2013 Measure Updates Memo:

Hospital 30-Day Readmission Following Percutaneous Coronary Intervention Measure

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Introduction

Under contract to the Centers for Medicare & Medicaid Services (CMS), the Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE), in partnership with the American College of Cardiology (ACC), developed a measure of hospital 30-day all-cause readmission following percutaneous coronary intervention (PCI). This measure uses clinical data submitted by participating hospitals to the ACC National Cardiovascular Data Registry® (NCDR) CathPCI Registry® for risk adjustment and Medicare claims to identify readmissions. The National Quality Forum (NQF) endorsed the measure in 2011.

This memo is an addendum to the 2009 PCI Readmission Measure Methodology Report. It describes three measure revisions and their rationale.

In brief, the model has been updated by:

1. Adapting CMS's Planned Readmission Algorithm Version 2.1 for the PCI readmission measure and applying it to expand the number and type of readmissions identified as planned and not counted in the measure outcome;
2. Incorporating Version 4.3.1 of the NCDR® CathPCI Registry® to include the most current model variable definitions, and;
3. Revising the approach to linking the NCDR® CathPCI Registry® data and Medicare claims data to include the use of social security numbers (SSNs).

Updates

1. Planned Readmission Algorithm - Update to Section 2.3.2 of 2009 Methodology Report

CMS has worked with experts in the medical community as well as other stakeholders to identify planned readmissions for procedures and treatments, and we do not count them in readmission measures. In 2011, CMS contracted with YNHHSC/CORE to develop a Planned Readmission Algorithm that can be used to identify planned readmissions across its readmission measures, and has applied the algorithm to each of the publicly reported measures. The algorithm is a set of criteria for classifying readmissions as planned using Medicare claims. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital.

We based the Planned Readmission Algorithm on three principles:

1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/ immunotherapy, 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.

The *Planned Readmission Algorithm Version 2.1 – General Population* is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The details of the *index* admission (diagnosis or procedures) are not considered when determining whether a readmission is planned.

Customization for PCI Readmission Measure

YNHHSC/CORE updated the approach to identifying planned readmissions in the PCI readmission measure by replacing the original NQF-endorsed approach, which only identified revascularization procedures as planned, with a more comprehensive planned readmission algorithm. The revised approach uses a modified version of the *Planned Readmission Algorithm Version 2.1 – General Population* that has been customized for the PCI patient population. The approach takes into account differences in the likelihood that a procedure is planned depending on whether a coronary stent was implanted during the index PCI procedure.

A working group of YNHHSC/CORE cardiologists and clinicians that developed the Planned Readmission Algorithm reviewed the list of potentially planned procedures in the context of the PCI population. Patients who receive a stent during their PCI require at least four weeks of therapy with aspirin and a platelet inhibitor. During that time period, it is unusual to perform procedures that would require interruption of this dual antiplatelet therapy (DAP). In contrast, if no stent is deployed, DAP is not required, and patients are more likely to undergo planned surgical procedures. Given these considerations, the working group developed different sets of potentially planned procedures for patients with and without stent implantation.

Final Algorithm

The flow chart (Figure 1) demonstrates the algorithm's sequence for characterizing readmissions as planned. In the first two steps (Table PR1 and Table PR2), the algorithm identifies readmissions for procedures and diagnoses that are always considered planned (e.g. chemotherapy or organ transplantation). The lists of these procedures and diagnoses are identical to those used in the *Planned Readmission Algorithm Version 2.1 – General Population*.

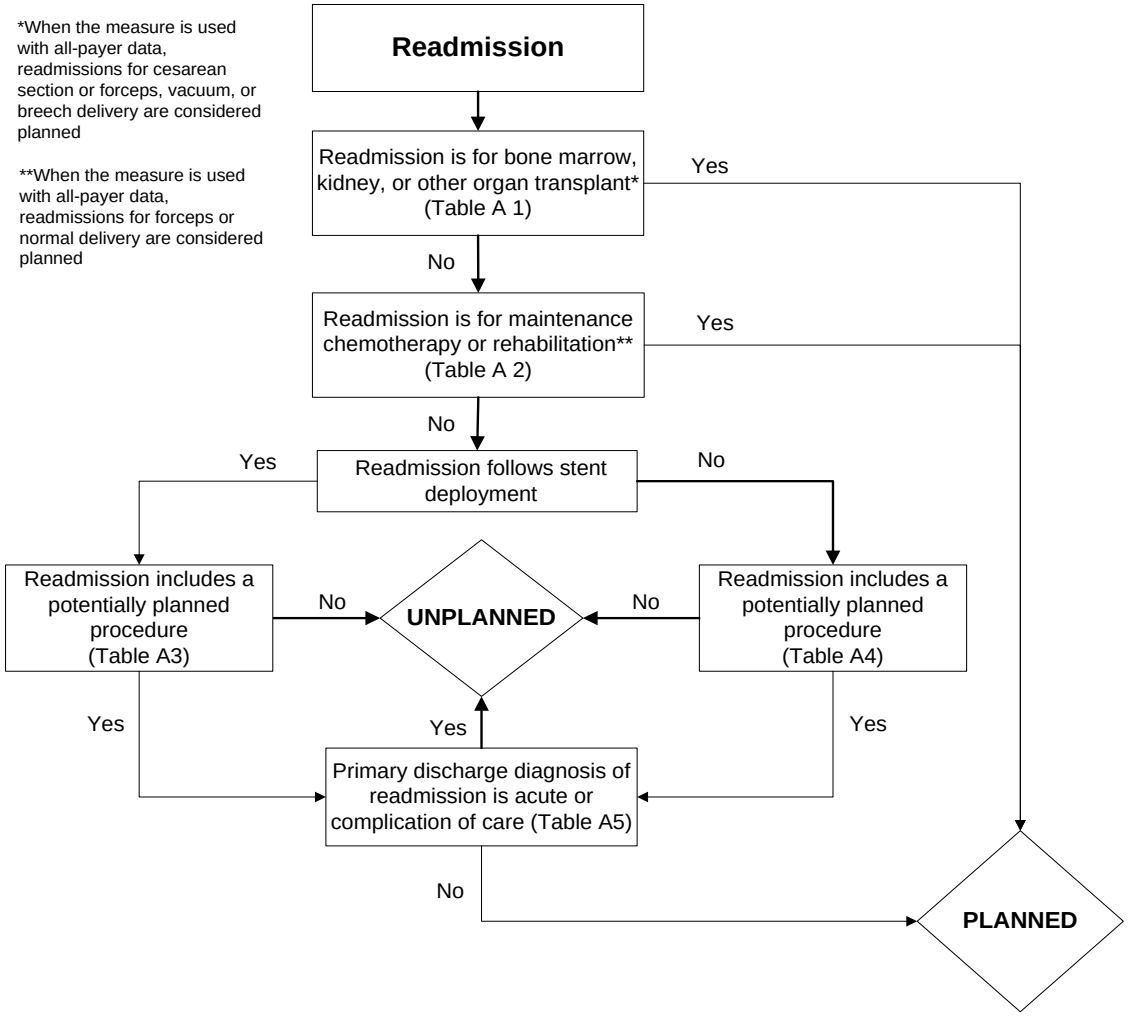
In the third step, the approach changes depending on whether or not a patient received a stent during the index PCI procedure**.** If a stent was deployed, the algorithm uses a more limited set of potentially planned procedures (Table PR3) than if a stent was not deployed (Table PR4). The list of potentially planned procedures for patients without stents in Table PR4 is identical to that

used in the *Planned Readmission Algorithm Version 2.1 – General Population* with the exception of the removal of AHRQ Procedure CCS 47 – Cardiac catheterization, as Procedure CCS 47 is unlikely to be planned within 30 days of any PCI procedure in the absence of a staged PCI.

The list of potentially planned procedures for patients that had a stent deployed during their index PCI in Table PR3 also omits AHRQ Procedure CCS 47 – Cardiac catheterization, for the reasons outlined above. Additionally, the revised list of potentially planned procedures for this patient population does not include most surgical procedures (with the exception of vascular surgery) because we would not expect the planned admission of patients for such surgeries that would interrupt their DAP therapy within 30 days of PCI with stent placement.

