (ICD-9 & ICD-10) | Description   |
|--------------------------------|---|
| 64                             | Bone marrow transplant  |
| 105                            | Kidney transplant   |
| 176                            | Other organ transplantation (in ICD-10 version, description adds: “[other than bone marrow corneal or kidney]”) |

**Table PA2. Diagnosis categories that are always planned (Planned Readmission Algorithm Version 4.0 – adapted for General Surgery ASC Measure Version 1.0)**

| Diagnosis CCS (ICD-9 & ICD-10) | Description              |
|--------------------------------|--------------------------|
| 45                             | Maintenance chemotherapy |
| 254                            | Rehabilitation           |

**Table PA3. Procedure categories that are potentially planned (Planned Readmission Algorithm Version 4.0 – adapted for General Surgery ASC Measure Version 1.0)**

| Code                                      | Description  |
|---|--|
| <b>Procedure CCS (ICD-9 &amp; ICD-10)</b> |  |
| 1   | Incision and excision of central nervous system (CNS)  |
| 3   | Laminectomy; excision intervertebral disc (in ICD-10 version, description is: “Excision, destruction or resection of intervertebral disc”) |
| 5   | Insertion of catheter or spinal stimulator and injection into spinal canal   |
| 9   | Other OR therapeutic nervous system procedures   |
| 10  | Thyroidectomy; partial or complete   |
| 12  | Other therapeutic endocrine procedures (in ICD-10 version, description is: “Therapeutic endocrine procedures”)                             |
| 33  | Other OR therapeutic procedures on nose; mouth and pharynx   |
| 36  | Lobectomy or pneumonectomy   |
| 38  | Other diagnostic procedures on lung and bronchus   |
| 40  | Other diagnostic procedures of respiratory tract and mediastinum   |
| 43  | Heart valve procedures   |
| 44  | Coronary artery bypass graft (CABG)  |
| 45  | Percutaneous transluminal coronary angioplasty (PTCA) (in ICD-10 version, description adds: “with or without stent”)                       |
| 49  | Other OR heart procedures  |
| 51  | Endarterectomy; vessel of head and neck  |
| 52  | Aortic resection; replacement or anastomosis   |
| 53  | Varicose vein stripping; lower limb  |
| 55  | Peripheral vascular bypass   |
| 56  | Other vascular bypass and shunt; not heart   |

| Code                                      | Description   |
|---|---|
| 59  | Other OR procedures on vessels of head and neck                               |
| 66  | Procedures on spleen  |
| 67  | Other therapeutic procedures; hemic and lymphatic system                      |
| 74  | Gastrectomy; partial and total  |
| 78  | Colorectal resection  |
| 79  | Local excision of large intestine lesion (not endoscopic)                     |
| 84  | Choletectomy and common duct exploration                                      |
| 85  | Inguinal and femoral hernia repair  |
| 86  | Other hernia repair   |
| 99  | Other OR gastrointestinal therapeutic procedures                              |
| 104                                       | Nephrectomy; partial or complete  |
| 106                                       | Genitourinary incontinence procedures   |
| 107                                       | Extracorporeal lithotripsy; urinary   |
| 109                                       | Procedures on the urethra   |
| 112                                       | Other OR therapeutic procedures of urinary tract                              |
| 113                                       | Transurethral resection of prostate (TURP)                                    |
| 114                                       | Open prostatectomy  |
| 119                                       | Oophorectomy; unilateral and bilateral  |
| 120                                       | Other operations on ovary   |
| 124                                       | Hysterectomy; abdominal and vaginal   |
| 129                                       | Repair of tocele and rectocele; obliteration of vaginal vault                 |
| 132                                       | Other OR therapeutic procedures; female organs                                |
| 142                                       | Partial excision bone   |
| 152                                       | Arthroplasty knee   |
| 153                                       | Hip replacement; total and partial  |
| 154                                       | Arthroplasty other than hip or knee   |
| 158                                       | Spinal fusion   |
| 159                                       | Other diagnostic procedures on musculoskeletal system                         |
| 166                                       | Lumpectomy; quadrantectomy of breast  |
| 167                                       | Mastectomy  |
| 170 (only in ICD-9 version of algorithm)  | Excision of skin lesion   |
| 172                                       | Skin graft  |
| 175 (only in ICD-10 version of algorithm) | Other OR therapeutic procedures on skin subcutaneous tissue fascia and breast |
| ICD-9-PCS Code                            |   |
| 30.1                                      | Hemilaryngectomy  |
| 30.29                                     | Other partial laryngectomy  |
| 30.3                                      | Complete laryngectomy   |
| 30.4                                      | Radical laryngectomy  |

