

## SUPPLEMENTAL MATERIAL

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**Supplemental Table 1. Components of precipitant algorithms.**

<b>Precipitant</b>	<b>Algorithm Components</b>
Pneumonia	≥ 2 ICD codes, 1° or 2° discharge diagnosis
Pulmonary Embolism	≥ 2 ICD codes, 1° discharge diagnosis
Pneumothorax	≥ 2 ICD codes, 1° or 2° discharge diagnosis
Respiratory Distress/Failure	≥ 2 ICD codes, 1° or 2° discharge diagnosis
Acute Myocardial Infarction	≥ 2 ICD codes, 1° discharge diagnosis
Sepsis	≥ 2 ICD codes, 1° or 2° discharge diagnosis
Thyrotoxicosis	≥ 2 ICD codes, laboratory results (low TSH, high T4)
Cardiac Surgery	≥ 1 CPT Code
Thoracic Non-Cardiac Surgery	≥ 1 CPT Code
Non-Cardiac Surgery	≥ 1 CPT Code
Myocarditis	≥ 2 ICD codes, 1° discharge diagnosis
Pericarditis	≥ 2 ICD codes
Alcohol Intoxication	≥ 2 ICD codes, 1° or 2° discharge diagnosis
ICD codes = International Statistical Classification of Diseases 9 and 10 diagnosis codes; CPT codes = Current Procedural Terminology billing codes; Discharge diagnoses determined via search phrases described below	

**Supplemental Table 2. Discharge summary text search phrases used within precipitant algorithms.**

<b>Precipitant</b>	<b>Phrases</b>
Pneumonia	“pneumonia”
Pulmonary Embolism	“pulmonary embolism”, “pulmonary emboli”
Pneumothorax	“pneumothorax”, “ptx”
Respiratory Distress/Failure	“hypoxemia”, “respiratory distress”, “respiratory failure”, “hypoxia”, “hypercapnia”, “pulmonary insufficiency”
Acute Myocardial Infarction	“myocardial infarction”, “STEMI”, “NSTEMI”, not “r/o MI”
Sepsis	“sepsis”, “septic shock”
Myocarditis	“myocarditis”, “myopericarditis”
Alcohol Intoxication	“alcohol dependence”, “alcohol abuse”, “alcohol intoxication”, “EtOH”, “alcohol withdrawal syndrome”

Text search phrases are not case sensitive.

<b>Supplemental Table 3. Precipitant algorithm test characteristics.</b>				
<b>Precipitant</b>	<b>Sensitivity (95% CI*)</b>	<b>Specificity (95% CI)</b>	<b>Positive Predictive Value (95% CI)</b>	<b>Mean Date Discrepancy (days)</b>
Cardiac Surgery	100 (96-100)	100 (96-100)	96 (90-99)	1.1
Non-Cardiac Surgery	85 (76-91)	93 (86-97)	89 (81-94)	0
Thoracic Surgery	100 (96-100)	88 (80-94)	100 (96-100)	0
Acute Alcohol Intoxication	100 (96-100)	91 (83-96)	98 (93-100)	0
Pneumonia	96 (90-99)	80 (71-87)	82 (73-89)	4.8
Pulmonary Embolism	100 (96-100)	82 (73-89)	92 (84-96)	1.0
Pneumothorax	100 (96-100)	93 (86-97)	80 (71-87)	3.5
Respiratory Distress	96 (90-99)	87 (79-93)	91 (83-96)	2.6
Sepsis	92 (84-96)	96 (90-99)	88 (80-94)	2.2
Pericarditis	78 (69-86)	90 (82-95)	97 (91-99)	2.7
Myocarditis	100 (96-100)	100 (96-100)	100 (96-100)	1.1
Myocardial Infarction	97 (91-99)	88 (80-94)	87 (79-93)	0.4
Thyrotoxicosis	76 (66-84)	85 (76-91)	72 (62-81)	0
<b>Any precipitant at AF†</b>	83 (74-90)	82 (73-89)	92 (84-96)	--

Mean date discrepancy calculated by taking the average of the absolute difference in days between algorithm date and true date of precipitant occurrence.

\*CI = binomial confidence interval.

†Describes overall ability of algorithms to distinguish AF with vs. without an acute precipitant when applied to incident AF cohort.

**Supplemental Table 4. Precipitant and outcome codes.**

Precipitant	Code Type	Codes	Code Descriptions
Pulmonary Embolism	ICD-9	415.11, 415.13, 415.12, 415.19	Iatrogenic pulmonary embolism and infarction, Saddle embolus of pulmonary artery, Septic pulmonary embolism, Other pulmonary embolism and infarction
Pulmonary Embolism	ICD-10	I26.01, I26.02, I26.09, I26.90, I26.92, I26.99	Septic pulmonary embolism with acute cor pulmonale, Saddle embolus of pulmonary artery with acute cor pulmonale, Other pulmonary embolism with acute cor pulmonale, Septic pulmonary embolism without acute cor pulmonale, Saddle embolus of pulmonary artery without acute cor pulmonale, Other pulmonary embolism without acute cor pulmonale
Pericarditis	ICD-9	036.41, 074.21, 093.81, 420, 098.83, 420.9, 420.99, 423.1, 423.2, 393, 420.91, 420.9, 115.93, 391, 115.03, 115.13, 115.93, 423.0, 423.3, 423.8, 423.9, 420.0	Meningococcal pericarditis, Coxsackie pericarditis, Syphilitic pericarditis, Acute pericarditis, Gonococcal pericarditis, Acute pericarditis, unspecified, Other acute pericarditis, Adhesive pericarditis, Constrictive pericarditis, Chronic rheumatic pericarditis, Acute idiopathic pericarditis, Other and unspecified acute pericarditis, Histoplasmosis pericarditis, Acute rheumatic pericarditis, Infection by Histoplasma capsulatum, pericarditis, Infection by Histoplasma duboisii, pericarditis, Histoplasmosis, unspecified, pericarditis, Hemopericardium, Cardiac tamponade, Other specified diseases of pericardium, Unspecified disease of pericardium, Acute pericarditis in diseases classified elsewhere
Pericarditis	ICD-10	A39.53, B33.23, I01.0, I09.2, I30.0, I30.1, I30.8, I30.9, I31.0, I31.1, I31.2, I31.3, I31.4, I31.8, I31.9, I32	Meningococcal pericarditis, Viral pericarditis, Acute thematic pericarditis, Chronic rheumatic pericarditis, Acute nonspecific idiopathic pericarditis, Infective pericarditis, Other forms of acute pericarditis, Acute pericarditis, unspecified, Chronic adhesive pericarditis, Chronic constrictive pericarditis, Hemopericardium, not elsewhere classified, Pericardial effusion (noninflammatory), Cardiac tamponade, Other specified diseases of pericardium, Disease of pericardium, unspecified, Pericarditis in diseases classified elsewhere
Myocarditis	ICD-9	42.9, 032.82, 036.43, 074.23, 093.82, 13.03, 39.12, 39.80, 422.0, 422.90, 422.91, 442.92, 442.93, 442.99, 442.0	Myocarditis, unspecified, Diphtheritic myocarditis, Meningococcal myocarditis, Coxsackie myocarditis, Syphilitic myocarditis, Myocarditis due to toxoplasmosis, Acute rheumatic myocarditis, Rheumatic myocarditis, Acute myocarditis in diseases classified elsewhere, Acute myocarditis, unspecified, Idiopathic myocarditis, Septic myocarditis, Toxic myocarditis, Other acute myocarditis
Myocarditis	ICD-10	I40.0, I40.1, I40.8, I40.9, I41, I51.4, J10.82, J11.82, A38.1, A39.52, B26.82, B33.22, B58.81, D86.85, I01.2, I09.0	infective myocarditis, Isolated myocarditis, Other acute myocarditis, Acute myocarditis, unspecified, Myocarditis in diseases classified elsewhere, Myocarditis, unspecified, Influenza due to other identified influenza virus with myocarditis, Influenza due to unidentified influenza virus with myocarditis, Scarlet fever with myocarditis, Meningococcal myocarditis, Mumps myocarditis, Viral myocarditis, Toxoplasma myocarditis, Sarcoid myocarditis, Acute rheumatic myocarditis, Rheumatic myocarditis
Respiratory Failure	ICD-9	518.51, 518.81	Acute respiratory failure following trauma and surgery, Acute respiratory failure
Respiratory Failure	ICD-10	J96.00, J96.01, J96.02, J96.00, J96.01, J96.02	Acute respiratory failure, unspecified whether with hypoxia or hypercapnia, Acute respiratory failure with hypoxia, Acute respiratory failure with hypercapnia, Acute respiratory failure, unspecified whether with hypoxia or hypercapnia, Acute respiratory failure with hypoxia, Acute respiratory failure with hypercapnia