All potentially planned procedures identified in both patient populations are then checked for an accompanying principal discharge diagnosis that would reflect an acute condition or complication of care (Table PR5). The list of acute diagnoses in this table is identical to that used in the *Planned Readmission Algorithm Version 2.1 – General Population*.

Figure 1. Planned Readmission Algorithm Version 2.1 (Adapted for PCI Readmission Measure)



Effect on Measure

To assess the effect of updating the measure with the planned readmission algorithm, we compared the results of the original, NQF-endorsed and updated measures. The measures were applied to admissions in 2010. There were 141,467 index admissions for PCI at 1,094 hospitals.
The updated algorithm identified 3,440 planned readmissions. The top 10 procedures among planned readmissions after PCI with and without stent identified by the updated measure are presented in Table 1 and Table 2 respectively.

Table 1. Top 10 Planned Procedures among Planned Readmissions Following PCI Discharge (*with* stent)

Procedure CCS	Procedure Description	Number of Planned Procedures
45	Percutaneous transluminal coronary angioplasty (PTCA)	2161
48	Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator	477
44	Coronary artery bypass graft (CABG)	300
49	Other OR heart procedures	126
62	Other diagnostic cardiovascular procedures	120
59	Other OR procedures on vessels of head and neck	102
51	Endarterectomy; vessel of head and neck	98
157	Amputation of lower extremity	55
52	Aortic resection; replacement or anastomosis	55
43	Heart valve procedures	48

Table 2. Top 10 Planned Procedures among Planned Readmissions Following PCI Discharge (*without* stent)

Procedure CCS	Procedure Description	Number of Planned Procedures
44	Coronary artery bypass graft (CABG)	221
45	Percutaneous transluminal coronary angioplasty (PTCA)	169
48	Insertion; revision; replacement; removal of cardiac pacemaker or cardioverter/defibrillator	73
49	Other OR heart procedures	33
51	Endarterectomy; vessel of head and neck	15
99	Other OR gastrointestinal therapeutic procedures	14
59	Other OR procedures on vessels of head and neck	14
62	Other diagnostic cardiovascular procedures	13
84	Cholecystectomy and common duct exploration	12
43	Heart valve procedures	12

Using the original, NQF-endorsed measure, the crude 30-day unplanned readmission rate was 12.3% and the planned readmission rate was 2.2%. The updated algorithm decreased the number of readmissions counted in the outcome by identifying additional readmissions as planned. For the updated measure, the crude 30-day unplanned readmission rate was 11.8%. Thus, in the updated measure, the rate of planned readmissions increased to 2.4%, an absolute increase of 0.2% from the original measure.

Although the rate of planned readmissions was higher for the updated measure, some readmissions considered as planned in the original, NQF-endorsed measure were identified as unplanned in the updated measure. This reflects the fact that the planned readmission algorithm contains a more

complete list of acute diagnosis categories (Table PR5) that disqualified some readmissions with a potentially planned procedure from being considered planned. Roughly 2% of readmissions identified as planned in the original, NQF-endorsed measure were no longer considered planned in the updated measure. This is due to the more comprehensive list of primary discharge diagnoses that disqualified a readmission from being considered planned.

2. CathPCI Registry® Versions - Update to Section 2.4.1 of 2009 Methodology Report

Initial development and specification of the measure used variables collected in Version 3 of the CathPCI Registry®. In July 2009, the NCDR® introduced Version 4 of the CathPCI Registry® that included modifications of previously collected data elements, addition of new data fields, and updated data definitions. In order to calculate the measure using current registry data, we re-specified the model variables to reflect changes in the data collection form. We assessed the impact of this change to confirm that simple re-specification of the variables in Version 4 was a valid approach.

We crosswalked the data elements that we used to define the final model variables in Versions 3.04 (Version 3) and 4.3.1 (Version 4) of the NCDR® CathPCI Registry®. We compared the data element names and definitions to ensure that we could successfully apply the model to data that was collected using the new data collection form. To evaluate model performance after the re-specification to Version 4 variables, we compared the odds ratios (OR) and c-statistics between 2008 Version 3 data and 2010 Version 4 data.

The complete crosswalk of the PCI readmission model variables from Version 3 to Version 4 of the CathPCI Registry® is provided in Appendix B. Overall, re-specification of the model variables from Version 3 to Version 4 was straightforward.

The c-statistic for the model was similar for the 2010, Version 4 model (0.680) and the 2008, Version 3 model (0.676). ORs in both data years were comparable (Table 3), indicating that model performance was not significantly altered by re-specification of the model variables. The current model uses Version 4 registry data.

Table 3. Comparison of Odds Ratios (OR) and 95% Confidence Intervals (CI) between Version 3 and Version 4 for the PCI Readmission Model Variables

PCI Readmission Risk-Variable as Specified in Measure	OR and 95% CI Version 4 (2010)	OR and 95% CI Version 3 (2008)
Age	1.28 (1.24 - 1.31)	1.23 (1.20 - 1.27)
Female	1.24 (1.20 - 1.29)	1.23 (1.19 - 1.28)
Body Mass Index	0.90 (0.88 - 0.93)	0.87 (0.85 - 0.90)
Heart failure-previous history	1.32 (1.26 - 1.38)	1.33 (1.27 - 1.40)
Previous valvular surgery	1.25 (1.12 - 1.39)	1.20 (1.07 - 1.34)
Cerebrovascular Disease	1.17 (1.12 - 1.23)	1.17 (1.12 - 1.23)
Peripheral Vascular Disease	1.20 (1.15 - 1.26)	1.18 (1.13 - 1.24)
Chronic Lung Disease	1.45 (1.39 - 1.51)	1.49 (1.43 - 1.55)
Diabetes - No diabetes	*Reference*	*Reference*
Diabetes - Non-insulin diabetes	1.13 (1.08 - 1.18)	1.12 (1.07 - 1.17)
Diabetes - Insulin diabetes	1.43 (1.36 - 1.51)	1.40 (1.33 - 1.48)
Glomerular Filtration Rate (GFR) - Not measured	1.05 (0.97 - 1.13)	0.99 (0.89 - 1.09)
GFR<30	1.67 (1.53 - 1.82)	1.58 (1.45 - 1.72)
30≤GFR<60	1.18 (1.13 - 1.23)	1.19 (1.15 - 1.24)
60≤GFR<90	*Reference*	*Reference*
GFR≥90	1.06 (0.99 - 1.13)	1.04 (0.97 - 1.10)
Renal failure - dialysis	1.56 (1.41 - 1.74)	1.63 (1.45 - 1.83)
Hypertension	1.17 (1.11 - 1.24)	1.10 (1.04 - 1.15)
History of tobacco use	1.10 (1.05 - 1.16)	1.03 (0.98 - 1.09)
Previous PCI	0.91 (0.88 - 0.95)	0.91 (0.87 - 0.94)
Heart failure – current status	1.34 (1.27 - 1.41)	1.39 (1.33 - 1.46)
No MI on admission	0.93 (0.88 - 0.97)	0.95 (0.90 – 1.00)
MI within 24 hours of admission	*Reference*	*Reference*
MI after 24 hours of admission	1.02 (0.92 - 1.13)	1.05 (0.98 - 1.13)
Ejection Fraction (EF) Percentage - Not measured	1.08 (1.04 - 1.13)	1.16 (1.12 - 1.21)
EF<30	1.50 (1.39 - 1.62)	1.55 (1.44 - 1.67)
30≤EF<45	1.14 (1.08 - 1.20)	1.27 (1.20 - 1.33)
EF>=45	*Reference*	*Reference*
PCI Procedure – Elective	*Reference*	*Reference*
PCI Procedure - Urgent	1.43 (1.37 - 1.49)	1.4 (1.34 - 1.46)
PCI Procedure - Emergency	1.55 (1.44 - 1.66)	1.60 (1.49 - 1.72)
PCI Procedure - Salvage	1.42 (0.93 - 2.19)	1.87 (1.32 - 2.65)
Highest risk lesion - pRCA/mLAD/pCIRC	1.01 (0.97 - 1.05)	1.07 (1.03 - 1.11)
Highest risk lesion - pLAD	1.04 (0.99 - 1.09)	1.07 (1.02 - 1.12)
Highest risk lesion - Left main	1.16 (1.06 - 1.27)	1.06 (0.95 - 1.18)
Highest risk lesion – Other	*Reference*	*Reference*
Highest pre-procedure TIMI flow: none	1.06 (1.00 - 1.12)	1.081.01 - 1.15)

3. Linking Strategy - Update to Section 2.5 of 2009 Methodology Report

The PCI readmission measure requires that data from the NCDR® CathPCI Registry® be linked with corresponding Medicare claims data to determine readmissions following hospital discharge. At the time of measure development, NCDR® did not require® CathPCI Registry® participants to submit direct patient identifiers. In the absence of direct patient identifiers, the measure was originally developed using a probabilistic match that linked PCI patients in both registry and Medicare claims data using the following indirect identifiers: hospital Medicare Provider Number (MPN), patient age, gender, date of admission, and date of discharge.