| Code            | Description  |
|-----------------|--|
| 31.74           | Revision of tracheostomy   |
| 34.6            | Scarification of pleura  |
| 38.18           | Endarterectomy, lower limb arteries  |
| 55.03           | Percutaneous nephrostomy without fragmentation   |
| 55.04           | Percutaneous nephrostomy with fragmentation  |
| 94.26           | Subconvulsive electroshock therapy   |
| 94.27           | Other electroshock therapy   |
| ICD-10-PCS Code |  |
| 0CBS0ZZ         | Excision of Larynx, Open Approach  |
| 0CBS3ZZ         | Excision of Larynx, Percutaneous Approach  |
| 0CBS4ZZ         | Excision of Larynx, Percutaneous Endoscopic Approach                                   |
| 0CBS7ZZ         | Excision of Larynx, Via Natural or Artificial Opening                                  |
| 0CBS8ZZ         | Excision of Larynx, Via Natural or Artificial Opening Endoscopic                       |
| 0CBS0ZZ         | Excision of Larynx, Open Approach  |
| 0CBS3ZZ         | Excision of Larynx, Percutaneous Approach  |
| 0CBS4ZZ         | Excision of Larynx, Percutaneous Endoscopic Approach                                   |
| 0CBS7ZZ         | Excision of Larynx, Via Natural or Artificial Opening                                  |
| 0CBS8ZZ         | Excision of Larynx, Via Natural or Artificial Opening Endoscopic                       |
| 0B110F4         | Bypass Trachea to Cutaneous with Tracheostomy Device, Open Approach                    |
| 0B110Z4         | Bypass Trachea to Cutaneous, Open Approach   |
| 0B113F4         | Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Approach            |
| 0B113Z4         | Bypass Trachea to Cutaneous, Percutaneous Approach                                     |
| 0B114F4         | Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Endoscopic Approach |
| 0B114Z4         | Bypass Trachea to Cutaneous, Percutaneous Endoscopic Approach                          |
| 0CTS0ZZ         | Resection of Larynx, Open Approach   |
| 0CTS4ZZ         | Resection of Larynx, Percutaneous Endoscopic Approach                                  |
| 0CTS7ZZ         | Resection of Larynx, Via Natural or Artificial Opening                                 |
| 0CTS8ZZ         | Resection of Larynx, Via Natural or Artificial Opening Endoscopic                      |
| 0B110F4         | Bypass Trachea to Cutaneous with Tracheostomy Device, Open Approach                    |
| 0B110Z4         | Bypass Trachea to Cutaneous, Open Approach   |
| 0B113F4         | Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Approach            |
| 0B113Z4         | Bypass Trachea to Cutaneous, Percutaneous Approach                                     |
| 0B114F4         | Bypass Trachea to Cutaneous with Tracheostomy Device, Percutaneous Endoscopic Approach |
| 0B114Z4         | Bypass Trachea to Cutaneous, Percutaneous Endoscopic Approach                          |
| 0CTS0ZZ         | Resection of Larynx, Open Approach   |

| Code    | Description   |
|---------|---|
| OCTS4ZZ | Resection of Larynx, Percutaneous Endoscopic Approach                               |
| OCTS7ZZ | Resection of Larynx, Via Natural or Artificial Opening                              |
| OCTS8ZZ | Resection of Larynx, Via Natural or Artificial Opening Endoscopic                   |
| 0GTG0ZZ | Resection of Left Thyroid Gland Lobe, Open Approach                                 |
| 0GTG4ZZ | Resection of Left Thyroid Gland Lobe, Percutaneous Endoscopic Approach              |
| 0GTH0ZZ | Resection of Right Thyroid Gland Lobe, Open Approach                                |
| 0GTH4ZZ | Resection of Right Thyroid Gland Lobe, Percutaneous Endoscopic Approach             |
| 0GTK0ZZ | Resection of Thyroid Gland, Open Approach   |
| 0GTK4ZZ | Resection of Thyroid Gland, Percutaneous Endoscopic Approach                        |
| 0WB60ZZ | Excision of Neck, Open Approach   |
| 0WB63ZZ | Excision of Neck, Percutaneous Approach   |
| 0WB64ZZ | Excision of Neck, Percutaneous Endoscopic Approach                                  |
| 0WB6XZZ | Excision of Neck, External Approach   |
| 0BW10FZ | Revision of Tracheostomy Device in Trachea, Open Approach                           |
| 0BW13FZ | Revision of Tracheostomy Device in Trachea, Percutaneous Approach                   |
| 0BW14FZ | Revision of Tracheostomy Device in Trachea, Percutaneous Endoscopic Approach        |
| 0WB6XZ2 | Excision of Neck, Stoma, External Approach  |
| 0WQ6XZ2 | Repair Neck, Stoma, External Approach   |
| 0B5N0ZZ | Destruction of Right Pleura, Open Approach  |
| 0B5N3ZZ | Destruction of Right Pleura, Percutaneous Approach                                  |
| 0B5N4ZZ | Destruction of Right Pleura, Percutaneous Endoscopic Approach                       |
| 0B5P0ZZ | Destruction of Left Pleura, Open Approach   |
| 0B5P3ZZ | Destruction of Left Pleura, Percutaneous Approach                                   |
| 0B5P4ZZ | Destruction of Left Pleura, Percutaneous Endoscopic Approach                        |
| 04CK0ZZ | Extirpation of Matter from Right Femoral Artery, Open Approach                      |
| 04CK3ZZ | Extirpation of Matter from Right Femoral Artery, Percutaneous Approach              |
| 04CK4ZZ | Extirpation of Matter from Right Femoral Artery, Percutaneous Endoscopic Approach   |
| 04CL0ZZ | Extirpation of Matter from Left Femoral Artery, Open Approach                       |
| 04CL3ZZ | Extirpation of Matter from Left Femoral Artery, Percutaneous Approach               |
| 04CL4ZZ | Extirpation of Matter from Left Femoral Artery, Percutaneous Endoscopic Approach    |
| 04CM0ZZ | Extirpation of Matter from Right Popliteal Artery, Open Approach                    |
| 04CM3ZZ | Extirpation of Matter from Right Popliteal Artery, Percutaneous Approach            |
| 04CM4ZZ | Extirpation of Matter from Right Popliteal Artery, Percutaneous Endoscopic Approach |
| 04CN0ZZ | Extirpation of Matter from Left Popliteal Artery, Open Approach                     |
| 04CN3ZZ | Extirpation of Matter from Left Popliteal Artery, Percutaneous Approach             |
| 04CN4ZZ | Extirpation of Matter from Left Popliteal Artery, Percutaneous Endoscopic Approach  |
| 04CP0ZZ | Extirpation of Matter from Right Anterior Tibial Artery, Open Approach              |



