MEASURE INFORMATION FORM

APRIL 2015

2014 MEASURE INFORMATION ABOUT THE 30-DAY ALL-CAUSE HOSPITAL READMISSION MEASURE, CALCULATED FOR THE VALUE-BASED PAYMENT MODIFIER PROGRAM

A. Measure Name

30-day All-Cause Hospital Readmission measure

B. Measure Description

The 30-day All-Cause Hospital Readmission measure is a risk-standardized readmission rate for beneficiaries age 65 or older who were hospitalized at a short-stay acute care hospital and experienced an unplanned readmission for any cause to an acute care hospital within 30 days of discharge. The measure applies to solo practitioners and groups of practitioners, as identified by their Taxpayer Identification Number (TIN).

This TIN-level, risk-standardized, all-cause unplanned readmission measure is adapted from a hospital-level quality measure developed for the Centers for Medicare & Medicaid Services (CMS) by the Center for Outcomes Research & Evaluation (CORE) at Yale School of Medicine (Horwitz et al. 2011); it is also calculated for Accountable Care Organizations (ACOs) for the Medicare Shared Savings Program (MSSP). This version of the measure is based on the measure updates developed for CMS by CORE in 2014 (Horwitz et al. 2014).

C. Rationale

Some readmissions are unavoidable, but they may also result from poor quality of care, inadequate coordination of care, or lack of effective discharge planning and transitional care. CMS is applying this measure to the Value Modifier because reducing avoidable readmissions is a key component in the effort to promote more efficient, high-quality care.

Information on TINs' performance on this measure is included in the Mid-Year and Annual Quality and Resource Use Reports (QRURs) and used in the calculation of the Value Modifier.

D. Measure Outcome (Numerator)

The outcome[1] for this measure is any unplanned readmission to a non-federal, short-stay, acute-care or critical access hospital within 30 days of discharge from an index admission. The

[1] This measure does not have a traditional numerator and denominator like a process of care measure; see risk adjustment and other resources below for more detail on measure construction.

identification of planned readmissions is discussed in section H. Readmissions during the 30-day period that follow a planned readmission are not counted in the outcome. In the case of multiple readmissions during the 30-day period, the measure counts only one outcome. Readmissions to the same hospital on the same day for the same principal diagnosis are not counted in the outcome.

E. Population Measured (Denominator)

Eligible (index) admissions include acute care hospitalizations for Fee-for-Service (FFS) Medicare beneficiaries age 65 or older at non-federal, short-stay, acute-care or critical access hospitals that occurred during the performance period and are not excluded for the reasons listed in the next section. Admissions for all principal diagnoses are included unless identified as having an exclusion. A hospital stay that counts as a readmission for a prior stay also counts as a new index stay if it meets the criteria for an index stay.

For the purposes of measure calculation (described in section H), the eligible admissions are assigned to one of five specialty cohorts—surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology—based on diagnoses and procedure codes on the claim mapped to Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications Software (CCS); section I provides a link to methodology reports that contain the detailed CCS categories for each cohort.

F. Exclusions

Beneficiaries are excluded from the population measured if they:

- were enrolled in Medicare Part A only or Medicare Part B only for any month during the performance period
- were enrolled in Medicare managed care (for example, a Medicare Advantage plan) for any month during the performance period
- resided outside of the United States, its territories, and its possessions for any month during the performance period

In addition , hospitalizations are excluded from the denominator if the beneficiary:

- died during the admission
- was not continuously enrolled in Medicare Part A FFS for at least 30 days following discharge from the index admission
- lacked complete Medicare Part A FFS enrollment history for the 12 months prior to the index admission
- was discharged against medical advice
- was transferred from the admission to another acute care hospital
- was hospitalized in a prospective payment system-exempt cancer hospital

- was hospitalized for medical treatment of cancer[2]
- was hospitalized for a primary psychiatric disease[3]

G. Data Collection Approach and Measure Collection

This measure is calculated from FFS Medicare administrative claims (Parts A and B) and Medicare beneficiary enrollment data; no additional data submission is required. The measure uses one year of inpatient claims to identify eligible admissions and readmissions, as well as up to one year prior of inpatient data to collect diagnoses for risk adjustment. The measure uses Part A and B claims from the performance period to attribute beneficiaries to TINs as described in the next section.