NCDR® has since modified its business associate agreements with participating hospitals to allow for the use of identified data for quality improvement efforts. In addition, starting in July 2009, the NCDR® asked hospitals to voluntarily submit direct patient identifiers, including SSN.

We developed a 5-step linking strategy using direct and indirect patient identifiers. The following linking strategy maximized the number of matches while minimally compromising accuracy: In step 1, SSN is used to identify the patient, discharge date is used to identify the visit, and MPN is used to identify the correct facility. In this step, all nine SSN digits, discharge date and MPN must match. Remaining steps are carried out sequentially on patients who were unmatched after the previous step. Steps 2-4 capture patients with inaccurate SSN. Since SSN discrepancies are allowed in these steps, age and gender are used as additional indirect patient identifiers. In step 5, SSN is removed from consideration, and date of birth (DOB) is used with gender, discharge date, and MPN to identify patients in both datasets.

This linking strategy yielded a 94.0% match rate of hospital stays in 2010 for hospitals that appeared in both data sources. The strategy matched roughly 78% of hospital stays using SSN, which was expected given that roughly 22% of hospital stays had a missing or invalid SSN. The strategy matched roughly 16% of hospital stays using DOB and gender (Table 4).

Using complete SSNs alone to link registry and administrative claims data would have resulted in the exclusion of more than 20% of cases and roughly 10% of hospitals from the measure. The use of a 5-step strategy to link the datasets substantially increased the match rate and improves the generalizability of the resulting risk-standardized readmission rates.

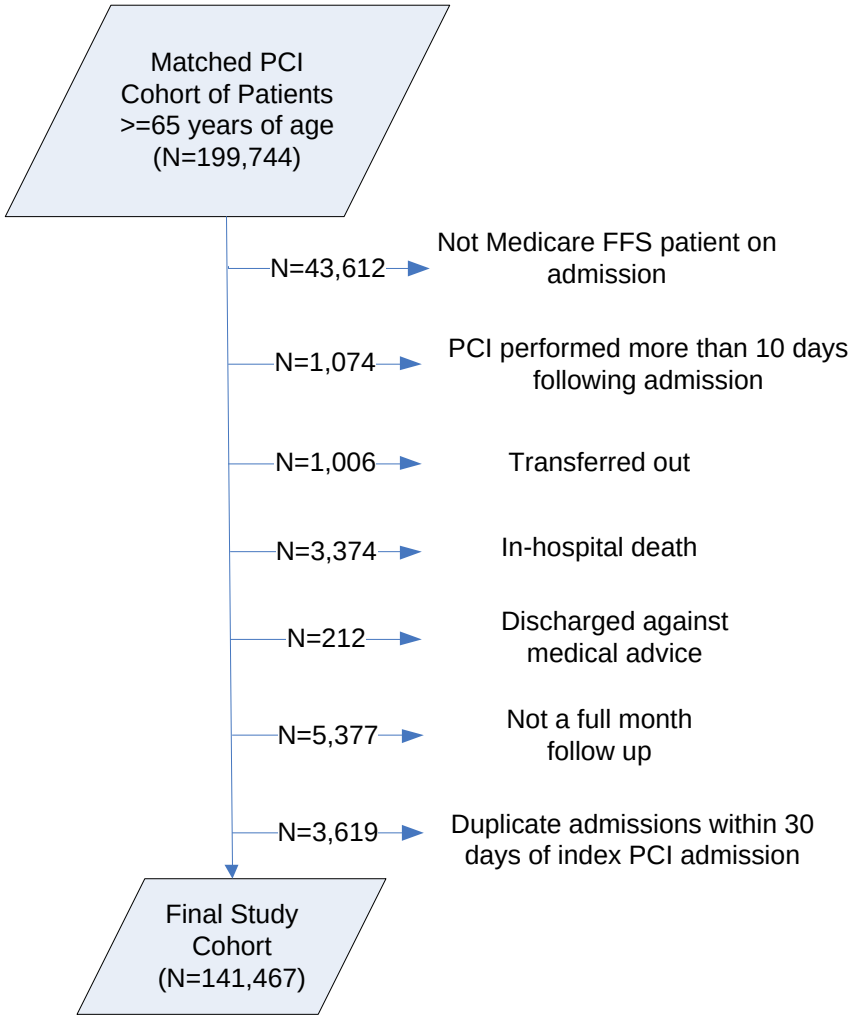
Table 4. Match Rate after Linking CathPCI Data to CMS Claims Data using a Five-Step Approach (2010)

Linking Steps and Matching Criteria	Hospital Stays	Marginal %	Cumulative %
Initial CMS Cohort	*212,728*	*n/a*	*n/a*
Step 1. 9/9 SSN digits, discharge date, MPN	164,579	77.4	77.4
Step 2. 8/9 SSN digits, age, gender, discharge date, MPN	1,635	0.8	78.2
Step 3. 7/9 SSN digits, age, gender, discharge date, MPN	412	0.2	78.4
Step 4. Last 4 SSN digits, age, gender, discharge date, MPN	35	0.0	78.4
Step 5. Date of birth, gender, discharge date, MPN	33,083	15.6	94.0
Total	**199,744**	**n/a**	**94.0**

Figure 2 describes the derivation of the final PCI measure study cohort. We identified 199,744 admissions in which patients received a PCI during their hospital stay and were discharged in 2010; were aged 65 years or over when they arrived at the hospital; and had a record in the CathPCI Registry® that met NCDR® data quality threshold criteria and was linked to the corresponding Medicare fee-for-service claim. Next, we identified admissions meeting each of seven exclusion criteria[1]: 43,612 admissions were for patients not enrolled in Medicare fee-for-service at the time of the PCI procedure; 1,074 admissions in which the PCI procedure was performed more than 10 days following admission; 1,006 admissions in which the patient was transferred to another acute care facility; 3,374 admissions in which the patient died during their initial hospitalization for a PCI procedure; 212 admissions in which patients were discharged against medical advice; 5,377 admissions in which the patient did not have 30 days of follow-up data available in the Medicare fee-for-service data; 3,619 admissions in which patients had duplicate admissions for a PCI procedure within 30 days of an index PCI admission. The final study cohort, after all inclusion and exclusion criteria were applied, included 141,467 admissions.

[1] Please note that the exclusion criteria are not mutually exclusive.

Figure 2. Inclusion and exclusion criteria (numbers of admissions based on 2010 data)



Appendix A: Planned Readmission Algorithm (Version 2.1 – PCI Population)

Table PR1: Procedure Categories that are Always Planned (Version 2.1 – PCI Population)

Procedure CCS[2]	Description
64	Bone marrow transplant
105	Kidney transplant
134	Cesarean section[3]
135	Forceps; vacuum; and breech delivery[3]
176	Other organ transplantation

Table PR2: Diagnosis Categories that are Always Planned (Version 2.1 – PCI Population)

Diagnosis CCS[2]	Description
45	Maintenance chemotherapy
194	Forceps delivery[3]
196	Normal pregnancy and/or delivery[3]
254	Rehabilitation

[2] CCS: Clinical Classification Software, developed by the Agency for Healthcare Research and Quality (AHRQ). The software creates clinically-coherent, mutually-exclusive condition categories (diagnosis groups) and procedure categories.