| Code    | Description  |
|---------|--|
| 04CP3ZZ | Extirpation of Matter from Right Anterior Tibial Artery, Percutaneous Approach             |
| 04CP4ZZ | Extirpation of Matter from Right Anterior Tibial Artery, Percutaneous Endoscopic Approach  |
| 04CQ0ZZ | Extirpation of Matter from Left Anterior Tibial Artery, Open Approach                      |
| 04CQ3ZZ | Extirpation of Matter from Left Anterior Tibial Artery, Percutaneous Approach              |
| 04CQ4ZZ | Extirpation of Matter from Left Anterior Tibial Artery, Percutaneous Endoscopic Approach   |
| 04CR0ZZ | Extirpation of Matter from Right Posterior Tibial Artery, Open Approach                    |
| 04CR3ZZ | Extirpation of Matter from Right Posterior Tibial Artery, Percutaneous Approach            |
| 04CR4ZZ | Extirpation of Matter from Right Posterior Tibial Artery, Percutaneous Endoscopic Approach |
| 04CS0ZZ | Extirpation of Matter from Left Posterior Tibial Artery, Open Approach                     |
| 04CS3ZZ | Extirpation of Matter from Left Posterior Tibial Artery, Percutaneous Approach             |
| 04CS4ZZ | Extirpation of Matter from Left Posterior Tibial Artery, Percutaneous Endoscopic Approach  |
| 04CT0ZZ | Extirpation of Matter from Right Peroneal Artery, Open Approach                            |
| 04CT3ZZ | Extirpation of Matter from Right Peroneal Artery, Percutaneous Approach                    |
| 04CT4ZZ | Extirpation of Matter from Right Peroneal Artery, Percutaneous Endoscopic Approach         |
| 04CU0ZZ | Extirpation of Matter from Left Peroneal Artery, Open Approach                             |
| 04CU3ZZ | Extirpation of Matter from Left Peroneal Artery, Percutaneous Approach                     |
| 04CU4ZZ | Extirpation of Matter from Left Peroneal Artery, Percutaneous Endoscopic Approach          |
| 04CV0ZZ | Extirpation of Matter from Right Foot Artery, Open Approach                                |
| 04CV3ZZ | Extirpation of Matter from Right Foot Artery, Percutaneous Approach                        |
| 04CV4ZZ | Extirpation of Matter from Right Foot Artery, Percutaneous Endoscopic Approach             |
| 04CW0ZZ | Extirpation of Matter from Left Foot Artery, Open Approach                                 |
| 04CW3ZZ | Extirpation of Matter from Left Foot Artery, Percutaneous Approach                         |
| 04CW4ZZ | Extirpation of Matter from Left Foot Artery, Percutaneous Endoscopic Approach              |
| 04CY0ZZ | Extirpation of Matter from Lower Artery, Open Approach                                     |
| 04CY3ZZ | Extirpation of Matter from Lower Artery, Percutaneous Approach                             |
| 04CY4ZZ | Extirpation of Matter from Lower Artery, Percutaneous Endoscopic Approach                  |
| 0T9030Z | Drainage of Right Kidney with Drainage Device, Percutaneous Approach                       |
| 0T9040Z | Drainage of Right Kidney with Drainage Device, Percutaneous Endoscopic Approach            |
| 0T9130Z | Drainage of Left Kidney with Drainage Device, Percutaneous Approach                        |
| 0T9140Z | Drainage of Left Kidney with Drainage Device, Percutaneous Endoscopic Approach             |
| 0TC03ZZ | Extirpation of Matter from Right Kidney, Percutaneous Approach                             |
| 0TC04ZZ | Extirpation of Matter from Right Kidney, Percutaneous Endoscopic Approach                  |
| 0TC13ZZ | Extirpation of Matter from Left Kidney, Percutaneous Approach                              |
| 0TC14ZZ | Extirpation of Matter from Left Kidney, Percutaneous Endoscopic Approach                   |

| Code    | Description  |
|---------|--|
| OTF33ZZ | Fragmentation in Right Kidney Pelvis, Percutaneous Approach            |
| OTF34ZZ | Fragmentation in Right Kidney Pelvis, Percutaneous Endoscopic Approach |
| OTF43ZZ | Fragmentation in Left Kidney Pelvis, Percutaneous Approach             |
| OTF44ZZ | Fragmentation in Left Kidney Pelvis, Percutaneous Endoscopic Approach  |
| GZB4ZZZ | Other Electroconvulsive Therapy  |
| GZB0ZZZ | Electroconvulsive Therapy, Unilateral-Single Seizure                   |
| GZB1ZZZ | Electroconvulsive Therapy, Unilateral-Multiple Seizure                 |
| GZB2ZZZ | Electroconvulsive Therapy, Bilateral-Single Seizure                    |
| GZB3ZZZ | Electroconvulsive Therapy, Bilateral-Multiple Seizure                  |
| GZB4ZZZ | Other Electroconvulsive Therapy  |

**Table PA4. Diagnosis categories that are acute (Planned Readmission Algorithm Version 4.0 – adapted for General Surgery ASC Measure Version 1.0)**

| Code                                      | Description   |
|---|---|
| <b>Diagnosis CCS (ICD-9 &amp; ICD-10)</b> |   |
| 1   | Tuberculosis  |
| 2   | Septicemia (except in labor)  |
| 3   | Bacterial infection; unspecified site   |
| 4   | Mycoses   |
| 5   | HIV infection   |
| 7   | Viral infection   |
| 8   | Other infections; including parasitic   |
| 9   | Sexually transmitted infections (not HIV or hepatitis)                            |
| 54  | Gout and other crystal arthropathies  |
| 55  | Fluid and electrolyte disorders   |
| 60  | Acute posthemorrhagic anemia  |
| 61  | Sickle cell anemia  |
| 63  | Diseases of white blood cells   |
| 76  | Meningitis (except that caused by tuberculosis or sexually transmitted disease)   |
| 77  | Encephalitis (except that caused by tuberculosis or sexually transmitted disease) |
| 78  | Other CNS infection and poliomyelitis   |
| 82  | Paralysis   |
| 83  | Epilepsy; convulsions   |
| 84  | Headache; including migraine  |
| 85  | Coma; stupor; and brain damage  |
| 87  | Retinal detachments; defects; vascular occlusion; and retinopathy                 |
| 89  | Blindness and vision defects  |