Precipitant	Code Type	Codes	Code Descriptions
Pneumothorax	ICD-9	512.0, 512.1, 512.81, 512.82, 860.0, 0117.0, 0117.1, 0117.2, 0117.3, 0117.4, 0117.5, 0117.6	Spontaneous tension pneumothorax, Iatrogenic pneumothorax, Primary spontaneous pneumothorax, Secondary spontaneous pneumothorax, Traumatic pneumothorax without mention of open wound into thorax, Tuberculous pneumothorax, unspecified, Tuberculous pneumothorax, bacteriological or histological examination not done, Tuberculous pneumothorax, Tuberculous pneumothorax, Tuberculous pneumothorax, Tuberculous pneumothorax, Tuberculous pneumothorax,
Pneumothorax	ICD-10	J95.811, J93.0, J93.11, J93.82, J93.83, J93.9, J95.811, J95.812, J95.821	Postprocedural pneumothorax, Spontaneous tension pneumothorax, Primary spontaneous pneumothorax, Other air leak, Other pneumothorax, Pneumothorax, unspecified, Postprocedural pneumothorax, Postprocedural air leak, Acute postprocedural respiratory failure
Pneumonia	ICD-9	003.22, 011.60, 011.61, 011.62, 011.63, 011.64, 011.65, 011.66, 055.1, 073.0, 115.15, 115.95, 480.0, 480.1, 480.2, 480.3, 480.8, 480.9, 481, 482.0, 482.1, 482.2, 482.3, 482.31, 482.32, 482.39, 482.4, 482.41, 482.42, 482.49, 482.81, 482.82, 482.83, 482.84, 482.89, 482.9, 483.0, 483.1, 483.8, 484.1, 484.3, 484.5, 484.6, 484.7, 484.8, 485, 486, 487.0, 488.01, 488.11, 488.81, 516.3, 516.35, 516.36, 516.37, 517.1, 770.0, 997.31, 997.32	Salmonella pneumonia, Tuberculous pneumonia (any form), unspecified, Tuberculous pneumonia (any form), bacteriological or histological examination not done, Tuberculous pneumonia (any form), bacteriological or histological examination unknown (at present), Tuberculous pneumonia (any form), tubercle bacilli found (in sputum) by microscopy, Tuberculous pneumonia (any form), tubercle bacilli not found (in sputum) by microscopy, but found by bacterial culture, Tuberculous pneumonia (any form), tubercle bacilli not found by bacteriological examination, but tuberculosis confirmed histologically, Tuberculous pneumonia (any form), tubercle bacilli not found by bacteriological or histologic exam, but TB confirm by other methods (inoculation of animals), Postmeasles pneumonia, Ornithosis with pneumonia, Infection by Histoplasma duboisii, pneumonia, Histoplasmosis, unspecified, pneumonia, Pneumonia due to adenovirus, Pneumonia due to respiratory syncytial virus, Pneumonia due to parainfluenza virus, Pneumonia due to SARS-associated coronavirus, Pneumonia due to other virus not elsewhere classified, Viral pneumonia, unspecified, Pneumococcal pneumonia (streptococcus pneumoniae pneumonia), Pneumonia due to Klebsiella pneumoniae, Pneumonia due to Pseudomonas, Pneumonia due to Hemophilus influenzae, Pneumonia due to Streptococcus, unspecified, Pneumonia due to streptococcus, group A, Pneumonia due to Streptococcus, group B, Pneumonia due to other streptococcus, Pneumonia due to Staphylococcus, unspecified, Methicillin susceptible pneumonia due to Staphylococcus aureus, Methicillin resistant pneumonia due to Staph aureus, Other Staphylococcus pneumonia, Pneumonia due to anaerobes, Pneumonia due to escherichia coli, Pneumonia due to other gram-negative bacteria, Pneumonia due to Legionnaires' disease, Pneumonia due to other specified bacteria, Bacterial pneumonia, unspecified, Pneumonia due to mycoplasma pneumoniae, Pneumonia due to chlamydia, Pneumonia due other specified organism, Pneumonia in cytomegalic inclusion disease, Pneumonia in whooping cough, Pneumonia in anthrax, Pneumonia in aspergillosis, Pneumonia in other systemic mycoses, Pneumonia in other infectious diseases classified elsewhere, Bronchopneumonia, organism unspecified, Pneumonia, organism unspecified, Influenza with pneumonia, Influenza due to identified avian influenza virus with pneumonia, Influenza due to identified 2009 H1N1 influenza virus with pneumonia, Influenza due to identified novel influenza A virus with pneumonia, Idiopathic interstitial pneumonia NOS, Idiopathic lymphoid interstitial pneumonia, Cryptogenic organizing pneumonia, Desquamative interstitial pneumonia, Rheumatic pneumonia, Congenital pneumonia, Ventilator associated pneumonia, Postprocedural aspiration pneumonia
Pneumonia	ICD-10	A01.03, A02.22, A37.00, A37.01, A37.10, A37.11, A37.80, A37.81, A37.90, A37.91, A54.84, B01.2, B05.2, B06.81, B77.81,	Typhoid pneumonia, Salmonella pneumonia, Whooping cough due to Bordetella pertussis without pneumonia, Whooping cough due to Bordetella pertussis with pneumonia, Whooping cough due to Bordetella parapertussis without pneumonia, Whooping cough due to Bordetella parapertussis with pneumonia, Whooping cough due to other Bordetella species without pneumonia, Whooping cough due to other Bordetella species with pneumonia, Whooping cough, unspecified species without pneumonia, Whooping cough, unspecified species with pneumonia, Gonococcal pneumonia, Varicella pneumonia, Measles complicated by pneumonia, Rubella pneumonia, Ascariasis pneumonia, Streptococcus pneumoniae as the cause of diseases classified elsewhere, Mycoplasma pneumoniae [M. pneumoniae] as