[3] CCS to be included only in all-payer settings, not intended for inclusion in CMS' claims-based readmission measures for Medicare fee-for-service beneficiaries aged 65+ years

Table PR3: Potentially Planned Procedure Categories (Version 2.1 – PCI Population *with* Stent)

Procedure CCS	Description
43	Heart valve procedures
44	Coronary artery bypass graft (CABG)
45	Percutaneous transluminal coronary angioplasty (PTCA)
48	Insertion; revision; replacement; 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
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
107	Extracorporeal lithotripsy; urinary
157	Amputation of lower extremity
169	Debridement of wound; infection or burn
211	Therapeutic radiology for cancer treatment
224	Cancer chemotherapy
ICD-9 Codes	**Description**
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 PR4: Potentially Planned Procedure Categories (Version 2.1 – PCI Population *without* Stent)

Procedure CCS[4]	Description
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)
48	Insertion; revision; replacement; 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

[4] CCS: Clinical Classification Software, developed by the Agency for Healthcare Research and Quality (AHRQ). The software creates clinically-coherent, mutually-exclusive condition categories (diagnosis groups) and procedure categories.

Procedure CCS[4]	Description
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
211	Therapeutic radiology for cancer treatment
224	Cancer chemotherapy
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 PR5: Acute Diagnosis Categories (Version 2.1 – PCI Population)

Diagnosis CCS[5]	Description
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
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

[5] CCS: Clinical Classification Software, developed by the Agency for Healthcare Research and Quality (AHRQ). The software creates clinically-coherent, mutually-exclusive condition categories (diagnosis groups) and procedure categories.

Diagnosis CCS[5]	Description
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
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

Diagnosis CCS[5]	Description
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	Impluse 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
ICD-9 codes	**Description**
Acute ICD-9 codes within Dx CCS 97: Peri-; endo-; and myocarditis; cardiomyopathy	
03282	Diphtheritic myocarditis
03640	Meningococcal carditis nos
03641	Meningococcal pericarditis
03642	Meningococcal endocarditis
03643	Meningococcal myocarditis
07420	Coxsackie carditis nos
07421	Coxsackie pericarditis
07422	Coxsackie endocarditis
07423	Coxsackie myocarditis
11281	Candidal endocarditis
11503	Histoplasma capsulatum pericarditis
11504	Histoplasma capssulatum endocarditis
11513	Histoplasma duboisii pericarditis
11514	Histoplasma duboisii endocarditis

Diagnosis CCS[5]	Description
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
4200	Acute pericarditis in other disease
42090	Acute pericarditis nos
42091	Acute idiopath 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
Acute ICD-9 codes within Dx CCS 105: Conduction disorders	
4260	Atrioventricular block complete
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

Diagnosis CCS[5]	Description
42653	Bilateral bundle branch block nec
42654	Trifascicular block
4266	Other heart block
4267	Anomalous atrioventricular excitation
42681	Lown-ganong-levine syndrome
42682	Long qt syndrome
4269	Conduction disorder nos
Acute ICD-9 codes within Dx CCS 106: Dysrhythmia	
4272	Paroxysmal tachycardia nos
7850	Tachycardia nos
42789	Cardiac dysrhythmias nec
4279	Cardiac dysrhythmia nos
42769	Premature beats nec
Acute ICD-9 codes within Dx CCS 108: Congestive heart failure; nonhypertensive	
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	Unpec combined syst & dias heart failure
42841	Acute combined systolic & diastolic heart failure
42843	Acute on chronic combined systolic & diastolic heart failure
4289	Heart failure nos

Appendix B: NCDR® CathPCI Registry® Version Update Crosswalk

Table B1. NCDR® CathPCI Registry® Version Update Crosswalk

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Age	252	Patient Age	Patient age in years, at time of admission. This should be calculated from the date of birth and the date of admission, according to the convention used in the USA (the number of birthdate anniversaries reached by the date of admission).	2050	Birth Date	**Coding Instructions:** Indicate the patient's date of birth. **Target Value:** The value on arrival at this facility
Age				3000	Arrival Date	
Female	260	Gender	Indicate the patient's gender at birth as either male or female. Choose one of the following: Male, Female	2060	Sex	**Coding Instructions:** Indicate the patient's sex at birth. **Target Value:** The value on arrival at this facility **Selections:** Male, Female
BMI	410	Height (cm)	Indicate the patient's height in centimeters.	4055	Height	**Coding Instructions:** Indicate the patient's height in centimeters. **Target Value:** First value between arrival at this facility and discharge
BMI	412	Weight (kg)	Indicate the weight of the patient in kilograms.	4060	Weight	**Coding Instructions:** Indicate the patient's weight in kilograms. **Target Value:** Last value between arrival at this facility and first procedure

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
History of HF	424	CHF - Previous History	Indicate if the patient has a history of congestive heart failure (CHF) documented in the medical record. History is defined as any time prior to two weeks before the current date of admission. Besides physician documentation of the CHF history, CHF can also be defined by one of the following: 1. Paroxysmal nocturnal dyspnea (PND); 2. Dyspnea on exertion (DOE) due to heart failure; or 3. Chest X-Ray (CXR) showing pulmonary congestion. 4. Pedal edema or dyspnea treated with medical therapy for heart failure. Choose one of the following: - No - Yes	4025	Prior Heart Failure	**Coding Instructions:** Indicate if there is a previous history of heart failure **Note(s):** A previous hospital admission with principal diagnosis of heart failure is considered evidence of heart failure history. **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Heart Failure: Heart failure is defined as physician documentation or report of any of the following clinical symptoms of heart failure described as unusual dyspnea on light exertion, recurrent dyspnea occurring in the supine position, fluid retention; or the description of rales, jugular venous distension, pulmonary edema on physical exam, or pulmonary edema on chest x-ray. A low ejection fraction alone, without clinical evidence of heart failure does not qualify as heart failure. *Note: Killip Class 2 is defined as rales covering 50% or less of the lung fields or the presence of an S3. Killip Class 3 is defined as rales covering more than 50% of the lung fields. Either class would qualify as a"yes." **Source** Acute Coronary Syndromes Data Standards (JACC 2001 38: 2114 - 30), The Society of Thoracic Surgeons
Previous valvular surgery	426	Previous Valvular Surgery	Indicate if the patient had a previous surgical replacement and/or repair of a cardiac valve, by any approach prior to the current admission. Choose one of the following: - Yes - No	4030	Prior Valve Surgery/ Procedure	**Coding Instructions:** Indicate if the patient had a previous surgical replacement and/or repair of a cardiac valve, by any approach prior to arrival. **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Note(s):** This also includes percutaneous valve procedures and valvuloplasty.

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Cerebrovascular disease	450	Cerebro-vascular Disease	Indicate if the patient has a history of cerebrovascular disease, documented by any one of the following: 1. Unresponsive Coma greater than 24 hours: Patient experienced complete mental unresponsiveness and no evidence of psychological or physiologically appropriate responses to stimulation. 2. Cerebrovascular Accident (CVA): Patient has a history of stroke, i.e., loss of neurological function with residual symptoms at least 72 hours after onset. 3. Reversible Ischemic Neurologic Deficit (RIND): Patient has a history of loss of neurological function with symptoms at least 24 hours after onset but with complete return of function within 72 hours. 4. Transient Ischemic Attack (TIA): Patient has a history of loss of neurological function that was abrupt in onset but with complete return of function within 24 hours. 5. Non-invasive/invasive carotid test with greater than 75% occlusion. 6. Previous carotid artery surgery. This does not include neurological disease processes such as metabolic and/or anoxic ischemic encephalopathy. Choose one of the following: Yes, No	4070	Cerebro-vascular Disease	**Coding Instructions:** Indicate if the patient has a history of cerebrovascular disease. **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Cerebrovascular Disease: Cerebrovascular Disease documented by any one of the following: 1. Cerebrovascular Accident (CVA): Patient has a history of stroke, i.e., loss of neurological function with residual symptoms at least 24 hrs after onset, presumed to be from vascular etiology. 2. Transient Ischemic Attack (TIA): Patient has a history of loss of neurological function that was abrupt in onset but with complete return of function within 24 hrs, presumed to be due to vascular etiology 3. Non-invasive/invasive carotid test with > 79% occlusion. 4. Previous carotid artery surgery/intervention for carotid artery stenosis. This does not include neurological disease processes such as metabolic and/or anoxic ischemic encephalopathy. **Source** Acute Coronary Syndromes Data Standards (JACC 2001 38: 2114-30), The Society of Thoracic Surgeons