| Code | Description   |
|------|---|
| 90   | Inflammation; infection of eye (except that caused by tuberculosis or sexually transmitted disease) |
| 91   | Other eye disorders   |
| 92   | Otitis media and related conditions   |
| 93   | Conditions associated with dizziness or vertigo   |
| 99   | Hypertension with complications and secondary hypertension  |
| 100  | Acute myocardial infarction (with the exception of ICD-9 codes 410.x2)                              |
| 102  | Nonspecific chest pain  |
| 104  | Other and ill-defined heart disease   |
| 107  | Cardiac arrest and ventricular fibrillation   |
| 109  | Acute cerebrovascular disease   |
| 112  | Transient cerebral ischemia   |
| 116  | Aortic and peripheral arterial embolism or thrombosis   |
| 118  | Phlebitis; thrombophlebitis and thromboembolism   |
| 120  | Hemorrhoids   |
| 122  | Pneumonia (except that caused by TB or sexually transmitted disease)                                |
| 123  | Influenza   |
| 124  | Acute and chronic tonsillitis   |
| 125  | Acute bronchitis  |
| 126  | Other upper respiratory infections  |
| 127  | Chronic obstructive pulmonary disease and bronchiectasis  |
| 128  | Asthma  |
| 129  | Aspiration pneumonitis; food/vomitus  |
| 130  | Pleurisy; pneumothorax; pulmonary collapse  |
| 131  | Respiratory failure; insufficiency; arrest (adult)  |
| 135  | Intestinal infection  |
| 137  | Diseases of mouth; excluding dental   |
| 139  | Gastroduodenal ulcer (except hemorrhage)  |
| 140  | Gastritis and duodenitis  |
| 142  | Appendicitis and other appendiceal conditions   |
| 145  | Intestinal obstruction without hernia   |
| 146  | Diverticulosis and diverticulitis   |
| 148  | Peritonitis and intestinal abscess  |
| 153  | Gastrointestinal hemorrhage   |
| 154  | Noninfectious gastroenteritis   |
| 157  | Acute and unspecified renal failure   |
| 159  | Urinary tract infections  |

| Code | Description  |
|------|--|
| 165  | Inflammatory conditions of male genital organs   |
| 168  | Inflammatory diseases of female pelvic organs  |
| 172  | Ovarian t  |
| 197  | Skin and subcutaneous tissue infections  |
| 198  | Other inflammatory condition of skin   |
| 225  | Joint disorders and dislocations; trauma-related   |
| 226  | Fracture of neck of femur (hip)  |
| 227  | Spinal cord injury   |
| 228  | Skull and face fractures   |
| 229  | Fracture of upper limb   |
| 230  | Fracture of lower limb   |
| 232  | Sprains and strains  |
| 233  | Intracranial injury  |
| 234  | Crushing injury or internal injury   |
| 235  | Open wounds of head; neck; and trunk   |
| 237  | Complication of device; implant or graft   |
| 238  | Complications of surgical procedures or medical care   |
| 239  | Superficial injury; contusion  |
| 240  | Burns  |
| 241  | Poisoning by psychotropic agents   |
| 242  | Poisoning by other medications and drugs   |
| 243  | Poisoning by non-medicinal substances  |
| 244  | Other injuries and conditions due to external causes   |
| 245  | Syncope  |
| 246  | Fever of unknown origin  |
| 247  | Lymphadenitis  |
| 249  | Shock  |
| 250  | Nausea and vomiting  |
| 251  | Abdominal pain   |
| 252  | Malaise and fatigue  |
| 253  | Allergic reactions   |
| 259  | Residual codes; unclassified   |
| 650  | Adjustment disorders   |
| 651  | Anxiety disorders  |
| 652  | Attention-deficit, conduct, and disruptive behavior disorders (in ICD-10 version, description is: "Attention-deficit") |

| Code  | Description  |
|---|--|
| 653   | Delirium, dementia, and amnestic and other cognitive disorders (in ICD-10 version, description is: "Delirium") |
| 656   | Impulse control disorders, NEC (in ICD-10 version, description is: "Impulse control disorders")                |
| 658   | Personality disorders  |
| 660   | Alcohol-related disorders  |
| 661   | Substance-related disorders  |
| 662   | Suicide and intentional self-inflicted injury  |
| 663   | Screening and history of mental health and substance abuse codes   |
| 670   | Miscellaneous disorders  |
| <b>Acute ICD-9 codes within Diagnosis CCS 97: Peri-; endo-; and myocarditis; cardiomyopathy</b> |  |
| 3282  | Diphtheritic myocarditis   |
| 3640  | Meningococcal carditis NOS   |
| 3641  | Meningococcal pericarditis   |
| 3642  | Meningococcal endocarditis   |
| 3643  | Meningococcal myocarditis  |
| 7420  | Coxsackie carditis NOS   |
| 7421  | Coxsackie pericarditis   |
| 7422  | Coxsackie endocarditis   |
| 7423  | Coxsackie myocarditis  |
| 11281   | Candida endocarditis   |
| 11503   | Histoplasma capsulatum pericarditis  |
| 11504   | Histoplasma capsulatum endocarditis  |
| 11513   | Histoplasma duboisii pericarditis  |
| 11514   | Histoplasma duboisii endocarditis  |
| 11593   | Histoplasmosis pericarditis  |
| 11594   | Histoplasmosis endocarditis  |
| 1303  | Toxoplasma myocarditis   |
| 3910  | Acute rheumatic pericarditis   |
| 3911  | Acute rheumatic endocarditis   |
| 3912  | Acute rheumatic myocarditis  |
| 3918  | Acute rheumatic heart disease NEC  |
| 3919  | Acute rheumatic heart disease NOS  |
| 3920  | Rheumatic chorea w heart involvement   |
| 3980  | Rheumatic myocarditis  |
| 39890   | Rheumatic heart disease NOS  |
| 39899   | Rheumatic heart disease NEC  |