Precipitant	Code Type	Codes	Code Descriptions
		B95.3, B96.0, B96.1, J09.X1, J10.00, J10.01, J10.08, J11.00, J11.08, J12.0, J12.1, J12.2, J12.3, J12.81, J12.89, J12.9, J13, J14, J15.0, J15.1, J15.20, J15.211, J15.212, J15.29, J15.3, J15.4, J15.5, J15.6, J15.7, J15.8, J15.9, J16.0, J16.8, J17, J18.0, J18.1, J18.2, J18.8, J18.9, J84.111, J84.116, J84.117, J84.2, J85.1, J85.2, J95.851	the cause of diseases classified elsewhere, Klebsiella pneumoniae [K. pneumoniae] as the cause of diseases classified elsewhere, Influenza due to identified novel influenza A virus with pneumonia, Influenza due to other identified influenza virus with unspecified type of pneumonia, Influenza due to other identified influenza virus with the same other identified influenza virus pneumonia, Influenza due to other identified influenza virus with other specified pneumonia, Influenza due to unidentified influenza virus with unspecified type of pneumonia, Influenza due to unidentified influenza virus with specified pneumonia, Adenoviral pneumonia, Respiratory syncytial virus pneumonia, Parainfluenza virus pneumonia, Human metapneumovirus pneumonia, Pneumonia due to SARS-associated coronavirus, Other viral pneumonia, Viral pneumonia, unspecified, Pneumonia due to Streptococcus pneumoniae, Pneumonia due to Hemophilus influenzae, Pneumonia due to Klebsiella pneumoniae, Pneumonia due to Pseudomonas, Pneumonia due to staphylococcus, unspecified, Pneumonia due to Methicillin susceptible Staphylococcus aureus, Pneumonia due to Methicillin resistant Staphylococcus aureus, Pneumonia due to other staphylococcus, Pneumonia due to streptococcus, group B, Pneumonia due to other streptococci, Pneumonia due to Escherichia coli, Pneumonia due to other Gram-negative bacteria, Pneumonia due to Mycoplasma pneumoniae, Pneumonia due to other specified bacteria, Unspecified bacterial pneumonia, Chlamydial pneumonia, Pneumonia due to other specified infectious organisms, Pneumonia in diseases classified elsewhere, Bronchopneumonia, unspecified organism, Lobar pneumonia, unspecified organism, Hypostatic pneumonia, unspecified organism, Other pneumonia, unspecified organism, Pneumonia, unspecified organism, Idiopathic interstitial pneumonia, not otherwise specified, Cryptogenic organizing pneumonia, Desquamative interstitial pneumonia, Lymphoid interstitial pneumonia, Abscess of lung with pneumonia, Abscess of lung without pneumonia, Ventilator associated pneumonia
Cardiac Surgery	ICD-9	35.00, 35.01, 35.02, 35.03, 35.04, 35.11, 35.22, 35.31, 35.32, 35.33, 35.34, 35.35, 35.39, 35.41, 35.42, 35.5, 35.51, 35.52, 35.53, 35.54, 35.55, 35.6, 35.61, 35.62, 35.63, 35.7, 35.71, 35.72, 35.73, 35.8, 36.03, 36.04, 36.07, 36.09, 36.10, 36.1, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 36.2, 37.0, 37.1, 37.11, 37.12, 37.2, 37.21, 37.22, 37.23, 37.24, 37.25, 37.26, 37.27, 37.28, 37.29, 37.3, 37.31, 37.32, 37.33, 37.34, 37.35, 37.36,	Closed heart valvotomy, unspecified, Closed heart valvotomy, aortic valve, Closed heart valvotomy, mitral valve, Closed heart valvotomy, pulmonary valve, Closed heart valvotomy, tricuspid valve, Open heart valvuloplasty of aortic valve without replacement, Open and other replacement of aortic valve, Operations on papillary muscle, Operations on chord tendineae, Annuloplasty, Infundibulectomy, Partial ventriculectomy, Operations on other structures adjacent to valves of heart, Implantation of prosthetic cardiac support device around the heart, Creation of septal defect in heart, Repair of atrial and ventricular septa with prosthesis, Repair of atrial septal defect with prosthesis, open technique, Repair of atrial septal defect with prosthesis, closed technique, Repair of ventricular septal defect with prosthesis, open technique, Repair of endocardial cushion defect with prosthesis, Repair of ventricular septal defect with prosthesis, closed technique, Repair of atrial and ventricular septa with tissue graft, Repair of atrial septal defect with tissue graft, Repair of ventricular septal defect with tissue graft, Repair of endocardial cushion defect with tissue graft, Other and unspecified repair of atrial and ventricular septa, Other and unspecified repair of atrial septal defect, Other and unspecified repair of ventricular septal defect, Other and unspecified repair of endocardial cushion defect, Total repair of certain congenital cardiac anomalies, Open chest coronary artery angioplasty, Intracoronary artery thrombolytic infusin, Insertion of non-drug-eluting coronary artery stent(s), Other removal of coronary artery obstruction, Aortocoronary bypass for heart revascularization, NOS, Bypass anastomosis for heart revascularization, Aortocoronary bypass of one coronary artery, Aortocoronary bypass of two coronary arteries, Aortocoronary bypass of three coronary arteries, Aortocoronary bypass of four or more coronary arteries, Single internal mammary-coronary artery bypass, Double internal mammary-coronary artery bypass, Abdominal-coronary artery bypass, Other bypass anastomosis for heart revascularization, Heart revascularization by arterial implant, Pericardiocentesis, Cardiotomy and pericardiotomy, Cardiotomy, Pericardiotomy, Diagnostic procedures on heart and pericardium, Right heart cardiac catheterization, Left heart cardiac catheterization, Combined right and left heart cardiac catheterization, Biopsy of pericardium, Biopsy of heart, Catheter based invasive electrophysiologic testing, Cardiac mapping, Intracardiac echocardiography, Other diagnostic procedures on heart and pericardium, Pericardiectomy and excision of lesion of heart, Pericardiectomy,

Precipitant	Code Type	Codes	Code Descriptions
		37.37, 37.4, 37.41, 37.49, 37.7, 37.8, 37.9	Excision of aneurysm of heart, Excision or destruction of other lesion or tissue of heart, open approach, Excision or destruction of other lesion or tissue of heart, endovascular approach, Partial ventriculectomy, Excision, destruction, or exclusion of left atrial appendage, Excision or destruction of other lesion or tissue of heart, thoracoscopic approach, Repair of heart and pericardium, Implantation of prosthetic cardiac support device around the heart, Other repair of heart and pericardium, Insertion, revision, replacement and removal of leads; insertion of temporary pacemaker system, Insertion, replacement, removal, and revision of pacemaker device, Other operations on heart and pericardium
Cardiac Surgery	CPT	32658, 32659, 32661, 33020, 33025, 33030, 33031, 33050, 33120, 33130, 33250, 33251, 33254, 33255, 33256, 33257, 33258, 33259, 33261, 33265, 33266, 33300, 33305, 33310, 33315, 33365, 33366, 33400, 33401, 33403, 33404, 33405, 33406, 33410, 33411, 33412, 33413, 33414, 33415, 33416, 33417, 33420, 33425, 33426, 33427, 33430, 33460, 33463, 33464, 33465, 33468, 33470, 33471, 33475, 33476, 33478, 33496, 33542, 33545, 33548, 33600, 33602, 33608, 33610, 33611, 33612, 33615, 33617, 33619, 33641, 33645, 33647, 33660, 33665, 33670, 33675, 33676, 33677, 33681, 33684, 33688, 33692, 33697, 33702, 33710, 33720, 33722, 33732, 33735, 33736, 33737, 33770, 33774, 33776, 33780, 33782, 33783, 33786, 33813, 33814, 33920, 33510, 33511, 33512, 33513,	Thoracoscopy, surgical; with removal of clot or foreign body from pericardial sac, Thoracoscopy, surgical; with creation of pericardial window or partial resection of pericardial sac for drainage, Thoracoscopy, surgical; with excision of pericardial cyst, tumor, or mass, Pericardiectomy for removal of clot or foreign body (primary procedure), Creation of pericardial window or partial resection for drainage, Pericardiectomy, subtotal or complete; without cardiopulmonary bypass, Pericardiectomy, subtotal or complete; with cardiopulmonary bypass, Resection of pericardial cyst or tumor, Excision of intracardiac tumor, resection with cardiopulmonary bypass, Resection of external cardiac tumor, Operative ablation of supraventricular arrhythmogenic focus or pathway (eg, Wolff-Parkinson-White, atrioventricular node re-entry), tract(s) and/or focus (foci); without cardiopulmonary bypass, Operative ablation of supraventricular arrhythmogenic focus or pathway (eg, Wolff-Parkinson-White, atrioventricular node re-entry), tract(s) and/or focus (foci); with cardiopulmonary bypass, Operative tissue ablation and reconstruction of atria, limited (eg, modified maze procedure), Operative tissue ablation and reconstruction of atria, extensive (eg, maze procedure); without cardiopulmonary bypass, Operative tissue ablation and reconstruction of atria, extensive (eg, maze procedure); with cardiopulmonary bypass, Operative tissue ablation and reconstruction of atria, performed at the time of other cardiac procedure(s), limited (eg, modified maze procedure) (List separately in addition to code for primary procedure), Operative tissue ablation and reconstruction of atria, performed at the time of other cardiac procedure(s), extensive (eg, maze procedure), without cardiopulmonary bypass (List separately in addition to code for primary procedure), Operative tissue ablation and reconstruction of atria, performed at the time of other cardiac procedure(s), extensive (eg, maze procedure), with cardiopulmonary bypass (List separately in addition to code for primary procedure), Operative ablation of ventricular arrhythmogenic focus with cardiopulmonary bypass, Endoscopy, surgical; operative tissue ablation and reconstruction of atria, limited (eg, modified maze procedure), without cardiopulmonary bypass, Endoscopy, surgical; operative tissue ablation and reconstruction of atria, extensive (eg, maze procedure), without cardiopulmonary bypass, Repair of cardiac wound; without bypass, Repair of cardiac wound; with cardiopulmonary bypass, Cardiotomy, exploratory (includes removal of foreign body, atrial or ventricular thrombus); without bypass, Cardiotomy, exploratory (includes removal of foreign body, atrial or ventricular thrombus); with cardiopulmonary bypass, Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; transaortic approach (eg, median sternotomy, mediastinotomy), Transcatheter aortic valve replacement (TAVR/TAVI) with prosthetic valve; transapical exposure (eg, left thoracotomy), Valvuloplasty, aortic valve; open, with cardiopulmonary bypass, Valvuloplasty, aortic valve; open, with inflow occlusion, Valvuloplasty, aortic valve; using transventricular dilation, with cardiopulmonary bypass, Construction of apical-aortic conduit, Replacement, aortic valve, with cardiopulmonary bypass; with prosthetic valve other than homograft or stentless valve, Replacement, aortic valve, with cardiopulmonary bypass; with allograft valve (freehand), Replacement, aortic valve, with cardiopulmonary bypass; with stentless tissue valve, Replacement, aortic valve; with aortic annulus enlargement, noncoronary sinus, Replacement, aortic valve; with transventricular aortic annulus enlargement (Konno procedure), Replacement, aortic valve; by translocation of autologous pulmonary valve with allograft replacement of pulmonary valve (Ross procedure), Repair of left ventricular outflow tract obstruction by patch enlargement of the outflow tract, Resection or incision of subvalvular tissue for discrete subvalvular aortic stenosis, Ventriculomyotomy (-myectomy) for idiopathic hypertrophic subaortic stenosis (eg,