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Peripheral Vascular Disease	452	Peripheral Vascular Disease	Indicate if the patient has a history of peripheral vascular disease. This can include: 1. Claudication either with exertion or at rest. 2. Amputation for arterial vascular insufficiency. 3. Aorto-iliac occlusive disease reconstruction, peripheral vascular bypass surgery, angioplasty or stent; or percutaneous intervention to the extremities. 4. Documented AAA repair or stent. 5. Positive non-invasive/invasive test. This does not include procedures such as vein stripping, carotid disease, or procedures originating above the diaphragm. Choose one of the following: - Yes - No	4075	Peripheral Arterial Disease	**Coding Instructions:** Indicate if the patient has a history of peripheral arterial disease (PAD) (includes upper and lower extremity, renal, mesenteric, and abdominal aortic systems). **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** PAD: Peripheral arterial disease can include: 1. Claudication, either with exertion or at rest. 2. Amputation for arterial vascular insufficiency. 3. Vascular reconstruction, bypass surgery, or percutaneous intervention to extremities (excluding dialysis fistulas & vein stripping) 4. Documented aortic aneurysm with or without repair. 5. Positive non-invasive test (e.g., ankle brachial index <=0.9); ultrasound, magnetic resonance, computed tomography, or angiographic imaging of > 50% diameter stenosis in any peripheral artery (e.g., renal, subclavian, femoral, iliac). For purposes of the Registry, peripheral arterial disease excludes disease in the carotid and cerebrovascular arteries. **Source** ACC Clinical Data Standards, The Society of Thoracic Surgeons
Chronic Lung Disease	454	Chronic Lung Disease	Indicate if the patient has a documented history of chronic lung disease (i.e. chronic obstructive pulmonary disease, asthma, bronchitis), or has been or is currently treated with pharmocologic therapy. Choose one of the following: - Yes - No	4080	Chronic Lung Disease	**Coding Instructions:** Indicate if the patient has a history of chronic lung disease **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Chronic Lung Disease: Chronic lung disease can include patients with chronic obstructive pulmonary disease, chronic bronchitis, or emphysema. It can also include a patient who is currently being chronically treated with inhaled or oral pharmacological therapy (e.g., beta-adrenergic agonist, anti-inflammatory agent, leukotriene receptor antagonist, or steroid). Patients with asthma or seasonal allergies are not considered to have chronic lung disease. **Source** NCDR®

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Diabetes	430	Diabetes	A history of diabetes, regardless of duration of disease, or need for anti-diabetic agents. This includes diagnosis on admission or pre-procedure. It does not include gestational diabetes. Choose one of the following: Yes, No	4085	Diabetes Mellitus	**Coding Instructions:** Indicate if the patient has a history of diabetes mellitus regardless of duration of disease or need for antidiabetic agents. **Note(s):** If the patient is diagnosed within 24 hours of arrival, code "yes." **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Diabetes Mellitus: Diabetes mellitus is diagnosed by a physician or can be defined as a fasting blood sugar greater than 7 mmol/l or 126 mg/dL. It does not include gestational diabetes. **Source** Acute Coronary Syndromes Data Standards (JACC 2001 38: 2114-30), The Society of Thoracic Surgeons
Diabetes	432	Diabetes Control	Code the control method patient presented with on admission. Patients placed on a pre-procedure diabetic pathway of insulin drip but at admission were controlled with diet or oral method are not coded as insulin dependent. Choose one of the following: - None: No treatment for diabetes - Diet: Diet treatment only - Oral: Oral agent treatment (includes oral agent with/without diet treatment) - Insulin: Insulin treatment (includes any combination with insulin)	4090	Diabetes Therapy	Indicate the most aggressive therapy the patient **Coding Instructions:** presented with. **Note(s):** Patients placed on a pre-procedure diabetic pathway of insulin drip after arrival but were not on insulin therapy (treated by diet or oral method) are not coded as insulin treatment. If a patient had a pancreatic transplant, code "other", since the insulin from the new pancreas is not exogenous insulin. **Target Value:** The value on arrival at this facility **Selections:** None - No treatment for diabetes Diet - Diet treatment only Oral - Oral agent treatment (includes oral agent with/without diet treatment) Insulin - Insulin treatment (includes any combination with insulin) Other - Other adjunctive treatment, non-oral/insulin/diet
GFR	252	Patient Age	See Above	2050	Birth Date	See Above
GFR	260	Gender	See Above	2060	Sex	See Above

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
GFR	270	Race/ Ethnicity	Patient race as determined by the patient/family. Choose one of the following: - Caucasian - Black - Hispanic - Asian - Native American - Other	2071	Race - Black or African American	**Coding Instructions:** Indicate if the patient is Black or African American as determined by the patient/family. **Note(s):** If the patient has multiple race origins, specify them using the other race selections in addition to this one. **Target Value:** The value on arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Black/African American (Race): Having origins in any of the black racial groups of Africa. Terms such as "Haitian" or "Negro" can be used in addition to "Black or African American." **Source** U.S. Census Bureau
GFR				2072	Race - Asian	**Coding Instructions:** Indicate if the patient is Asian as determined by the patient/family. **Note(s):** If the patient has multiple race origins, specify them using the other race selections in addition to this one. **Target Value:** The value on arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Asian (Race): Having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam. **Source** U.S. Census Bureau
GFR				2073	Race - American Indian or Alaskan Native	**Coding Instructions:** Indicate if the patient is American Indian or Alaskan Native as determined by the patient/family. **Note(s):** If the patient has multiple race origins, specify them using the other race selections in addition to this one. **Target Value:** The value on arrival at this facility **Selections:** No, Yes **Supporting Definitions:** American Indian or Alaskan Native (Race): Having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment. **Source** U.S. Census Bureau

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
GFR				2074	Race - Native Hawaiian or Pacific Islander	**Coding Instructions:** Indicate if the patient is Native Hawaiian or Pacific Islander as determined by the patient/family. **Note(s):** If the patient has multiple race origins, specify them using the other race selections in addition to this one. **Target Value:** The value on arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Native Hawaiian or Pacific Islander (Race): Having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. **Source** U.S. Census Bureau
GFR				2076	Race - Hispanic of Latino Ethnicity	**Coding Instructions:** Indicate if the patient is of Hispanic or Latino ethnicity as determined by the patient/family. **Target Value:** The value on arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Hispanic or Latino Ethnicity: A person of Cuban, Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race. The term, "Spanish origin," can be used in addition to "Hispanic or Latino." **Source** U.S. Office of Management and Budget. Classification of Federal Data on Race and Ethnicity
GFR	439	Creatinine Assessed on Admission	Indicate if the patient's creatinine level was assessed prior to day of procedure. Choose one of the following: Yes, No	7315	Pre-Procedure Creatinine	**Coding Instructions:** Indicate the patient's most recent creatinine level in mg/dL. **Target Value:** The last value between 1 month prior to arrival and current procedure
GFR				7316	Pre-Procedure Creatinine Not Drawn	**Coding Instructions:** Indicate if the patient's creatinine level was not collected. **Selections:** No, Yes - Code "yes" when pre-procedure Creatinine level was not collected.
GFR	440	Last Creatinine	Indicate the patient's most recent creatinine level prior to day of procedure. Creatinine should be collected on all patients for consistency, even if they have no prior history of renal failure.	7340	Post-Procedure Creatinine	**Coding Instructions:** Indicate the post-procedure creatinine level in mg/dL. If more than one level is available, code the peak level. **Note(s):** For patients with extended hospital stays, restrict coding of post-procedure creatinine to 30 days after the last procedure. **Target Value:** The highest value between current procedure and until next procedure or discharge