H. Methodological Information and Measure Construction

Attribution. Beneficiaries are attributed to TINs for the 30-day All-Cause Hospital Readmission measure using a two-step process. Only beneficiaries who received a primary care service from a physician are considered in attribution. First, a beneficiary is attributed to a TIN if the TIN's primary care physicians (PCPs)—defined as family practice, internal medicine, geriatric medicine, or general practice physicians[4]—accounted for a larger share (plurality) of allowed charges for primary care services (as shown in Table 3) than PCPs for any other TIN.[5] Second, beneficiaries who did not receive a primary care service from a PCP are assigned to a TIN if the non-PCP physicians, nurse practitioners, clinical nurse specialists, and physician assistants in the TIN accounted for a larger amount of total Medicare allowed charges for primary care services than any other TIN.

Planned readmissions. This measure does not count hospitalizations that are considered planned in the outcome. Planned readmissions are identified based on the following three principles: (1) some types of care are always considered planned (obstetrical delivery, transplant surgery, maintenance chemotherapy, rehabilitation); (2) otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and (3) admissions for acute illness or for complications of care are never planned. Tables 4 and 5 present procedure and diagnosis categories that are always considered planned, identified by AHRQ CCS. Table 6 presents procedure codes that are considered planned as long as they are not accompanied by one of the acute diagnoses listed in Table 7.

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[2] These are identified by AHRQ CCS categories; see Table 1 for a listing of CCS categories for cancer that are excluded from the set of eligible index admissions.

[3] See Table 2 for a listing of AHRQ CCS categories for psychiatric disease that are excluded from the set of eligible index admissions.

[4] These specialties are defined using the following CMS specialty codes: general practice (01), family practice (08), internal medicine (11), and geriatric medicine (38).

[5] In the 2015 Physician Fee Schedule Final Rule, CMS finalized a change to the attribution methodology. Beginning with the Value Modifier that will be applied in 2017, CMS will include non-physician practitioners (nurse practitioners, clinical nurse specialists, and physician assistants) in the first step of attribution and will no longer require that a beneficiary receive primary care services from a physician to be attributed to a TIN.

Risk adjustment and measure construction. Risk-adjusted readmissions account for beneficiary-level age and clinical risk factors of the beneficiaries attributed to the TIN that can affect hospital readmissions, regardless of the care provided. Risk-adjusted readmissions also includes a TIN-level effect that accounts for the underlying risk of readmission for that TIN. The measure reports a single composite risk-standardized rate derived from the volume-weighted results of hierarchical regression models for five specialty cohorts: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology.

Each specialty cohort model uses a fixed, common set of risk-adjustment variables summarized in Table 8. Diagnoses recorded in hospital claims during the year prior to hospitalization and secondary diagnoses from the index admission (that do not represent complications) are used in assigning risk-adjustment variables for each admission, grouped by selected condition categories.

A Hierarchical Generalized Linear Model (HGLM) logistic regression model is used to calculate a "standardized readmission ratio" (SRR) for each cohort. At the beneficiary level, HGLM models the log-odds of hospital readmission within 30 days of discharge using age, selected clinical covariates, and a TIN-specific intercept. At the TIN level, it models the TIN-specific intercepts as arising from a normal distribution. The TIN-level intercept represents the underlying risk of a readmission for a TIN's beneficiaries, after accounting for beneficiary risk. The TIN-specific intercepts are given a distribution to account for the clustering (non-independence) of beneficiaries within the same TIN.