Precipitant	Code Type	Codes	Code Descriptions
		33533, 33534, 33535, 33536	<p>asymmetric septal hypertrophy), Aortoplasty (gusset) for supra-ventricular stenosis, Valvotomy, mitral valve; closed heart, Valvuloplasty, mitral valve, with cardiopulmonary bypass, Valvuloplasty, mitral valve, with cardiopulmonary bypass; with prosthetic ring, Valvuloplasty, mitral valve, with cardiopulmonary bypass; radical reconstruction, with or without ring, Replacement, mitral valve, with cardiopulmonary bypass, Valvectomy, tricuspid valve, with cardiopulmonary bypass, Valvuloplasty, tricuspid valve; without ring insertion, Valvuloplasty, tricuspid valve; with ring insertion, Replacement, tricuspid valve, with cardiopulmonary bypass, Tricuspid valve repositioning and plication for Ebstein anomaly, Valvotomy, pulmonary valve, closed heart; transventricular, Valvotomy, pulmonary valve, closed heart; via pulmonary artery, Replacement, pulmonary valve, Right ventricular resection for infundibular stenosis, with or without commissurotomy, Outflow tract augmentation (gusset), with or without commissurotomy or infundibular resection, Repair of non-structural prosthetic valve dysfunction with cardiopulmonary bypass (separate procedure), Myocardial resection (eg, ventricular aneurysmectomy), Repair of postinfarction ventricular septal defect, with or without myocardial resection, Surgical ventricular restoration procedure, includes prosthetic patch, when performed (eg, ventricular remodeling, SVR, SAVER, Dor procedures), Closure of atrioventricular valve (mitral or tricuspid) by suture or patch, Closure of semilunar valve (aortic or pulmonary) by suture or patch, Repair of complex cardiac anomaly other than pulmonary atresia with ventricular septal defect by construction or replacement of conduit from right or left ventricle to pulmonary artery, Repair of complex cardiac anomalies (eg, single ventricle with subaortic obstruction) by surgical enlargement of ventricular septal defect, Repair of double outlet right ventricle with intraventricular tunnel repair, Repair of double outlet right ventricle with intraventricular tunnel repair; with repair of right ventricular outflow tract obstruction, Repair of complex cardiac anomalies (eg, tricuspid atresia) by closure of atrial septal defect and anastomosis of atria or vena cava to pulmonary artery (simple Fontan procedure), Repair of complex cardiac anomalies (e.g., single ventricle by modified Fontan), Repair of single ventricle with aortic outflow obstruction and aortic arch hypoplasia (hypoplastic left heart syndrome) (eg, Norwood procedure), Repair atrial septal defect, secundum, with cardiopulmonary bypass, with or without patch, Direct or patch closure, sinus venosus, with or without anomalous pulmonary venous drainage, Repair of atrial septal defect and ventricular septal defect, with direct or patch closure, Repair of incomplete or partial atrioventricular canal (ostium primum atrial septal defect), with or without atrioventricular valve repair, Repair of intermediate or transitional atrioventricular canal, with or without atrioventricular valve repair, Repair of complete atrioventricular canal, with or without prosthetic valve, Closure of multiple ventricular septal defects, Closure of multiple ventricular septal defects; with pulmonary valvotomy or infundibular resection (acyanotic), Closure of multiple ventricular septal defects; with removal of pulmonary artery band, with or without gusset, Closure of single ventricular septal defect, with or without patch, Closure of single ventricular septal defect, with or without patch; with pulmonary valvotomy or infundibular resection (acyanotic), Closure of single ventricular septal defect, with or without patch; with removal of pulmonary artery band, with or without gusset, Complete repair tetralogy of Fallot without pulmonary atresia, Complete repair tetralogy of Fallot with pulmonary atresia including construction of conduit from right ventricle to pulmonary artery and closure of ventricular septal defect, Repair sinus of Valsalva fistula, with cardiopulmonary bypass, Repair sinus of Valsalva fistula, with cardiopulmonary bypass; with repair of ventricular septal defect, Repair sinus of Valsalva aneurysm, with cardiopulmonary bypass, Closure of aortico-left ventricular tunnel, Repair of cor triatriatum or supra-ventricular mitral ring by resection of left atrial membrane, Atrial septectomy or septostomy; closed heart (Blalock-Hanlon type operation), Atrial septectomy or septostomy; open heart with cardiopulmonary bypass, Atrial septectomy or septostomy; open heart, with inflow occlusion, Repair of transposition of the great arteries with ventricular septal defect and subpulmonary stenosis; without surgical enlargement of ventricular septal defect, Repair of transposition of the great arteries, atrial baffle procedure (eg, Mustard or Senning type) with cardiopulmonary bypass, Repair of transposition of the great arteries, atrial baffle procedure (eg, Mustard or Senning type) with cardiopulmonary bypass;</p>

Precipitant	Code Type	Codes	Code Descriptions
			with closure of ventricular septal defect, Repair of transposition of the great arteries, aortic pulmonary artery reconstruction (eg, Jatene type); with closure of ventricular septal defect, Aortic root translocation with ventricular septal defect and pulmonary stenosis repair (ie, Nikaidoh procedure); without coronary ostium reimplantation, Aortic root translocation with ventricular septal defect and pulmonary stenosis repair (ie, Nikaidoh procedure); with reimplantation of 1 or both coronary ostia, Total repair, truncus arteriosus (Rastelli type operation), Obliteration of aortopulmonary septal defect; without cardiopulmonary bypass, Obliteration of aortopulmonary septal defect; with cardiopulmonary bypass, Repair of pulmonary atresia with ventricular septal defect, by construction or replacement of conduit from right or left ventricle to pulmonary artery, Coronary artery bypass, vein only; single coronary venous graft, Coronary artery bypass, vein only; 2 coronary venous grafts, Coronary artery bypass, vein only; 3 coronary venous grafts, Coronary artery bypass, vein only; 4 coronary venous grafts, Coronary artery bypass, using arterial graft(s); single arterial graft, Coronary artery bypass, using arterial graft(s); 2 coronary arterial grafts, Coronary artery bypass, using arterial graft(s); 3 coronary arterial grafts, Coronary artery bypass, using arterial graft(s); 4 or more coronary arterial grafts
Thoracic Non-Cardiac Surgery	CPT	19272, 20101, 31770, 31775, 32096, 32097, 32100, 32110, 32120, 32124, 32140, 32141, 32151, 32200, 32215, 32220, 32225, 32310, 32320, 32440, 32442, 32445, 32480, 32482, 32484, 32486, 32488, 32491, 32501, 32503, 32504, 32505, 32506, 32507, 32540, 32553, 32607, 32608, 32609, 32651, 32652, 32655, 32662, 32663, 32666, 32667, 32668, 32669, 32670, 32671, 32672, 32800, 32815, 32905, 32906, 32940, 32960, 39000, 39010, 39200, 39220, 39501, 39545, 39560, 39561, 64746	Excision of chest wall tumor involving ribs, with plastic reconstruction; with mediastinal lymphadenectomy, Exploration of penetrating wound (separate procedure); chest, Bronchoplasty; graft repair, Bronchoplasty; excision stenosis and anastomosis, Thoracotomy, with diagnostic biopsy(ies) of lung infiltrate(s) (eg, wedge, incisional), unilateral, Thoracotomy, with diagnostic biopsy(ies) of lung nodule(s) or mass(es) (eg, wedge, incisional), unilateral, Thoracotomy; with exploration, Thoracotomy; with control of traumatic hemorrhage and/or repair of lung tear, Thoracotomy; for postoperative complications, Thoracotomy; with open intrapleural pneumonolysis, Thoracotomy; with cyst(s) removal, includes pleural procedure when performed, Thoracotomy; with resection-plication of bullae, includes any pleural procedure when performed, Thoracotomy; with removal of intrapulmonary foreign body, Pneumonostomy, with open drainage of abscess or cyst, Pleural scarification for repeat pneumothorax, Decortication, pulmonary (separate procedure); total, Decortication, pulmonary (separate procedure); partial, Pleurectomy, parietal (separate procedure), Decortication and parietal pleurectomy, Removal of lung, pneumonectomy;, Removal of lung, pneumonectomy; with resection of segment of trachea followed by broncho-tracheal anastomosis (sleeve pneumonectomy), Removal of lung, pneumonectomy; extrapleural, Removal of lung, other than pneumonectomy; single lobe (lobectomy), Removal of lung, other than pneumonectomy; 2 lobes (bilobectomy), Removal of lung, other than pneumonectomy; single segment (segmentectomy), Removal of lung, other than pneumonectomy; with circumferential resection of segment of bronchus followed by broncho-bronchial anastomosis (sleeve lobectomy), Removal of lung, other than pneumonectomy; with all remaining lung following previous removal of a portion of lung (completion pneumonectomy), Removal of lung, other than pneumonectomy; with resection-plication of emphysematous lung(s) (bullous or non-bullous) for lung volume reduction, sternal split or transthoracic approach, includes any pleural procedure, when performed, Resection and repair of portion of bronchus (bronchoplasty) when performed at time of lobectomy or segmentectomy (List separately in addition to code for primary procedure), Resection of apical lung tumor (eg, Pancoast tumor), including chest wall resection, rib(s) resection(s), neurovascular dissection, when performed; without chest wall reconstruction(s), Resection of apical lung tumor (eg, Pancoast tumor), including chest wall resection, rib(s) resection(s), neurovascular dissection, when performed; with chest wall reconstruction, Thoracotomy; with therapeutic wedge resection (eg, mass, nodule), initial, Thoracotomy; with therapeutic wedge resection (eg, mass or nodule), each additional resection, ipsilateral (List separately in addition to code for primary procedure), Thoracotomy; with diagnostic wedge resection followed by anatomic lung resection (List separately in addition to code for primary procedure), Extrapleural enucleation of empyema (empyemectomy), Placement of interstitial device(s) for radiation therapy guidance (eg, fiducial markers, dosimeter), percutaneous, intrathoracic, single or multiple, Thoracoscopy; with diagnostic biopsy(ies) of lung infiltrate(s) (eg, wedge, incisional),