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
GFR				7341	Post-Procedure Creatinine Not Drawn	**Coding Instructions:** Indicate if a post-procedure creatinine level was not collected. **Note(s):** For patients with extended hospital stays, restrict coding of post-procedure creatinine to 30 days after the last procedure. **Selections:** No, Yes - Code "yes" when pre-procedure Creatinine level was not collected.
Renal Failure - Dialysis	444	Renal Failure - Dialysis	Indicate if the patient received dialysis as a result of his/her renal failure. Choose one of the following: - Yes - No	4065	Currently on Dialysis	**Coding Instructions:** Indicate if the patient is currently undergoing either hemodialysis or peritoneal dialysis on an ongoing basis as a result of renal failure. **Note(s):** If a patient is on receiving continuous veno-venous hemofiltration (CVVH) as a result of renal failure (and not as treatment to remove fluid for heart failure), code "yes." **Target Value:** The value on arrival at this facility **Selections:** No, Yes
Hypertension	456	Hypertension	Indicate if the patient has hypertension as documented by one of the following: 1. History of hypertension diagnosed and treated with medication, diet and/or exercise. 2. Blood pressure greater than 140 systolic or 90 diastolic on at least 2 occasions. 3. Currently on antihypertensive pharmacologic therapy. Choose one of the following: - Yes - No	4005	Hypertension	**Coding Instructions:** Indicate if the patient has a current diagnosis of hypertension. **Note(s):** If the patient is diagnosed within 24 hours of arrival, code "yes." **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** Hypertension: Hypertension is defined by any one of the following: 1. History of hypertension diagnosed and treated with medication, diet and/or exercise 2. Prior documentation of blood pressure greater than 140 mm Hg systolic and/or 90 mm Hg diastolic for patients without diabetes or chronic kidney disease, or prior documentation of blood pressure greater than 130 mm Hg systolic and/or 80 mm Hg diastolic on at least two occasions for patients with diabetes or chronic kidney disease 3. Currently on pharmacologic therapy for treatment of hypertension. **Source** Acute Coronary Syndromes Data Standards (JACC 2001 38: 2114 - 30), The Society of Thoracic Surgeons

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
History of Tobacco Use	460	History of Tobacco Use	Indicate if the patient has a history confirming any form of tobacco use in the past. This includes cigarettes, cigar, tobacco chew, etc. Choose one of the following: - Yes, Current: Use of tobacco within one month of this admission. - Yes, Former: Use of tobacco greater than one month prior to this admission. - Never	4000	Current/ Recent Smoker (w/in 1 year)	**Coding Instructions:** Indicate if the patient has smoked cigarettes anytime during the year prior to arrival at your facility. **Target Value:** Any occurrence between 1 year prior to arrival at this facility and arrival at this facility **Selections:** No, Yes
Previous PCI	490	Previous PCI	Indicate if the patient had a previous percutaneous coronary intervention (even if unsuccessful) of any type (balloon angioplasty, stent or other), performed prior to the current admission. Choose one of the following: - Yes - No	4035	Prior PCI	**Coding Instructions:** Indicate if the patient had a previous percutaneous coronary intervention. **Note(s):** Timeframe does NOT include PCIs performed after arrival. **Target Value:** Any occurrence between birth and arrival at this facility **Selections:** No, Yes **Supporting Definitions:** PCI: Percutaneous coronary intervention (PCI) is the placement of an angioplasty guide wire, balloon, or other device (e.g. stent, atherectomy, brachytherapy, or thrombectomy catheter) into a native coronary artery or coronary artery bypass graft for the purpose of mechanical coronary revascularization. **Source** NCDR®

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Heart Failure - Current Status	500	CHF - Current Status	Indicate whether, within 2 weeks prior to the first procedure, a physician has diagnosed that the patient is currently in congestive heart failure (CHF). CHF can be diagnosed bases on careful history and physical exam, or by one of the following criteria: 1. Paroxysmal nocturnal dyspnea (PND) and/or fatigue; 2. Dyspnea on exertion (DOE) due to heart failure; or 3. Chest X-Ray (CXR) showing pulmonary congestion. 4. Pedal edema or dyspnea treated with medical therapy for heart failure. Choose one of the following: - Yes - No	5040	Heart Failure w/in 2 Weeks	**Coding Instructions:** Indicate if there is physician documentation or report that the patient has been in a state of heart failure within the past 2 weeks. **Note(s):** If this is a subsequent episode of care (within 2 weeks), do not code the Heart Failure w/in 2 Weeks (5040) from the previous episode of care. **Target Value:** Any occurrence between 2 weeks prior to current procedure and current procedure **Selections:** No, Yes **Supporting Definitions:** Heart failure: Heart failure is defined as physician documentation or report of any of the following clinical symptoms of heart failure described as unusual dyspnea on light exertion, recurrent dyspnea occurring in the supine position, fluid retention; or the description of rales, jugular venous distension, pulmonary edema on physical exam, or pulmonary edema on chest x-ray presumed to be cardiac dysfunction. A low ejection fraction alone, without clinical evidence of heart failure does not qualify as heart failure. ***Note:** Killip Class 2 is defined as rales covering 50% or less of the lung fields or the presence of an S3. Killip Class 3 is defined as rales covering more than 50% of the lung fields. Either class would qualify as a "yes." **Source:** Acute Coronary Syndromes Data Standards (JACC 2001 38: 2114 - 30), The Society of Thoracic Surgeons

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Symptoms Present on Admission	550	Admission Sx Presentation	Indicate the patient's symptom presentation or angina type on admission. Choose one of the following: - No Symptoms or Angina. - Atypical Chest Pain: Pain, pressure or discomfort in the chest, neck or arms not clearly exertional or not otherwise consistent with pain or discomfort of myocardial ischemic origin. - Stable Angina: Angina without a change in frequency or pattern for the six weeks prior to this cath lab visit. Angina is controlled by rest and/or oral or transcutaneous medications. - Acute Coronary Syndrome (ACS) - Unstable Angina. - Acute Coronary Syndrome (ACS) - Non-ST Elevation MI (Non-STEMI). - Acute Coronary Syndrome (ACS) - ST Elevation MI (STEMI). UNSTABLE ANGINA is defined as: The patient was hospitalized for unstable angina documented in the medical record with serial ECG's and biochemical profiles. One of the following criteria are necessary: 1. Angina at rest (usually prolonged >20 minutes). 2. New onset angina (<2 months) exertional angina of at least Canadian Cardiovascular Society Classification (CCSC) Class III.	5000	CAD Presentation	**Coding Instructions:** Indicate the patient's coronary artery disease (CAD) presentation. Choose the worst status. **Target Value:** The highest value between 2 weeks prior to arrival and current procedure **Selections:** **Note(s):** If the patient presents with atypical symptoms of myocardial ischemia (i.e. only shortness of breath, upper abdominal pain, left arm pain, etc.) that is known and documented to be myocardial ischemia, and is considered to be an anginal equivalent, code the selection that fits their presentation. If these symptoms are not thought to be or have not been proven to be the anginal equivalent, code "Symptom unlikely to be ischemic." If this is a subsequent episode of care (within 2 weeks), do not code the CAD Presentation from the previous episode of care. For STEMI and NSTEMI, code the highest value within 1 week of the current procedure. If this is a repeat visit to the cath lab during the same episode of care, code the CAD presentation based on the patients clinical status prior to the subsequent procedure. *Selection Text Definition* No symptom, no angina No symptoms, No angina. Symptom unlikely to be ischemic. Pain, pressure or discomfort in the chest, neck

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
			3. *new per guidelines* Increasing angina - previously diagnosed angina that has become distinctly more frequent, longer in duration, or lower in threshold (i.e., increased by greater than or equal to 1 CCS class to at least CCS Class III severity). NON ST ELEVATION MYOCARDIAL INFARCTION (Non-STEMI) is defined as: The patient was hospitalized for a myocardial infarction documented in the medical record. AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits): 1) Troponin T or I: a) Maximal concentration of troponin T or I > the MI decision limit on at least one occasion during the first 24 hours after the index clinical event. 2) CK-MB: a) Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event. OR b) Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3) Total CK: a) In the absence of availability of a troponin or CK-MB assay, total CK > 2			or arms NOT clearly exertional or NOT otherwise consistent with pain or discomfort of myocardial ischemic origin. This includes patients with non-cardiac pain (e.g.pulmonary embolism, musculoskeletal, or esophageal discomfort), or cardiac pain not caused by myocardial ischemia (e.g., acute pericarditis). Stable angina Angina without a change in frequency or pattern for the 6 weeks prior to this cath lab visit. Angina is controlled by rest and/or oral ortranscutaneous medications. Unstable angina There are three principal presentations of unstable angina: 1. Rest angina (occurring at rest and prolonged, usually >20 minutes); 2. Newonset angina (within the past 2 months, of at least Canadian Cardiovascular Society Class III severity); or 3. Increasing angina (previously diagnosed angina that has become distinctly more frequent, longer in duration, or increased by 1 or more Canadian Cardiovascular Society class to at least CCS III severity). Non-STEMI The patient was hospitalized for a non-ST elevation myocardial infarction (STEMI) as documented in the medical record. Non-STEMIs are characterized by the presence of both criteria: a. Cardiac biomarkers (creatinine kinase-