For each specialty cohort, the numerator of the SRR ("predicted") is the number of 30-day readmissions for beneficiaries within the specialty cohort predicted on the basis of the TIN's performance (accounting for its TIN-specific intercept) with its observed case mix; the denominator ("expected") is the number of readmissions expected for beneficiaries within the specialty cohort on the basis of the nation's performance with that TIN's case mix. If a TIN has an SRR > 1, this indicates higher than expected readmissions given the patient mix of its attributed beneficiaries; an SRR < 1 indicates lower than expected readmissions.

These SRRs are then pooled for each TIN to create a composite SRR. The composite SRR is the geometric mean of the specialty cohort SRRs, weighted by the number of admissions in the specialty cohort; the pooled SRR is then multiplied by the national observed readmission rate to produce the risk-standardized rate.

I. For Further Information

- This risk-standardized, 30-day All-Cause Hospital Readmission measure is adapted from a hospital risk-standardized, all condition readmission quality measure previously developed for CMS by the CORE (Horwitz et al., 2011).[6] Specifically, it is calculated at the TIN level for the Value-Based Payment Modifier Program. This version of the measure is based on the measure updates developed for CMS by Yale in 2014 (Horwitz et al., 2014). For the measure

[6] This measure is also applied at the MSSP ACO level for that program. For more information see: http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Measure-ACO-8-Readmission.pdf

specifications and other information, please see https://www.qualitynet.org → Hospitals-Inpatient → Claims-Based Measures → Readmission Measures → Measure Methodology.

- More detailed information on the Value-Based Payment Modifier Program and how the 30-day All-Cause Hospital Readmission measure is used in calculations of the Value Modifier is located in the Detailed Methodology Document for the 2014 QRUR and 2016 Value Modifier : [http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeedbackProgram/2014-QRUR.html]

J. References

Horwitz, L., Partovian C., Lin Z., et al. *Hospital-Wide All-Cause Risk-Standardized Readmission Measure: Measure Methodology Report*. Prepared for the Centers for Medicare and Medicaid Services. New Haven, CT: Yale New Haven Health Services Corporation/Center for Outcomes Research & Evaluation, 2011.

Horwitz, L., Partovian C., Lin Z., et al. *2014 Measure Updates and Specification Report: Hospital-Wide All-Cause Risk-Standardized Readmission Measure–Version 3.0*. Prepared for the Centers for Medicare and Medicaid Services. New Haven, CT: Yale New Haven Health Services Corporation/Center for Outcomes Research & Evaluation, 2014.

Commonwealth Fund. Why not the best? Results from a national scorecard on U.S. health system performance. Fund report. Harrisburg, PA: The Commonwealth Fund, 2006.

K. Tables

Table 1. Cancer discharge condition categories excluded from eligible admissions

AHRQ CCS	Brief description
11	Cancer of head and neck
12	Cancer of esophagus
13	Cancer of stomach
14	Cancer of colon
15	Cancer of rectum and anus
16	Cancer of liver and intrahepatic bile duct
17	Cancer of pancreas
18	Cancer of other GI organs, peritoneum
19	Cancer of bronchus, lung
20	Cancer, other respiratory and intrathoracic
21	Cancer of bone and connective tissue
22	Melanomas of skin
23	Other non-epithelial cancer of skin
24	Cancer of breast
25	Cancer of uterus
26	Cancer of cervix
27	Cancer of ovary
28	Cancer of other female genital organs
29	Cancer of prostate
30	Cancer of testis
31	Cancer of other male genital organs
32	Cancer of bladder
33	Cancer of kidney and renal pelvis
34	Cancer of other urinary organs
35	Cancer of brain and nervous system
36	Cancer of thyroid
37	Hodgkin`s disease
38	Non-Hodgkin`s lymphoma
39	Leukemias
40	Multiple myeloma
41	Cancer, other and unspecified primary
42	Secondary malignancies
43	Malignant neoplasm without specification of site
44	Neoplasms of unspecified nature or uncertain behavior
45	Maintenance chemotherapy, radiotherapy