Precipitant	Code Type	Codes	Code Descriptions
			<p>unilateral, Thoracoscopy; with diagnostic biopsy(ies) of lung nodule(s) or mass(es) (eg, wedge, incisional), unilateral, Thoracoscopy; with biopsy(ies) of pleura, Thoracoscopy, surgical; with partial pulmonary decortication, Thoracoscopy, surgical; with total pulmonary decortication, including intrapleural pneumonolysis, Thoracoscopy, surgical; with resection-plication of bullae, includes any pleural procedure when performed, Thoracoscopy, surgical; with excision of mediastinal cyst, tumor, or mass, Thoracoscopy, surgical; with lobectomy (single lobe), Thoracoscopy, surgical; with therapeutic wedge resection (eg, mass, nodule), initial unilateral, Thoracoscopy, surgical; with therapeutic wedge resection (eg, mass or nodule), each additional resection, ipsilateral (List separately in addition to code for primary procedure), Thoracoscopy, surgical; with diagnostic wedge resection followed by anatomic lung resection (List separately in addition to code for primary procedure), Thoracoscopy, surgical; with removal of a single lung segment (segmentectomy), Thoracoscopy, surgical; with removal of two lobes (bilobectomy), Thoracoscopy, surgical; with removal of lung (pneumonectomy), Thoracoscopy, surgical; with resection-plication for emphysematous lung (bullous or non-bullous) for lung volume reduction (LVRS), unilateral includes any pleural procedure, when performed, Repair lung hernia through chest wall, Open closure of major bronchial fistula, Thoracoplasty, Schede type or extrapleural (all stages);, Thoracoplasty, Schede type or extrapleural (all stages); with closure of bronchopleural fistula, Pneumonolysis, extraperiosteal, including filling or packing procedures, Pneumothorax, therapeutic, intrapleural injection of air, Mediastinotomy with exploration, drainage, removal of foreign body, or biopsy; cervical approach, Mediastinotomy with exploration, drainage, removal of foreign body, or biopsy; transthoracic approach, including either transthoracic or median sternotomy, Resection of mediastinal cyst, Resection of mediastinal tumor, Repair, laceration of diaphragm, any approach, Imbrication of diaphragm for eventration, transthoracic or transabdominal, paralytic or nonparalytic, Resection, diaphragm; with simple repair (eg, primary suture), Resection, diaphragm; with complex repair (eg, prosthetic material, local muscle flap), Transection or avulsion of; phrenic nerve</p>
Non-Cardiac Surgery	CPT	33875, 33877, 34830, 34831, 34832, 35081, 35082, 35091, 35092, 35102, 35103, 11752, 23900, 23920, 24900, 24920, 24930, 24931, 25900, 25905, 25909, 25920, 25922, 25924, 25927, 25929, 25931, 26551, 26910, 26951, 26952, 27290, 27295, 27590, 27591, 27592, 27598, 27880, 27882, 27884, 27886, 27888, 27889, 28800, 28805, 28810, 28820, 28825, 44900, 44950, 44955, 44960, 44970, 44979, 36800, 36810, 36815, 36818, 36819, 36820, 36821, 36825, 36830,	<p>Descending thoracic aorta graft, with or without bypass, Repair of thoracoabdominal aortic aneurysm with graft, with or without cardiopulmonary bypass, Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; tube prosthesis, Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; aorto-bi-iliac prosthesis, Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; aorto-bifemoral prosthesis, Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta, Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta, Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta involving visceral vessels (mesenteric, celiac, renal), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta involving visceral vessels (mesenteric, celiac, renal), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta involving iliac vessels (common, hypogastric, external), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta involving iliac vessels (common, hypogastric, external), Excision of nail and nail matrix, partial or complete (e.g., ingrown or deformed nail), for permanent removal; with amputation of tuft of distal phalanx, Interthoracoscaphular amputation (forequarter), Disarticulation of shoulder, Amputation, arm through humerus; with primary closure, Amputation, arm through humerus; open, circular (guillotine), Amputation, arm through humerus; re-amputation, Amputation, arm through humerus; with implant,</p>