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
			x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. AND ONE OF THE FOLLOWING: 1) Either ST segment depression or T wave abnormalities; or 2) Ischemic symptoms in the presence or absence of chest discomfort. Ischemic symptoms may include: a) unexplained nausea and vomiting; or b) persistent shortness of breath secondary to left ventricular failure; or c) unexplained weakness, dizziness, lightheadedness, or syncope. ---------- ST ELEVATION MYOCARDIAL INFARCTION (STEMI) is defined as: Indicate whether the patient was hospitalized for an ST Elevation Myocardial Infarction (STEMI) documented in the medical record. AT LEAST ONE OF THE FOLLOWING BIOCHEMICAL INDICATORS for detecting myocardial necrosis must be present (see below for a definition of Reference Control Limits): 1) Troponin T or I: a) Maximal concentration of troponin T or I > the MI decision limit on at			myocardial band, Troponin T or I) exceed the upper limit of normal according to the individual hospital's laboratory parameters a clinical presentation which is consistent or suggestive of ischemia which is consistent or suggestive of ischemia. Note: For purposes of the Registry, ST elevation in the posterior chest leads (V7 through V9), or ST depression that is maximal in V1-3, without ST-segment elevation in other leads, demonstrating posterobasal myocardial infarction, is considered a STEMI equivalent and qualifies the patient for reperfusion therapy.

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
			least one occasion during the first 24 hours after the index clinical event. 2) CK-MB: a) Maximal value of CK-MB > 2 x the upper limit of normal on one occasion during the first hours after the index clinical event; OR b) Maximal value of CK-MB, preferable CK-MB mass, > upper limit of normal on two successive samples. 3) Total CK a) In the absence of availability of a troponin or CK-MB assay, total CK > 2 x the upper limit of normal, or the B fraction of CK may be employed, but these last two biomarkers are considerably less satisfactory than CK-MB. AND ONE OF THE FOLLOWING ECG CHANGES: 1) ST-segment elevation: New or presumed new ST segment elevation at the J point in two or more continguous leads with the cut-off points >=0.2 mV in leads V1, V2, or V3, or >=0.1 mV in other leads; OR 2) Development of any Q wave in leads V1 through V3, or the development of a Q-wave > or = to 30 ms (0.03s) in leads I, II, aVL, aVF, V4, V5, or V6. (Q wave changes must be present in any two continguous leads, and be > or = to 1mm in depth.) _____			
			Defining Reference Control Values (MI Diagnostic Limit and Upper Limit of Normal): Reference values must be determined in each laboratory by studies using specific assays with appropriate quality control, as reported in peer-reviewed journals. Acceptable imprecision (coefficient of variation) at the 99th percentile for each assay should be defined as < or = to 10%. Each individual laboratory should confirm the range of reference values in their specific setting.			

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Symptoms Present on Admission	560	Time Period: Sx Onset to Admission	MI Patients Only: Indicate the time from the documented onset of symptoms of acute MI to the time of admission to your facility. Choose one of the following: - Less than or equal to 6 hours: - Greater than 6 hours and less than or equal to 12 hours: - Greater than 12 hours and less than or equal to 24 hours: - Greater than 24 hours and less than or equal to 48 hours: - Greater than 48 hours and less than or equal to 7 days: - No time period noted. Patient presented as a silent MI.	5005	Symptom Onset Date	**Coding Instructions:** Indicate the date the patient first noted ischemic symptoms lasting greater than or equal to 10 minutes. **Note(s):** If the patient had intermittent ischemic symptoms, record the date and time of the most recent ischemic symptoms prior to hospital presentation. Symptoms may include jaw pain, arm pain, shortness of breath, nausea, vomiting, fatigue/malaise, or other equivalent discomfort suggestive of a myocardial infarction. In the event of stuttering symptoms, Acute Coronary Syndrome (ACS) symptom onset is the time at which symptoms became constant in quality or intensity. **Target Value:** The first value between 1 week prior to current procedure and current procedure
Symptoms Present on Admission				5006	Symptom Onset Time	**Coding Instructions:** Indicate the time the patient first noted ischemic symptoms lasting greater than or equal to 10 minutes. **Note(s):** If an estimated symptom onset time is recorded, code "Symptom Onset Time Estimated" as "Yes." Indicate the time (hours: minutes) using the military 24-hour clock, beginning at midnight (0000 hours). If the symptom onset time is not specified in the medical record, it may be recorded as 0700 for morning; 1200 for lunchtime; 1500 for afternoon; 1800 for dinnertime; 2200 for evening and 0300 if awakened from sleep. **Target Value:** The first value between 1 week prior to current procedure and current procedure
Ejection Fraction Percentage	654	Ejection Fraction Done	Indicate whether the patient had Ejection Fraction assessed before or during the cath lab visit via invasive (i.e. LV gram) or non-invasive testing (i.e. Echo). Choose one of the following: - Yes - No	7026	Pre-PCI Left Ventricular Ejection Fraction Not Assessed	**Coding Instructions:** Indicate whether the left ventricular ejection fraction was not assessed. **Target Value:** The last value between 6 months prior to current procedure and prior to the intervention **Selections:** No, Yes

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Ejection Fraction Percentage	656	Ejection Fraction Percentage	The percentage of the blood emptied from the ventricle at the end of the contraction. Use the most recent determination during or prior to intervention. Enter a percentage in the range of 01 - 99.	7025	Pre-PCI Left Ventricular Ejection Fraction	**Coding Instructions:** Code the best estimate of current left ventricular ejection fraction. **Note(s):** If only a range is reported, report the median of the range (i.e.50-55%, is reported as 53%). If only a descriptive value is reported (i.e. normal), enter the corresponding percentage value from the list below: Normal = 60% Good function = 50% Mildly reduced = 45% Fair function = 40% Moderately reduced = 30% Poor function = 25% Severely reduced = 20% The Left Ventricular Ejection Fraction can be assessed via invasive (i.e. LV gram) or non-invasive (i.e. Echo, MR, CT or Nuclear) testing. If an ejection fraction is not measured during this admission and prior to the PCI, and their clinical status has not changed, it is acceptable to code an ejection fraction that was obtained prior to arrival. **Target Value:** The last value between 6 months prior to current procedure and prior to the intervention Selection Definitions: LVEF: The left ventricular ejection fraction is the percentage of the blood emptied from the left ventricle at the end of the contraction. **Source:** ACC Clinical Data Standards, The Society of Thoracic Surgeons