| Code   | Description                           |
|--|---------------------------------------|
| 4200   | Acute pericarditis in other disease   |
| 42090  | Acute pericarditis NOS                |
| 42091  | Acute idiopathic pericarditis         |
| 42099  | Acute pericarditis NEC                |
| 4210   | Acute/subacute bacterial endocarditis |
| 4211   | Acute endocarditis in other diseases  |
| 4219   | Acute/subacute endocarditis NOS       |
| 4220   | Acute myocarditis in other diseases   |
| 42290  | Acute myocarditis NOS                 |
| 42291  | Idiopathic myocarditis                |
| 42292  | Septic myocarditis                    |
| 42293  | Toxic myocarditis                     |
| 42299  | Acute myocarditis NEC                 |
| 4230   | Hemopericardium                       |
| 4231   | Adhesive pericarditis                 |
| 4232   | Constrictive pericarditis             |
| 4233   | Cardiac tamponade                     |
| 4290   | Myocarditis NOS                       |
| <b>Acute ICD-10 codes within Diagnosis CCS 97: Peri-; endo-; and myocarditis; cardiomyopathy</b> |                                       |
| A3681  | Diphtheritic cardiomyopathy           |
| A3950  | Meningococcal carditis, unspecified   |
| A3951  | Meningococcal endocarditis            |
| A3952  | Meningococcal myocarditis             |
| A3953  | Meningococcal pericarditis            |
| B3320  | Viral carditis, unspecified           |
| B3321  | Viral endocarditis                    |
| B3322  | Viral myocarditis                     |
| B3323  | Viral pericarditis                    |
| B376   | Candida endocarditis                  |
| B394   | Histoplasmosis capsulati, unspecified |
| B395   | Histoplasmosis duboisii               |
| B399   | Histoplasmosis, unspecified           |
| B5881  | Toxoplasma myocarditis                |
| I010   | Acute rheumatic pericarditis          |
| I011   | Acute rheumatic endocarditis          |
| I012   | Acute rheumatic myocarditis           |
| I018   | Other acute rheumatic heart disease   |

| Code  | Description   |
|---|---|
| I019  | Acute rheumatic heart disease, unspecified                              |
| I020  | Rheumatic chorea with heart involvement                                 |
| I090  | Rheumatic myocarditis   |
| I0989   | Other specified rheumatic heart diseases                                |
| I099  | Rheumatic heart disease, unspecified                                    |
| I300  | Acute nonspecific idiopathic pericarditis                               |
| I308  | Other forms of acute pericarditis                                       |
| I309  | Acute pericarditis, unspecified   |
| I310  | Chronic adhesive pericarditis   |
| I311  | Chronic constrictive pericarditis                                       |
| I312  | Hemopericardium, not elsewhere classified                               |
| I314  | Cardiac tamponade   |
| I32   | Pericarditis in diseases classified elsewhere                           |
| I330  | Acute and subacute infective endocarditis                               |
| I339  | Acute and subacute endocarditis, unspecified                            |
| I39   | Endocarditis and heart valve disorders in diseases classified elsewhere |
| I400  | Infective myocarditis   |
| I401  | Isolated myocarditis  |
| I408  | Other acute myocarditis   |
| I409  | Acute myocarditis, unspecified  |
| I41   | Myocarditis in diseases classified elsewhere                            |
| I514  | Myocarditis, unspecified  |
| <b>Acute ICD-9 codes within Diagnosis CCS 105: Conduction disorders</b> |   |
| 4260  | Atrioventricular  |
| 42610   | Atrioventricular block NOS  |
| 42611   | Atrioventricular block-1st degree                                       |
| 42612   | Atrioventricular block-Mobitz II  |
| 42613   | Atrioventricular block-2nd degree NEC                                   |
| 4262  | Left bundle branch hemiblock  |
| 4263  | Left bundle branch block NEC  |
| 4264  | Right bundle branch block   |
| 42650   | Bundle branch block NOS   |
| 42651   | Right bundle branch block/left posterior fascicular block               |
| 42652   | Right bundle branch block/left ant fascicular block                     |
| 42653   | Bilateral bundle branch block NEC                                       |
| 42654   | Trifascicular block   |
| 4266  | Other heart block   |

| Code   | Description                           |
|--|---------------------------------------|
| 4267   | Anomalous atrioventricular excitation |
| 42681  | Lown-Ganong-Levine syndrome           |
| 42682  | Long QT syndrome                      |
| 4269   | Conduction disorder NOS               |
| <b>Acute ICD-10 codes within Diagnosis CCS 105: Conduction disorders</b> |                                       |
| I442   | Atrioventricular block, complete      |
| I4430  | Unspecified atrioventricular block    |
| I440   | Atrioventricular block, first degree  |
| I441   | Atrioventricular block, second degree |
| I4469  | Other fascicular block                |
| I444   | Left anterior fascicular block        |
| I445   | Left posterior fascicular block       |
| I4460  | Unspecified fascicular block          |
| I447   | Left bundle-branch block, unspecified |
| I4510  | Unspecified right bundle-branch block |
| I4430  | Unspecified atrioventricular block    |
| I4439  | Other atrioventricular block          |
| I454   | Nonspecific intraventricular block    |
| I452   | Bifascicular block                    |
| I453   | Trifascicular block                   |
| I455   | Other specified heart block           |
| I456   | Pre-excitation syndrome               |
| I4581  | Long QT syndrome                      |
| I459   | Conduction disorder, unspecified      |
| <b>Acute ICD-9 codes within Diagnosis CCS 106: Dysrhythmia</b>           |                                       |
| 4272   | Paroxysmal tachycardia NOS            |
| 7850   | Tachycardia NOS                       |
| 42789  | Cardiac dysrhythmias NEC              |
| 4279   | Cardiac dysrhythmia NOS               |
| 42769  | Premature beats NEC                   |
| <b>Acute ICD-10 codes within Diagnosis CCS 106: Dysrhythmia</b>          |                                       |
| I479   | Paroxysmal tachycardia, unspecified   |
| I4949  | Other premature depolarization        |
| I498   | Other specified cardiac arrhythmias   |
| I499   | Cardiac arrhythmia, unspecified       |
| R000   | Tachycardia, unspecified              |
| R001   | Bradycardia, unspecified              |