Table 2. Psychiatric discharge condition categories excluded from eligible admissions

AHRQ CCS	Brief description
650	Adjustment disorders
651	Anxiety disorders
652	Attention-deficit, conduct, and disruptive behavior disorders
654	Developmental disorders
655	Disorders usually diagnosed in infancy, childhood, or adolescence
656	Impulse control disorders, NEC
657	Mood disorders
658	Personality disorders
659	Schizophrenia and other psychotic disorders
662	Suicide and intentional self-inflicted injury
670	Miscellaneous disorders

Table 3. Healthcare Common Procedure Coding System (HCPCS) primary care service codes

HCPCS codes	Brief description
99201–99205	New patient, office, or other outpatient visit
99211–99215	Established patient, office, or other outpatient visit
99304–99306	New patient, nursing facility care
99307–99310	Established patient, nursing facility care
99315–99316	Established patient, discharge day management service
99318	Established patient, other nursing facility service
99324–99328	New patient, domiciliary or rest home visit
99334–99337	Established patient, domiciliary or rest home visit
99339–99340	Established patient, physician supervision of patient (patient not present) in home, domiciliary, or rest home
99341–99345	New patient, home visit
99347–99350	Established patient, home visit
G0402	Initial Medicare visit
G0438	Annual wellness visit, initial
G0439	Annual wellness visit, subsequent

Note: Labels are approximate. See the American Medical Association's Current Procedural Terminology and the CMS website (http://www.cms.gov/Medicare/Coding/HCPCSReleaseCodeSets/HCPCS_Quarterly_Update.html) for detailed definitions.

Table 4. Procedure categories that are always considered planned (version 3.0)

AHRQ Procedure CCS	Description
64	Bone marrow transplant
105	Kidney transplant
134	Cesarean section*
135	Forceps, vacuum, and breech delivery*
176	Other orgran transplantation

* CCS to be included only in all-payer settings, not intended for inclusion in CMS's claims-based readmission measures for FFS Medicare beneficiaries age 65+ years.

Table 5. Diagnosis categories that are always considered planned (version 3.0)

AHRQ Procedure CCS	Description
45	Maintenance chemotherapy
194	Forceps delivery*
196	Normal pregnancy and/or delivery*
254	Rehabilitation

* CCS to be included only in all-payer settings, not intended for inclusion in CMS's claims-based readmission measures for FFS Medicare beneficiaries age 65+ years.

Table 6. Potentially planned procedure codes (version 3.0)

AHRQ CCS	Description
PROCEDURE CCS	
3	Laminectomy, excision intervertebral disc
5	Insertion of catheter or spinal stimulator and injection into spinal
9	Other OR therapeutic nervous system procedures
10	Thyroidectomy, partial or complete
12	Other 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)
47	Diagnostic cardiac catheterization, coronary arteriography
48	Insertion, revision, replacement, or removal of cardiac pacemaker or cardioverter/defibrillator
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
59	Other OR procedures on vessels of head and neck
62	Other diagnostic cardiovascular procedures
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	Cholecystectomy 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 cystocele 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
157	Amputation of lower extremity
158	Spinal fusion
159	Other diagnostic procedures on musculoskeletal system
166	Lumpectomy, quadrantectomy of breast
167	Mastectomy
169	Debridement of wound, infection, or burn
170	Excision of skin lesion
172	Skin graft

Table 6 (continued)

AHRQ CCS	Description
ICD-9 CODES	
30.1, 30.29, 30.3, 30.4, 31.74, 34.6	Laryngectomy, revision of tracheostomy, scarification of pleura (from Proc CCS 42-Other OR Rx procedures on respiratory system and mediastinum)
38.18	Endarterectomy leg vessel (from Proc CCS 60-Embolectomy and endarterectomy of lower limbs)
55.03, 55.04	Percutaneous nephrostomy with and without fragmentation (from Proc CCS 103-Nephrotomy and nephrostomy)
94.26, 94.27	Electroshock therapy (from Proc CCS 218-Psychological and psychiatric evaluation and therapy)