Precipitant	Code Type	Codes	Code Descriptions
		36832, 36833, 36838, 47010, 47015, 47100, 47120, 47122, 47125, 47130, 47140, 47141, 47142, 47300, 47350, 47360, 47361, 47362, 47370, 47371, 47379, 47380, 47381, 47400, 47420, 47425, 47460, 47560, 47561, 47700, 47701, 47711, 47712, 47715, 47760, 47765, 47780, 47785, 47800, 47802, 47900, 48000, 48001, 48020, 48100, 48105, 48120, 48140, 48145, 48146, 48148, 48150, 48152, 48153, 48154, 48155, 48160, 48500, 48510, 48520, 48540, 48545, 48548, 11970, 19101, 19110, 19112, 19120, 19125, 19126, 19300, 19301, 19302, 19303, 19304, 19305, 19306, 19307, 19316, 19318, 19324, 19325, 19328, 19330, 19340, 19342, 19350, 19355, 19357, 19361, 19364, 19366, 19367, 19368, 19369, 19370, 19371, 19380, 35301, 35390, 47480, 47562, 47563, 47564, 47570, 47600, 47605, 47610, 47612, 47620, 47720, 47721, 47740, 47741, 44025, 44110, 44111, 44130, 44137, 44139, 44140, 44141, 44143, 44144, 44145, 44146, 44147, 44150, 44151,	Amputation, forearm, through radius and ulna, Amputation, forearm, through radius and ulna; open, circular (guillotine), Amputation, forearm, through radius and ulna; re-amputation, Disarticulation through wrist, Disarticulation through wrist; secondary closure or scar revision, Disarticulation through wrist; re-amputation, Transmetacarpal amputation, Transmetacarpal amputation; secondary closure or scar revision, Transmetacarpal amputation; re-amputation, Transfer, toe-to-hand with microvascular anastomosis; great toe wrap-around with bone graft, Amputation, metacarpal, with finger or thumb (ray amputation), single, with or without interosseous transfer, Amputation, finger or thumb, primary or secondary, any joint or phalanx, single, including neurectomies; with direct closure, Amputation, finger or thumb, primary or secondary, any joint or phalanx, single, including neurectomies; with local advancement flaps (V-Y, hood), Interpelviabdominal amputation (hindquarter amputation), Disarticulation of hip, Amputation, thigh, through femur, any level, Amputation, thigh, through femur, any level; immediate fitting technique including first cast, Amputation, thigh, through femur, any level; open, circular (guillotine), Disarticulation at knee, Amputation, leg, through tibia and fibula, Amputation, leg, through tibia and fibula; open, circular (guillotine), Amputation, leg, through tibia and fibula; secondary closure or scar revision, Amputation, leg, through tibia and fibula; re-amputation, Amputation, ankle, through malleoli of tibia and fibula (e.g., Syme, Pirogoff type procedures), with plastic closure and resection of nerves, Ankle disarticulation, Amputation, foot; midtarsal (e.g., Chopart type procedure), Amputation, foot; transmetatarsal, Amputation, metatarsal, with toe, single, Amputation, toe; metatarsophalangeal joint, Amputation, toe; interphalangeal joint, Incision and drainage of appendiceal abscess; open, Appendectomy, Appendectomy; when done for indicated purpose at time of other major procedure (not as separate procedure) (List separately in addition to code for primary procedure), Appendectomy; for ruptured appendix with abscess or generalized peritonitis, Laparoscopy, surgical, appendectomy, Unlisted laparoscopy procedure, appendix, Insertion of cannula for hemodialysis, other purpose (separate procedure); vein to vein, Insertion of cannula for hemodialysis, other purpose (separate procedure); arteriovenous, external (Scribner type), Insertion of cannula for hemodialysis, other purpose (separate procedure); arteriovenous, external revision, or closure, Arteriovenous anastomosis, open; by upper arm cephalic vein transposition, Arteriovenous anastomosis, open; by upper arm basilic vein transposition, Arteriovenous anastomosis, open; by forearm vein transposition, Arteriovenous anastomosis, open; direct, any site (e.g., Cimino type) (separate procedure), Creation of arteriovenous fistula by other than direct arteriovenous anastomosis (separate procedure); autogenous graft, Creation of arteriovenous fistula by other than direct arteriovenous anastomosis (separate procedure); nonautogenous graft (eg, biological collagen, thermoplastic graft), Revision, open, arteriovenous fistula; without thrombectomy, autogenous or nonautogenous dialysis graft (separate procedure), Revision, open, arteriovenous fistula; with thrombectomy, autogenous or nonautogenous dialysis graft (separate procedure), Distal revascularization and interval ligation (DRIL), upper extremity hemodialysis access (steal syndrome), Hepatotomy; for open drainage of abscess or cyst, 1 or 2 stages, Laparotomy, with aspiration and/or injection of hepatic parasitic (eg, amoebic or echinococcal) cyst(s) or abscess(es), Biopsy of liver, wedge, Hepatectomy, resection of liver; partial lobectomy, Hepatectomy, resection of liver; trisegmentectomy, Hepatectomy, resection of liver; total left lobectomy, Hepatectomy, resection of liver; total right lobectomy, Donor hepatectomy (including cold preservation), from living donor; left lateral segment only (segments II and III), Donor hepatectomy (including cold preservation), from living donor; total left lobectomy (segments II, III and IV), Donor hepatectomy (including cold preservation), from living donor; total right lobectomy (segments V, VI, VII and VIII), Marsupialization of cyst or abscess of liver, Management of liver hemorrhage; simple suture of liver wound or injury, Management of liver hemorrhage; complex suture of liver wound or injury, with or without hepatic artery ligatio, Management of liver hemorrhage; exploration of hepatic wound, extensive debridement, coagulation and/or suture, with or without packing of liver, Management of liver hemorrhage; re-exploration of hepatic wound for removal of packing, Laparoscopy, surgical, ablation of 1 or more liver tumor(s); radiofrequency, Laparoscopy, surgical, ablation of

Precipitant	Code Type	Codes	Code Descriptions
		44155, 44156, 44157, 44158, 44160, 44188, 44204, 44205, 44206, 44207, 44208, 44210, 44211, 44212, 44213, 44227, 44320, 44322, 44340, 44345, 44346, 44604, 44605, 44620, 44625, 44626, 57307, 0169T, 61105, 61107, 61108, 61120, 61140, 61150, 61151, 61154, 61156, 61210, 61250, 61253, 61304, 61305, 61312, 61313, 61314, 61315, 61320, 61321, 61322, 61323, 61330, 61332, 61333, 61340, 61343, 61345, 61458, 61460, 61480, 61510, 61512, 61514, 61516, 61518, 61519, 61520, 61521, 61522, 61524, 61526, 61530, 61531, 61533, 61534, 61535, 61536, 61537, 61538, 61539, 61540, 61541, 61543, 61544, 61545, 61546, 61548, 61566, 61567, 61570, 61571, 61575, 61576, 61580, 61581, 61582, 61583, 61584, 61585, 61586, 61590, 61591, 61592, 61595, 61598, 61600, 61601, 61605, 61606, 61607, 61608, 61610, 61612, 61615, 61616, 61618, 61619, 61680, 61682, 61684, 61686, 61690, 61692, 61697, 61698, 61700, 61702, 61703, 61705, 61708,	1 or more liver tumor(s); cryosurgical, Unlisted laparoscopic procedure, liver, Ablation, open, of 1 or more liver tumor(s); radiofrequency, Ablation, open, of 1 or more liver tumor(s); cryosurgical, Hepaticotomy or hepaticostomy with exploration, drainage, or removal of calculus, Choledochotomy or choledochostomy with exploration, drainage, or removal of calculus, with or without cholecystotomy; without transduodenal sphincterotomy or sphincteroplasty, Choledochotomy or choledochostomy with exploration, drainage, or removal of calculus, with or without cholecystotomy; with transduodenal sphincterotomy or sphincteroplasty, Transduodenal sphincterotomy or sphincteroplasty, with or without transduodenal extraction of calculus (separate procedure), Laparoscopy, surgical; with guided transhepatic cholangiography, without biopsy, Laparoscopy, surgical; with guided transhepatic cholangiography with biopsy, Exploration for congenital atresia of bile ducts, without repair, with or without liver biopsy, with or without cholangiography, Portoenterostomy (eg, Kasai procedure), Excision of bile duct tumor, with or without primary repair of bile duct; extrahepatic, Excision of bile duct tumor, with or without primary repair of bile duct; intrahepatic, Excision of choledochal cyst, Anastomosis, of extrahepatic biliary ducts and gastrointestinal tract, Anastomosis, of intrahepatic ducts and gastrointestinal tract, Anastomosis, Roux-en-Y, of extrahepatic biliary ducts and gastrointestinal tract, Anastomosis, Roux-en-Y, of intrahepatic biliary ducts and gastrointestinal tract, Reconstruction, plastic, of extrahepatic biliary ducts with end-to-end anastomosis, U-tube hepaticoenterostomy, Suture of extrahepatic biliary duct for pre-existing injury (separate procedure), Placement of drains, peripancreatic, for acute pancreatitis;, Placement of drains, peripancreatic, for acute pancreatitis; with cholecystostomy, gastrostomy, and jejunostomy, Removal of pancreatic calculus, Biopsy of pancreas, open (eg, fine needle aspiration, needle core biopsy, wedge biopsy), Resection or debridement of pancreas and peripancreatic tissue for acute necrotizing pancreatitis, Excision of lesion of pancreas (eg, cyst, adenoma), Pancreatectomy, distal subtotal, with or without splenectomy; without pancreaticojejunostomy, Pancreatectomy, distal subtotal, with or without splenectomy; with pancreaticojejunostomy, Pancreatectomy, distal, near-total with preservation of duodenum (Child-type procedure), Excision of ampulla of Vater, Pancreatectomy, proximal subtotal with total duodenectomy, partial gastrectomy, choledochenterostomy and gastrojejunostomy (Whipple-type procedure); with pancreaticojejunostomy, Pancreatectomy, proximal subtotal with total duodenectomy, partial gastrectomy, choledochenterostomy and gastrojejunostomy (Whipple-type procedure); without pancreaticojejunostomy, Pancreatectomy, proximal subtotal with near-total duodenectomy, choledochenterostomy and duodenojejunostomy (pylorus-sparing, Whipple-type procedure); with pancreaticojejunostomy, Pancreatectomy, proximal subtotal with near-total duodenectomy, choledochenterostomy and duodenojejunostomy (pylorus-sparing, Whipple-type procedure); without pancreaticojejunostomy, Pancreatectomy, total, Pancreatectomy, total or subtotal, with autologous transplantation of pancreas or pancreatic islet cells, Marsupialization of pancreatic cyst, External drainage, pseudocyst of pancreas; open, Internal anastomosis of pancreatic cyst to gastrointestinal tract; direct, Internal anastomosis of pancreatic cyst to gastrointestinal tract; Roux-en-Y, Pancreatorrhaphy for injury, Pancreaticojejunostomy, side-to-side anastomosis (Puestow-type operation), Removal of tissue expander(s) without insertion of prosthesis removal of tissue expander(s) with insertion of prosthesis, Biopsy of breast; open, incisional, Nipple exploration, with or without excision of a solitary lactiferous duct or a papilloma lactiferous duct, Excision of lactiferous duct fistula, Excision of cyst, fibroadenoma, or other benign or malignant tumor, aberrant breast tissue, duct lesion, nipple or areolar lesion (except 19300), open, male or female, 1 or more lesions, Excision of breast lesion identified by pre-operative placement of radiological marker, open, single lesion, Excision of breast lesion identified by pre-operative placement of radiological marker, open, single lesion; each additional lesion separately identified by a preoperative radiological marker (list separately in addition to code for primary procedures) excision of breast lesion identified by pre-operative placement of radiological marker, open, single lesion, Mastectomy for gynecomastia, Mastectomy, partial (eg, lumpectomy, tylectomy, quadrantectomy, segmentectomy);, Mastectomy, partial (eg, lumpectomy, tylectomy, quadrantectomy, segmentectomy); with axillary lymphadenectomy, Mastectomy, simple,