| Code   | Description  |
|--|--|
| <b>Acute ICD-9 codes within Diagnosis CCS 108: Congestive heart failure; non-hypertensive</b>  |  |
| 39891  | Rheumatic heart failure  |
| 4280   | Congestive heart failure   |
| 4281   | Left heart failure   |
| 42820  | Unspecified systolic heart failure   |
| 42821  | Acute systolic heart failure   |
| 42823  | Acute on chronic systolic heart failure  |
| 42830  | Unspecified diastolic heart failure  |
| 42831  | Acute diastolic heart failure  |
| 42833  | Acute on chronic diastolic heart failure   |
| 42840  | Unspecified combined systolic & diastolic heart failure                                  |
| 42841  | Acute combined systolic & diastolic heart failure  |
| 42843  | Acute on chronic combined systolic & diastolic heart failure                             |
| 4289   | Heart failure NOS  |
| <b>Acute ICD-10 codes within Diagnosis CCS 108: Congestive heart failure; non-hypertensive</b> |  |
| I0981  | Rheumatic heart failure  |
| I509   | Heart failure, unspecified   |
| I501   | Left ventricular failure   |
| I5020  | Unspecified systolic (congestive) heart failure  |
| I5021  | Acute systolic (congestive) heart failure  |
| I5023  | Acute on chronic systolic (congestive) heart failure                                     |
| I5030  | Unspecified diastolic (congestive) heart failure   |
| I5031  | Acute diastolic (congestive) heart failure   |
| I5033  | Acute on chronic diastolic (congestive) heart failure                                    |
| I5040  | Unspecified combined systolic and diastolic (congestive) heart failure                   |
| I5041  | Acute combined systolic (congestive) and diastolic (congestive) heart failure            |
| I5043  | Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure |
| I509   | Heart failure, unspecified   |
| <b>Acute ICD-9 codes within Diagnosis CCS 149: Biliary tract disease</b>                       |  |
| 5740   | Calculus of gallbladder with acute cholecystitis   |
| 57400  | Calculus of gallbladder with acute cholecystitis without mention of obstruction          |
| 57401  | Calculus of gallbladder with acute cholecystitis with obstruction                        |
| 5743   | Calculus of bile duct with acute cholecystitis   |
| 57430  | Calculus of bile duct with acute cholecystitis without mention of obstruction            |
| 57431  | Calculus of bile duct with acute cholecystitis with obstruction                          |
| 5746   | Calculus of gallbladder and bile duct with acute cholecystitis                           |

| Code  | Description  |
|---|--|
| 57460   | Calculus of gallbladder and bile duct with acute choletitis without mention of obstruction             |
| 57461   | Calculus of gallbladder and bile duct with acute choletitis with obstruction                           |
| 5748  | Calculus of gallbladder and bile duct with acute and chronic choletitis                                |
| 57480   | Calculus of gallbladder and bile duct with acute and chronic choletitis without mention of obstruction |
| 57481   | Calculus of gallbladder and bile duct with acute and chronic choletitis with obstruction               |
| 5750  | Acute choletitis   |
| 57512   | Acute and chronic choletitis   |
| 5761  | Cholangitis  |
| <b>Acute ICD-10 codes within Diagnosis CCS 149: Biliary tract disease</b> |  |
| K8000   | Calculus of gallbladder with acute choletitis w/o obstruction  |
| K8001   | Calculus of gallbladder with acute choletitis with obstruction   |
| K8042   | Calculus of bile duct with acute choletitis w/o obstruction  |
| K8043   | Calculus of bile duct with acute choletitis with obstruction   |
| K8062   | Calculus of GB and bile duct with acute choletitis w/o obstruction                                     |
| K8063   | Calculus of GB and bile duct with acute choletitis with obstruction                                    |
| K8066   | Calculus of GB and bile duct with acute and chronic choletitis w/o obstruction                         |
| K8067   | Calculus of GB and bile duct with acute and chronic choletitis with obstruction                        |
| K810  | Acute choletitis   |
| K812  | Acute choletitis with chronic choletitis   |
| K830  | Cholangitis  |
| <b>Acute ICD-9 codes with Diagnosis CCS 152: Pancreatic disorders</b>     |  |
| 5770  | Acute Pancreatitis   |
| <b>Acute ICD-10 codes with Diagnosis CCS 152: Pancreatic disorders</b>    |  |
| K859  | Acute pancreatitis, unspecified  |

## 13.4 Appendix D: Measure Score Calculation and Reporting

### D1. Risk-Standardized Measure Score Calculation Algorithm

We fit a hierarchical generalized linear model (HGLM), which accounts for the clustering of observations within ASCs. We assume that the outcome is a known exponential family distribution and that it is related linearly to the covariates via a known linked function,  $h$ . For our model, we assumed a binomial distribution and a logit link function. Further, we accounted for the clustering within ASC by estimating a facility-specific effect,  $\alpha_i$ , which is assumed to follow a normal distribution with mean  $\mu$  and variance  $\tau^2$ , the between-facility variance component. The HGLM is defined by the following equations:

$$h(Y_{ij}) = \alpha_i + \beta Z_{ij} \quad (1)$$

$$\alpha_i = \mu + \omega_i; \omega_i \sim N(0, \tau^2) \quad (2)$$

$$i = 1 \dots I; j = 1 \dots n_i$$

Where  $Y_{ij}$  denotes the outcome (equal to 1 if the patient has an eligible hospital visit within 7 days of a surgery procedure, 0 otherwise) for the  $j$ -th patient who had a procedure at the  $i$ -th ASC;  $\mathbf{Z}_{ij} = (Z_{1ij}, Z_{2ij}, \dots, Z_{pij})$  is a set of  $p$  patient-specific covariates derived from the data; and  $I$  denotes the total number of ASCs and  $n_i$  the number of surgeries performed at ASC  $i$ . The facility-specific intercept of the  $i$ -th ASC,  $\alpha_i$ , defined above, is comprised of  $\mu$ , the adjusted average intercept over all ASCs in the sample and  $\omega_i$ , the facility-specific intercept deviation from  $\mu$ . A point estimate of  $\omega_i$ , greater or less than 0, determines if ASC performance is worse or better compared to the adjusted average outcome.