Table 7. Acute diagnosis codes (Version 3.0)

Diagnosis	Description
Diagnosis CCS	
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
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
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

Table 7 (continued)

Diagnosis	Description
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
165	Inflammatory conditions of male genital organs
168	Inflammatory diseases of female pelvic organs
172	Ovarian cyst
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 nonmedicinal 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
653	Delirium, dementia, and amnestic and other cognitive disorders
656	Impulse control disorders, NEC
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

Table 7 (continued)

Diagnosis	Description
ICD-9 CODES	
Acute ICD-9 codes within Dx CCS 97: Peri-, endo-, and myocarditis, cardiomyopathy	
032.82	Diphtheritic myocarditis
036.40	Meningococcal carditis nos
036.41	Meningococcal pericarditis
036.42	Meningococcal endocarditis
036.43	Meningococcal myocarditis
074.20	Cocksackie carditis nos
074.21	Cocksackie pericarditis
074.22	Cocksackie endocarditis
074.23	Cocksackie myocarditis
112.81	Candidal endocarditis
115.03	Histoplasma capsulatum pericarditis
115.04	Histoplasma capsulatum endocarditis
115.13	Histoplasma duboisii pericarditis
115.14	Histoplasma duboisii endocarditis
115.93	Histoplasmosis pericarditis
115.94	Histoplasmosis endocarditis
130.3	Toxoplasma myocarditis
391.0	Acute rheumatic pericarditis
391.1	Acute rheumatic endocarditis
391.2	Acute rheumatic heart disease myocarditis
391.8	Acute rheumatic heart disease nec
391.9	Acute rheumatic heart disease nos
392.0	Rheumatic chorea w heart involvement
398.0	Rheumatic myocarditis
398.90	Rheumatic heart disease nos
398.99	Rheumatic heart disease nec
420.0	Acute pericarditis in other disease
420.90	Acute pericarditis nos
420.91	Acute idiopath pericarditis
420.99	Acute pericarditis nec
421.0	Acute/subacute bacterial endocarditis
421.1	Acute endocarditis in other diseases
421.9	Acute/subacute endocarditis nos
422.0	Acute myocarditis in other diseases
422.90	Acute myocarditis nos
422.91	Idiopathic myocarditis
422.92	Septic myocarditis
422.93	Toxic myocarditis
422.99	Acute myocarditis nec
423.0	Hemopericardium
423.1	Adhesive pericarditis
423.2	Constrictive pericarditis
423.3	Cardiac tamponade
429.0	Myocarditis nos
Acute ICD-9 Codes within Dx CCS 105: Conduction disorders	
426.0	Atrioventricular
426.10	Atrioventricular block nos
426.11	Atrioventricular block-1st degree
426.12	Atrioventricular block-mobitz ii
426.13	Atrioventricular block-2nd degree nec
426.2	Left bundle branch hemiblock
426.3	Left bundle branch block nec
426.4	Right bundle branch block
426.50	Bundle branch block nos
426.51	Right bundle branch block/left posterior fascicular block
426.52	Right bundle branch block/left ant fascicular block
426.53	Bilateral bundle branch block nec
426.54	Trifascicular block

Table 7 (continued)