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
PCI Status	804	PCI Status	Indicate the status of the PCI. Choose one of the following: - Elective: The patient's cardiac function has been stable in the days or weeks prior to the procedure. The procedure could be deferred without increased risk of compromised cardiac outcome. - Urgent: ALL of the following conditions are met: a. Not elective status. b. Not emergency status. c. Procedure required during same hospitalization in order to minimize chance of further clinical deterioration. d. Worsening, sudden chest pain, CHF, acute myocardial infarction (AMI), anatomy, IABP, unstable angina (USA) with intravenous (IV) nitroglycerin (TNG) or rest angina (but stabilized patient) may be included. - Emergency: The patient's clinical status includes any of the following: a. Ischemic dysfunction (any of the following): (1) Ongoing ischemia including rest angina despite maximal medical therapy (medical and/or IABP)); (2) Acute Evolving Myocardial Infarction within 24 hours before Cardiac Cath Lab Procedure; or (3) pulmonary edema requiring intubation.	7020	PCI Status	**Coding Instructions:** Indicate the status of the PCI. The status is determined at the time the operator decides to perform a PCI. **Target Value:** The highest value on current procedure **Selections:** Elective - The procedure can be performed on an outpatient basis or during a subsequent hospitalization without significant risk of infarction or death. For stable inpatients, the procedure is being performed during this hospitalization for convenience and ease of scheduling and NOT because the patient's clinical situation demands the procedure prior to discharge. If the diagnostic catheterization was elective and there were no complications, the PCI would also be elective. Urgent - The procedure should be performed on an inpatient basis and prior to discharge because of significant concerns that there is risk of ischemia, infarction and/or death. Patients who are outpatients or in the emergency department at the time that the cardiac catheterization is requested would warrant an admission based on their clinical presentation. Emergency - The procedure should be performed as soon as possible because of substantial concerns that ongoing ischemia and/or infarction could lead to death. "As soon as possible" refers to a
			b. Mechanical dysfunction (either of the following): (1) shock with circulatory support; or (2) shock without circulatory support. - Emergent Salvage: The patient is undergoing CPR en route to the Cardiac Cath Lab or prior to procedure.			patient who is of sufficient acuity that you would cancel a scheduled case to perform this procedure immediately in the next available room during business hours, or you would activate the on-call team were this to occur during off-hours. Salvage - The procedure is a last resort. The patient is in cardiogenic shock when the PCI begins (i.e. at the time of introduction into a coronary artery or bypass graft of the first guidewire or intracoronary device for the purpose of mechanical revascularization). Within the last ten minutes prior to the start of the case or during the diagnostic portion of the case, the patient has also received chest compressions for a total of at least sixty seconds or has been on unanticipated extracorporeal circulatory support (e.g. extracorporeal mechanical oxygenation, or cardiopulmonary support).

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
Highest Lesion Location	902	Segment Number	Use the following numeric reference points to identify segments where procedures were attempted and its proximal reference number. 1 Proximal right coronary artery conduit segment - pRCA 2 Mid-right coronary artery conduit segment - mRCA 3 Distal right coronary artery conduit segment - dRCA 4 Right posterior descending artery segment - rPDA 5 Right posterior atrioventricular segment - rPAV 6 First right posterolateral segment - 1st RPL 7 Second right posterolateral segment - 2nd RPL 8 Third right posterolateral segment - 3rd RPL 9 Posterior descending septal perforators segment - pDSP 10 Acute marginal segment(s) - aMarg 11 Left main coronary artery segment - LM 12 Proximal LAD artery segment - pLAD 13 Mid-LAD artery segment - mLAD 14 Distal LAD artery segment - dLAD 15 First diagonal branch segment - 1st Diag 15a Lateral first diagonal branch segment - Lat 1st Diag 16 Second diagonal branch segment - 2nd	7105	Segment Number	**Coding Instruction:** Indicate the segment(s) that the current lesion spans (a lesion can span one or more segments). Use the following numeric reference points to identify segments where procedures were attempted and its proximal reference number. 1 Proximal right coronary artery conduit segment - pRCA 2 Mid-right coronary artery conduit segment - mRCA 3 Distal right coronary artery conduit segment - dRCA 4 Right posterior descending artery segment - rPDA 5 Right posterior atrioventricular segment - rPAV 6 First right posterolateral segment - 1st RPL 7 Second right posterolateral segment - 2nd RPL 8 Third right posterolateral segment - 3rd RPL 9 Posterior descending septal perforators segment - pDSP 10 Acute marginal segment(s) - aMarg 11 Left main coronary artery segment - LM 12 Proximal LAD artery segment - pLAD 13 Mid-LAD artery segment - mLAD 14 Distal LAD artery segment - dLAD 15 First diagonal branch segment - 1st Diag

Risk Variable in PCI Readmission Measure	Version 3.04 NCDR® Number	Version 3.04 Variable Name	Version 3.04 Variable Definition	Version 4.3.1 NCDR® Number	Version 4.3.1 Variable Name	Version 4.3.1 Variable Definition
			2nd Diag 16a Lateral second diagonal branch segment - Lat 2nd Diag 17 LAD septal perforator segments - LAD SP 18 Proximal circumflex artery segment - pCIRC 19 Mid-circumflex artery segment - mCIRC 19a Distal circumflex artery segment - dCIRC 20 First obtuse marginal branch segment - 1st OM 20a Lateral first obtuse marginal branch segment - Lat 1st OM 21 Second obtuse marginal branch segment - 2nd OM 21a Lateral second obtuse marginal branch segment - Lat 2nd OM 22 Third obtuse marginal branch segment - 3rd OM 22a Lateral third obtuse marginal branch segment - Lat 3rd OM 23 Circumflex artery AV groove continuation segment - CIRC AV 24 First left posterolateral branch segment - 1st LPL 25 Second left posterolateral branch segment - 2nd LPL 26 Third posterolateral descending artery segment - 3rd LPL 27 Left posterolateral descending artery segment - LPDA 28 Ramus intermedius segment - Ramus			15a Lateral first diagonal branch segment - Lat 1st Diag 16 Second diagonal branch segment - 2nd Diag 16a Lateral second diagonal branch segment - Lat 2nd Diag 17 LAD septal perforator segments - LAD SP 18 Proximal circumflex artery segment - pCIRC 19 Mid-circumflex artery segment - mCIRC 19a Distal circumflex artery segment - dCIRC 20 First obtuse marginal branch segment - 1st OM 20a Lateral first obtuse marginal branch segment - Lat 1st OM 21 Second obtuse marginal branch segment - 2nd OM 21a Lateral second obtuse marginal branch segment - Lat 2nd OM 22 Third obtuse marginal branch segment - 3rd OM 22a Lateral third obtuse marginal branch segment - Lat 3rd OM 23 Circumflex artery AV groove continuation segment - CIRC AV 24 First left posterolateral branch segment - 1st LPL 25 Second left posterolateral branch segment - 2nd LPL 26 Third posterolateral descending artery segment - 3rd LPL

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			28a Lateral ramus intermedius segment - Lat Ramus 29 Third diagonal branch segment - 3rd Diag 29a Lateral third diagonal branch segment - Lat 3rd Diag ---------- Note: For T or Y grafts connected to 2 areas of the native vessels, code using the most dominant vessel or the first one addressed in the procedure.			27 Left posterolateral descending artery segment – LPDA 28 Ramus intermedius segment - Ramus 28a Lateral ramus intermedius segment - Lat Ramus 29 Third diagonal branch segment - 3rd Diag 29a Lateral third diagonal branch segment - Lat 3rd Diag **Note(s):** A segment is a defined region of a coronary artery, as illustrated in the CathPCI Registry® coronary anatomy segment diagram. If the target lesion is in a bypass graft, indicate the segment location of the first anastomosis distal to the lesion (and if it's above a Y graft, indicate the segment location of the most important distal vessel). If a PCI of a left subclavian supplying a LIMA is performed, it is not considered a PCI. **Supporting Definitions:** Lesion: A target lesion is defined as a stenosis within a coronary artery or coronary artery bypass graft on which mechanical coronary revascularization is attempted. **Source** NCDR®
Pre-Procedure TIMI Flow: none	920	Pre-Procedure TIMI Flow	Indicate for the segment identified the pre-procedure TIMI flow. Choose one of the following: - TIMI-0: No flow/no perfusion. - TIMI-1:Slow penetration without perfusion. - TIMI-2:Partial flow/partial perfusion (greater than TIMI-1 but less than TIMI-3). - TIMI-3:Complete and brisk flow/complete perfusion.	7140	Pre-Procedure TIMI Flow	**Coding Instruction**: Indicate the pre-procedure TIMI flow value. **Note(s):** If a lesion spans multiple segments with different TIMI flows, coded the lowest TIMI flow within the entire lesion. **Target Value:** Any occurrence on current procedure **Selections:** TIMI - 0 No flow/no perfusion TIMI - 1 Slow penetration without perfusion TIMI - 2 Partial flow/partial perfusion (greater than TIMI-1 but less than TIMI-3. TIMI - 3 Complete and brisk flow/complete perfusion.