The HGLM is estimated using the SAS software system (GLIMMIX procedure).

### D2. Provider Performance Reporting

Using the HGLM defined by Equations (1) - (2), we estimate the parameters  $\hat{\mu}$ ,  $\{\hat{\alpha}_1, \hat{\alpha}_2, \dots, \hat{\alpha}_I\}$ ,  $\hat{\beta}$ , and  $\hat{\tau}^2$ . We calculate the measure score,  $s_i$ , for each ASC by computing the ratio of the number of predicted hospital visits to the number of expected hospital visits. Specifically, we calculate:

$$\text{Predicted} \quad \hat{y}_{ij}(Z) = h^{-1}(\hat{\alpha}_i + \hat{\beta} Z_{ij})$$

$$\text{Expected} \quad \hat{e}_{ij}(Z) = h^{-1}(\hat{\mu} + \hat{\beta} Z_{ij})$$

$$\text{Measure score} \quad \hat{s}_i(Z) = \frac{\sum_{j=1}^{n_i} \hat{y}_{ij}(Z)}{\sum_{j=1}^{n_i} \hat{e}_{ij}(Z)}$$

If the “predicted”  $\hat{s}_i$  number of hospital visits is higher (lower) than the “expected” number of hospital visits, then that ASC’s ratio will be higher (lower) than 1.0.

## 13.5 Appendix E: Risk-Adjustment Model Development

**Table E1. Candidate variables considered for the risk-adjustment model**

| Patient demographic, comorbidity, and procedural complexity candidate variables for risk adjustment |  |
|---|--|
| Variable category   | Definition   |
| Age   |  |
| Sex   |  |
| Number of qualifying procedures   | Defined as 1, 2, or $\geq 3$   |
| Procedure type  | Defined as abdominal (reference), alimentary tract, breast, skin/soft tissue, varicose vein, or wound procedures                               |
| Work Relative Value Units (work RVUs)   | Work RVUs are assigned to each CPT® procedure code and approximate procedure complexity by incorporating elements of physician time and effort |
| Septicemia, sepsis, systemic inflammatory response syndrome/shock                                   | CC 2   |
| History of infection  | CC 1, 3-7  |
| Cancers   | CC 8, 9, 10, 11, 12, 13, 14  |
| Other benign tumors   | CC 15, 16  |
| Diabetes and diabetes mellitus complications  | CC 17, 18, 19, 122, 123  |
| Protein-calorie malnutrition  | CC 21  |
| Morbid Obesity  | CC 22 (excluding ICD-9-CM code 27803)  |
| Disorders of fluid/electrolyte/acid-base balance  | CC 23, 24  |
| Disorders of lipid metabolism   | CC 25  |
| Other endocrine/metabolic/nutritional disorders   | CC 26  |
| Liver or biliary disease  | CC 27, 28, 29, 30, 31, 32  |
| Intestinal obstruction/perforation  | CC 33  |
| Chronic pancreatitis; and peptic ulcer, hemorrhage, other specified gastrointestinal disorders      | CC 34, 36  |
| Inflammatory bowel disease  | CC 35  |
| Other gastrointestinal disorders  | CC 38  |
| Bone/joint/muscle infections/necrosis   | CC 39  |
| Rheumatoid and osteoarthritis   | CC 40-42   |

| Patient demographic, comorbidity, and procedural complexity candidate variables for risk adjustment |   |
|---|---|
| Variable category   | Definition  |
| Osteoporosis and other bone/cartilage disorders   | CC 43   |
| Other Musculoskeletal and Connective Tissue Disorders   | CC 44, 45   |
| Hematological disorders including coagulation defects and iron deficiency                           | CC 46, 48, 49   |
| Disorders of immunity   | CC 47   |
| Delirium and encephalopathy   | CC 50   |
| Dementia or senility  | CC 51-53  |
| Drug/alcohol abuse/dependence/psychosis   | CC 54, 55, 56<br>(excluding ICD-9-CM codes 30400, 30401, 30402, 30403, 30470, 30471, 30472, 30403, 30550, 30551, 30552, 30553;<br>ICD-10-CM codes F11.10, F11.120, F11.121, F11.122, F11.129, F11.14, F11.150, F11.151, F11.159, F11.181, F11.182, F11.188, F11.19, F11.20, F11.21, F11.220, F11.221, F11.222, F11.229, F11.23, F11.24, F11.250, F11.251, F11.259, F11.281, F11.282, F11.288, F11.29, F553) |
| Psychiatric disorders   | CC 57, 58, 59, 60, 61, 62, 63   |
| Hemiplegia, paraplegia, paralysis, functional disability  | CC 70, 71, 73, 74, 103, 104   |
| Spinal cord disorders/injuries  | CC 72   |
| Amputation status   | CC 189, 190   |
| Polyneuropathy  | CC 75, 81   |
| Muscular Dystrophy  | CC 76   |
| Other significant central nervous system (CNS) disease  | CC 77, 78, 79, 80   |
| Cardiorespiratory arrest, failure and respiratory dependence  | CC 82, 83, 84   |
| Congestive heart failure  | CC 85   |
| Ischemic heart disease  | CC 86, 87, 88, 89   |
| Valvular and rheumatic heart disease  | CC 91   |
| Other and unspecified heart disease   | CC 90, 92, 93, 98   |
| Hypertension and hypertensive disease   | CC 94, 95   |
| Specified arrhythmias and other heart rhythm disorders  | CC 96, 97   |
| Stroke  | CC 99, 100  |
| Pre-cerebral arterial occlusion and transient cerebral ischemia                                     | CC 101  |
| Cerebrovascular disease   | CC 102, 105   |