Diagnosis	Description
426.6	Other heart block
426.7	Anomalous atrioventricular excitation
426.81	Lown-ganong-levine syndrome
426.82	Long qt syndrome
426.9	Conduction disorder nos
Acute ICD-9 codes within Dx CCS 106: Dysrhythmia	
427.2	Paroxysmal tachycardia nos
785.0	Tachycardia nos
427.89	Cardiac dysrhythmias nec
427.9	Cardiac dysrhythmia nos
427.69	Premature beats nec
Acute ICD-9 codes within Dx CCS 108: Congestive heart failure, nonhypertensive	
398.91	Rheumatic heart failure
428.0	Congestive heart failure
428.1	Left heart failure
428.20	Unspecified systolic heart failure
428.21	Acute systolic heart failure
428.23	Acute on chronic systolic heart failure
428.30	Unspecified diastolic heart failure
428.31	Acute diastolic heart failure
428.33	Acute on chronic diastolic heart failure
428.40	Unspec combined syst & dias heart failure
428.41	Acute combined systolic & diastolic heart failure
428.43	Acute on chronic combined systolic & diastolic heart failure
428.9	Heart failure nos
Acute ICD-9 codes within Dx CCS 149: Biliary tract disease	
574.0	Calculus of gallbladder with acute cholecystitis
574.00	Calculus of gallbladder with acute cholecystitis without mention of obstruction
574.01	Calculus of gallbladder with acute cholecystitis with obstruction
574.3	Calculus of bile duct with acute cholecystitis
574.30	Calculus of bile duct with acute cholecystitis without mention of obstruction
574.31	Calculus of bile duct with acute cholecystitis with obstruction
574.6	Calculus of gallbladder and bile duct with acute cholecystitis
574.60	Calculus of gallbladder and bile duct with acute cholecystitis without mention of obstruction
574.61	Calculus of gallbladder and bile duct with acute cholecystitis with obstruction
574.8	Calculus of gallbladder and bile duct with acute and chronic cholecystitis
574.80	Calculus of gallbladder and bile duct with acute and chronic cholecystitis without mention of obstruction
574.81	Calculus of gallbladder and bile duct with acute and chronic cholecystitis with obstruction
575.0	Acute cholecystitis
575.12	Acute and chronic cholecystitis
576.1	Cholangitis
Acute ICD-9 codes with Dx CCS 152: Pancreatic disorders	
577.0	Acute pancreatitis

Table 8. Comorbid risk variables common to all specialty cohorts

Variable Name	CMS CCs	Description
Age_65	n/a	Age (-65)
HxInfection	1, 3-5	Severe infection
OtherInfectious	6, 111-113	Other infectious disease & pneumonias
MetaCancer	7	Metastatic cancer/acute leukemia
SevereCancer	8, 9	Severe cancer
OtherCancer	10, 11, 12	Other cancers
Diabetes	15-20, 119, 120	Diabetes mellitus
Malnutrition	21	Protein-calorie malnutrition
LiverDisease	25, 26	End-Stage liver disease
Hematological	44	Severe hematological disorders
Alcohol	51-52	Drug and Alcohol disorders
Psychological	54-56, 58, 60	Psychiatric comorbidity
MotorDisfunction	67-69, 100-102, 177, 178	Hemiplegia, paraplegia, paralysis, functional disability
Seizure	74	Seizure disorders and convulsions
CHF	80	CHF
CADCVD	81-84, 89, 98, 99, 103-106	Coronary atherosclerosis or angina, cerebrovascular disease
Arryhthmias	92, 93	Specified arrhythmias
COPD	108	Chronic obstructive pulmonary disease
LungDisorder	109	Fibrosis of lung or other chronic lung disorders
OnDialysis	130	Dialysis Status
Ulcers	148-149	Decubitus ulcer or chronic skin ulcer
Septicemia	2	Septicemia/shock
MetabolicDisorder	22-23	Disorders of fluid, electrolyte, acid-base
IronDeficiency	47	Iron deficiency or other unspecified anemias and blood disease
CardioRespiratory	79	Cardio-respiratory failure or cardio-respiratory shock
RenalFailure	131	Acute Renal failure
PancreaticDisease	32	Pancreatic disease
Arthritis	38	Rheumatoid arthritis and inflammatory connective tissue disease
RespiratorDependence	77	Respirator dependence/tracheostomy status
Transplants	128, 174	Transplants
Coagulopathy	46	Coagulation defects and other specified hematological disorders
HipFracture	158	Hip fracture/dislocation