Precipitant	Code Type	Codes	Code Descriptions
		61710, 61711, 61720, 61735, 61750, 61751, 61760, 61770, 61850, 61860, 61863, 61867, 61870, 61875, 61880, 61886, 61888, 62000, 62005, 62010, 62100, 62120, 62121, 62161, 62163, 62164, 62165, 59100, 59510, 59514, 59515, 59618, 59620, 59622, 59857, 0195T, 0196T, 22532, 22533, 22548, 22551, 22554, 22556, 22558, 22586, 22590, 22595, 22600, 22610, 22612, 22630, 22633, 22800, 22802, 22804, 22808, 22810, 22812, 27280, 23615, 23616, 23630, 23670, 23680, 24515, 24516, 24545, 24546, 24575, 24579, 24586, 24587, 24635, 24665, 24666, 24685, 25337, 25515, 25525, 25526, 25545, 25574, 25575, 25607, 25608, 25609, 25652, 27177, 27178, 27179, 27181, 27244, 27245, 27248, 27254, 27269, 27506, 27507, 27511, 27513, 27514, 27519, 27535, 27536, 27540, 27758, 27759, 27766, 27769, 27784, 27792, 27814, 27822, 27823, 27826, 27827, 27828, 27829, 43117, 43118, 43121, 43122, 43280, 43320, 43325, 43327, 43328, 43360, 43500,	complete, Mastectomy, subcutaneous, Mastectomy, radical, including pectoral muscles, axillary lymph nodes, Mastectomy, radical, including pectoral muscles, axillary and internal mammary lymph nodes (Urban type operation), Mastectomy, modified radical, including axillary lymph nodes, with or without pectoralis minor muscle, but excluding pectoralis major muscle, Mastopexy, Reduction mammoplasty, Mammoplasty, augmentation; without prosthetic implant, Mammoplasty, augmentation; with prosthetic implant, Removal of intact mammary implant, Removal of mammary implant material, Immediate insertion of breast prosthesis following mastopexy, mastectomy or in reconstruction, Delayed insertion of breast prosthesis following mastopexy, mastectomy or in reconstruction, Nipple/areola reconstruction, Correction of inverted nipples, Breast reconstruction, immediate or delayed, with tissue expander, including subsequent expansion, Breast reconstruction with latissimus dorsi flap, without prosthetic implant, Breast reconstruction with free flap, Breast reconstruction with other technique, Breast reconstruction with transverse rectus abdominis myocutaneous flap (TRAM), single pedicle, including closure of donor site, Breast reconstruction with transverse rectus abdominis myocutaneous flap (TRAM), single pedicle, including closure of donor site; with microvascular anastomosis (supercharging), Breast reconstruction with transverse rectus abdominis myocutaneous flap (TRAM), double pedicle, including closure of donor site, Open periprosthetic capsulotomy, breast, Periprosthetic capsulotomy, breast, Revision of reconstructed breast, Thromboendarterectomy, including patch graft, if performed; carotid, vertebral, subclavian, by neck incision, Reoperation, carotid, thromboendarterectomy, more than 1 month after original operation (List separately in addition to code for primary procedure), Cholecystotomy or cholecystostomy, open, with exploration, drainage, or removal of calculus (separate procedure), Laparoscopy, surgical; cholecystectomy, Laparoscopy, surgical; cholecystectomy with cholangiography, Laparoscopy, surgical; cholecystectomy with exploration of common duct, Laparoscopy, surgical; cholecystoenterostomy, Cholecystectomy, Cholecystectomy; with cholangiography, Cholecystectomy with exploration of common duct, Cholecystectomy with exploration of common duct; with choledochenterostomy, Cholecystectomy with exploration of common duct; with transduodenal sphincterotomy or sphincteroplasty, with or without cholangiography, Cholecystoenterostomy; direct, Cholecystoenterostomy; with gastroenterostomy, Cholecystoenterostomy; Roux-en-Y, Cholecystoenterostomy; Roux-en-Y with gastroenterostomy, Colotomy, for exploration, biopsy(s), or foreign body removal, Excision of 1 or more lesions of small or large intestine not requiring anastomosis, exteriorization, or fistulization; single enterotomy, Excision of 1 or more lesions of small or large intestine not requiring anastomosis, exteriorization, or fistulization; multiple enterotomies, Enteroenterostomy, anastomosis of intestine, with or without cutaneous enterostomy (separate procedure), Removal of transplanted intestinal allograft, complete, Mobilization (take-down) of splenic flexure performed in conjunction with partial colectomy (List separately in addition to primary procedure), Colectomy, partial; with anastomosis, Colectomy, partial; with skin level cecostomy or colostomy, Colectomy, partial; with end colostomy and closure of distal segment (Hartmann type procedure), Colectomy, partial; with resection, with colostomy or ileostomy and creation of mucofistula, Colectomy, partial; with coloproctostomy (low pelvic anastomosis), Colectomy, partial; with coloproctostomy (low pelvic anastomosis), with colostomy, Colectomy, partial; abdominal and transanal approach, Colectomy, total, abdominal, without proctectomy; with ileostomy or ileoproctostomy, Colectomy, total, abdominal, without proctectomy; with continent ileostomy, Colectomy, total, abdominal, with proctectomy; with ileostomy, Colectomy, total, abdominal, with proctectomy; with continent ileostomy, Colectomy, total, abdominal, with proctectomy; with ileoanal anastomosis, includes loop ileostomy, and rectal mucosectomy, when performed, Colectomy, total, abdominal, with proctectomy; with ileoanal anastomosis, creation of ileal reservoir (S or J), includes loop ileostomy, and rectal mucosectomy, when performed, Colectomy, partial, with removal of terminal ileum with ileocolostomy, Laparoscopy, surgical, colostomy or skin level cecostomy, Laparoscopy, surgical; colectomy, partial, with anastomosis, Laparoscopy, surgical; colectomy, partial, with removal of terminal ileum with ileocolostomy,