| Patient demographic, comorbidity, and procedural complexity candidate variables for risk adjustment |  |
|---|--|
| Variable category   | Definition   |
| Vascular or circulatory disease   | CC 106, 107, 108, 109  |
| Chronic lung disease  | CC 110, 111, 112, 113  |
| Pneumonia   | CC 114, 115, 116   |
| Pleural effusion/pneumothorax   | CC 117   |
| Other respiratory disorders   | CC 118<br>(excluding ICD-9-CM codes 78051, 78057, 3272, 32720, 32721, 32723, 32727, 32729;<br>ICD-10-CM codes G4730, G4731, G4733, G4737, G4739) |
| Sleep apnea   | ICD-9-CM codes 78051, 78057, 3272, 32720, 32721, 32723, 32727, 32729;<br>ICD-10-CM codes: G4730, G4731, G4733, G4737, G4739                      |
| Other ENT and mouth disorders   | CC 129, 131  |
| Organ transplant  | CC 132, 186, 187   |
| Dialysis or severe chronic kidney disease   | CC 134, 136, 137   |
| Acute or unspecified renal failure  | CC 135, 140  |
| Mild to moderate chronic kidney disease   | CC 138, 139  |
| Nephritis   | CC 141   |
| Urinary obstruction and retention   | CC 142   |
| Urinary incontinence  | CC 143   |
| Urinary tract infection and other urinary tract disorders   | CC 144, 145  |
| Pelvic inflammatory disease and other specified female Genital Disorders                            | CC 147, 148  |
| Male Genital Disorders (without Benign Prostatic hyperplasia [BPH])                                 | CC 149<br>(excluding ICD-9-CM codes 60000, 60001, 60020, 60021, 60090, 6091;<br>ICD-10-CM codes: N40.0, N40.1, N40.2, N40.3)                     |
| Benign prostatic hyperplasia  | ICD-9-CM codes 60000, 60001, 60020, 60021, 60090, 6091;<br>ICD-10-CM codes N40.0, N40.1, N40.2, N40.3  |
| Pressure ulcer  | CC 157, 158, 159, 160  |
| Burns, non-pressure ulcers  | CC 161, 162, 163   |

| Patient demographic, comorbidity, and procedural complexity candidate variables for risk adjustment |  |
|---|--|
| Variable category   | Definition   |
| Cellulitis, local skin infection  | CC 164   |
| Other dermatological disorders  | CC 165   |
| Head injury   | CC 166, 167, 168   |
| Major traumatic fracture or internal injury   | CC 169, 170, 171, 172, 173, 174  |
| Poisonings and allergic reactions   | CC 175   |
| Complications of care   | CC 176, 177  |
| Radiation therapy   | CC 192   |
| Chemotherapy  | CC 193   |
| Chronic anticoagulant use   | ICD-9-CM code V5861;<br>ICD-10-CM code Z7901   |
| Failure to thrive   | ICD-9 code: 7837;<br>ICD-10 code: R627   |
| History of falling  | ICD-9-CM code V1588;<br>ICD-10-CM codes Z9181, R296  |
| Opioid abuse  | ICD-9-CM codes 30400, 30401, 30402, 30403, 30470, 30471, 30472, 30403, 30550, 30551, 30552, 30553;<br>ICD-10-CM codes F11.10, F11.120, F11.121, F11.122, F11.129, F11.14, F11.150, F11.151, F11.159, F11.181, F11.182, F11.188, F11.19, F11.20, F11.21, F11.220, F11.221, F11.222, F11.229, F11.23, F11.24, F11.250, F11.251, F11.259, F11.281, F11.282, F11.288, F11.29 |
| Steroid use   | ICD-9-CM codes V58.65, V87.44, V87.45;<br>ICD-10-CM codes Z7951, Z7952, Z92240, Z92241, F553   |
| Tobacco use disorder  | ICD-9-CM diagnosis code 3051;<br>ICD-10-CM code F17200   |



**Table E2. Condition Categories (CCs) that are not risk adjusted for if they occur only at the time of the procedure**

| Condition Category (CC) | CC description   |
|-------------------------|--|
| CC 2                    | Septicemia, sepsis, systemic inflammatory response syndrome/shock    |
| CC 7                    | Other infectious diseases  |
| CC 17                   | Diabetes with acute complications                                    |
| CC 24                   | Disorders of fluid/electrolyte/acid-base                             |
| CC 30                   | Acute liver failure/disease  |
| CC 33                   | Intestinal obstruction/perforation                                   |
| CC 36                   | Peptic ulcer, hemorrhage, other specified gastrointestinal disorders |
| CC 50                   | Delirium and encephalopathy  |
| CC 80                   | Coma, brain compression/anoxic damage                                |
| CC 82                   | Respirator dependence/tracheostomy status                            |
| CC 83                   | Respiratory arrest   |
| CC 84                   | Cardio-respiratory failure and shock                                 |
| CC 85                   | Congestive heart failure   |
| CC 86                   | Acute myocardial infarction  |
| CC 87                   | Unstable angina and other acute ischemic heart disease               |
| CC 96                   | Specified heart arrhythmias  |
| CC 97                   | Other heart rhythm and conduction disorders                          |
| CC 98                   | Other and unspecified heart disease                                  |
| CC 99                   | Cerebral hemorrhage  |
| CC 100                  | Ischemic or unspecified stroke                                       |
| CC 101                  | Precerebral arterial occlusion and transient cerebral ischemia       |
| CC 103                  | Hemiplegia/hemiparesis   |
| CC 104                  | Monoplegia, other paralytic syndromes                                |
| CC 107                  | Vascular disease with complications                                  |
| CC 114                  | Aspiration and specified bacterial pneumonias                        |
| CC 115                  | Pneumococcal pneumonia, emphysema, lung abscess                      |
| CC 117                  | Pleural effusion/pneumothorax  |
| CC 135                  | Acute renal failure  |
| CC 140                  | Unspecified renal failure  |
| CC 141                  | Nephritis  |
| CC 142                  | Urinary obstruction and retention                                    |
| CC 144                  | Urinary tract infection  |
| CC 164                  | Cellulitis, local skin infection                                     |
| CC 168                  | Concussion or unspecified head injury                                |
| CC 175                  | Poisonings and allergic and inflammatory reactions                   |
| CC 176                  | Complications of specified implanted device or graft                 |
| CC 177                  | Other complications of medical care                                  |