Precipitant	Code Type	Codes	Code Descriptions
		43501, 43502, 43520, 43605, 43610, 43611, 43620, 43621, 43622, 43631, 43632, 43633, 43634, 43640, 43641, 43644, 43645, 43770, 43771, 43772, 43773, 43774, 43775, 43800, 43810, 43820, 43825, 43840, 43842, 43843, 43845, 43846, 43847, 43848, 43850, 43855, 43860, 43865, 43870, 43880, 43886, 43887, 43888, 11008, 49491, 49492, 49495, 49496, 49500, 49501, 49505, 49507, 49520, 49521, 49525, 49550, 49553, 49555, 49557, 49560, 49561, 49565, 49566, 49570, 49572, 49580, 49582, 49585, 49587, 49590, 49600, 49605, 49606, 49610, 49611, 49650, 49651, 49652, 49653, 49654, 49655, 49656, 49657, 49659, 27125, 27130, 27132, 27134, 27137, 27138, 27236, 33945, 58150, 58152, 58180, 58200, 58210, 58240, 58541, 58542, 58543, 58544, 58548, 58570, 58571, 58572, 58573, 58951, 58953, 58954, 58956, 59525, 27438, 27440, 27441, 27442, 27443, 27445, 27446, 27447, 27486, 27487, 50340, 50360, 50365, 50380, 0171T, 0202T, 0219T,	Laparoscopy, surgical; colectomy, partial, with end colostomy and closure of distal segment (Hartmann type procedure), Laparoscopy, surgical; colectomy, partial, with anastomosis, with coloproctostomy (low pelvic anastomosis), Laparoscopy, surgical; colectomy, partial, with anastomosis, with coloproctostomy (low pelvic anastomosis) with colostomy, Laparoscopy, surgical; colectomy, total, abdominal, without proctectomy, with ileostomy or ileoproctostomy, Laparoscopy, surgical; colectomy, total, abdominal, with proctectomy, with ileoanal anastomosis, creation of ileal reservoir (S or J), with loop ileostomy, includes rectal mucosectomy, when performed, Laparoscopy, surgical; colectomy, total, abdominal, with proctectomy, with ileostomy, Laparoscopy, surgical, mobilization (take-down) of splenic flexure performed in conjunction with partial colectomy (List separately in addition to primary procedure), Laparoscopy, surgical, closure of enterostomy, large or small intestine, with resection and anastomosis, Colostomy or skin level cecostomy, Colostomy or skin level cecostomy; with multiple biopsies (eg, for congenital megacolon) (separate procedure), Revision of colostomy; simple (release of superficial scar) (separate procedure), Revision of colostomy; complicated (reconstruction in-depth) (separate procedure), Revision of colostomy; with repair of paracolostomy hernia (separate procedure), Suture of large intestine (colorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture (single or multiple perforations); without colostomy, Suture of large intestine (colorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture (single or multiple perforations); with colostomy, Closure of enterostomy, large or small intestine, Closure of enterostomy, large or small intestine; with resection and anastomosis other than colorectal, Closure of enterostomy, large or small intestine; with resection and colorectal anastomosis (eg, closure of Hartmann type procedure), Closure of rectovaginal fistula; abdominal approach, with concomitant colostomy, Stereotactic placement of infusion catheter(s) in the brain for delivery of therapeutic agent(s), including computerized stereotactic planning and burr hole(s), Twist drill hole for subdural or ventricular puncture, Twist drill hole(s) for subdural, intracerebral, or ventricular puncture; for implanting ventricular catheter, pressure recording device, or other intracerebral monitoring device, Twist drill hole(s) for subdural, intracerebral, or ventricular puncture; for evacuation and/or drainage of subdural hematoma, Burr hole(s) for ventricular puncture (including injection of gas, contrast media, dye, or radioactive material), Burr hole(s) or trephine; with biopsy of brain or intracranial lesion, Burr hole(s) or trephine; with drainage of brain abscess or cyst, Burr hole(s) or trephine; with subsequent tapping (aspiration) of intracranial abscess or cyst, Burr hole(s) with evacuation and/or drainage of hematoma, extradural or subdural, Burr hole(s); with aspiration of hematoma or cyst, intracerebral, Burr hole(s); for implanting ventricular catheter, reservoir, EEG electrode(s), pressure recording device, or other cerebral monitoring device (separate procedure), Burr hole(s) or trephine, supratentorial, exploratory, not followed by other surgery, Burr hole(s) or trephine, infratentorial, unilateral or bilateral, Craniectomy or craniotomy, exploratory; supratentorial, Craniectomy or craniotomy, exploratory; infratentorial (posterior fossa), Craniectomy or craniotomy for evacuation of hematoma, supratentorial; extradural or subdural, Craniectomy or craniotomy for evacuation of hematoma, supratentorial; intracerebral, Craniectomy or craniotomy for evacuation of hematoma, infratentorial; extradural or subdural, Craniectomy or craniotomy for evacuation of hematoma, infratentorial; intracerebellar, Craniectomy or craniotomy, drainage of intracranial abscess; supratentorial, Craniectomy or craniotomy, drainage of intracranial abscess; infratentorial, Craniectomy or craniotomy, decompressive, with or without duraplasty, for treatment of intracranial hypertension, without evacuation of associated intraparenchymal hematoma; without lobectomy, Craniectomy or craniotomy, decompressive, with or without duraplasty, for treatment of intracranial hypertension, without evacuation of associated intraparenchymal hematoma; with lobectomy, Decompression of orbit only, transcranial approach, Exploration of orbit (transcranial approach); with biopsy, Exploration of orbit (transcranial approach); with removal of lesion, Subtemporal cranial decompression (pseudotumor cerebri, slit ventricle syndrome), Craniectomy, suboccipital with cervical laminectomy for decompression of medulla and spinal cord, with or without dural graft (eg, Arnold-Chiari malformation), Other cranial decompression, posterior fossa, Craniectomy, suboccipital;

Precipitant	Code Type	Codes	Code Descriptions
		0220T, 0221T, 0375T, 22220, 22222, 22224, 22856, 22857, 22861, 22862, 62287, 62351, 63001, 63003, 63005, 63011, 63012, 63015, 63016, 63017, 63020, 63030, 63035, 63040, 63042, 63045, 63046, 63047, 63048, 63050, 63051, 63055, 63056, 63064, 63075, 63077, 63081, 63082, 63085, 63086, 63087, 63088, 63090, 63091, 63101, 63102, 63103, 63170, 63172, 63173, 63180, 63182, 63185, 63190, 63191, 63194, 63195, 63196, 63197, 63198, 47135, 47399, 31300, 31365, 31367, 31368, 31370, 31375, 31380, 31382, 31390, 31395, 31400, 31420, 31560, 31561, 31599, 38308, 38542, 38720, 38724, 41135, 41140, 41145, 41155, 42420, 42425, 42426, 69150, 69155, 50010, 50020, 50040, 50045, 50060, 50065, 50070, 50075, 50120, 50125, 50130, 50135, 50205, 50220, 50225, 50230, 50234, 50236, 50240, 50250, 50280, 50290, 50320, 50400, 50405, 50541, 50542, 50543, 50545, 50546, 50547, 50548, 50549, 58660, 58661, 58662, 58679, 58720, 58740,	for exploration or decompression of cranial nerves, Craniectomy, suboccipital; for exploration or decompression of cranial nerves for section of 1 or more cranial nerves, Craniectomy, suboccipital; for mesencephalic tractotomy or pedunculotomy, Craniectomy, trephination, bone flap craniotomy; for excision of brain tumor, supratentorial, except meningioma, Craniectomy, trephination, bone flap craniotomy; for excision of meningioma, supratentorial, Craniectomy, trephination, bone flap craniotomy; for excision of brain abscess, supratentorial, Craniectomy, trephination, bone flap craniotomy; for excision or fenestration of cyst, supratentorial, Craniectomy for excision of brain tumor, infratentorial or posterior fossa; except meningioma, cerebellopontine angle tumor, or midline tumor at base of skull, Craniectomy for excision of brain tumor, infratentorial or posterior fossa; meningioma, Craniectomy for excision of brain tumor, infratentorial or posterior fossa; cerebellopontine angle tumor, Craniectomy for excision of brain tumor, infratentorial or posterior fossa; midline tumor at base of skull, Craniectomy, infratentorial or posterior fossa; for excision of brain abscess, Craniectomy, infratentorial or posterior fossa; for excision or fenestration of cyst, Craniectomy, bone flap craniotomy, transtemporal (mastoid) for excision of cerebellopontine angle tumor, Craniectomy, bone flap craniotomy, transtemporal (mastoid) for excision of cerebellopontine angle tumor; combined with middle/posterior fossa craniotomy/craniectomy, Subdural implantation of strip electrodes through 1 or more burr or trephine hole(s) for long-term seizure monitoring, Craniotomy with elevation of bone flap; for subdural implantation of an electrode array, for long-term seizure monitoring, Craniotomy with elevation of bone flap; for excision of epileptogenic focus without electrocorticography during surgery, Craniotomy with elevation of bone flap; for removal of epidural or subdural electrode array, without excision of cerebral tissue (separate procedure), Craniotomy with elevation of bone flap; for excision of cerebral epileptogenic focus, with electrocorticography during surgery (includes removal of electrode array), Craniotomy with elevation of bone flap; for lobectomy, temporal lobe, without electrocorticography during surgery, Craniotomy with elevation of bone flap; for lobectomy, temporal lobe, with electrocorticography during surgery, Craniotomy with elevation of bone flap; for lobectomy, other than temporal lobe, partial or total, with electrocorticography during surgery, Craniotomy with elevation of bone flap; for lobectomy, other than temporal lobe, partial or total, without electrocorticography during surgery, Craniotomy with elevation of bone flap; for transection of corpus callosum, Craniotomy with elevation of bone flap; for partial or subtotal (functional) hemispherectomy, Craniotomy with elevation of bone flap; for excision or coagulation of choroid plexus, Craniotomy with elevation of bone flap; for excision of craniopharyngioma, Craniotomy for hypophysectomy or excision of pituitary tumor, intracranial approach, Hypophysectomy or excision of pituitary tumor, transnasal or transseptal approach, nonstereotactic, Craniotomy with elevation of bone flap; for selective amygdalohippocampectomy, Craniotomy with elevation of bone flap; for selective amygdalohippocampectomy for multiple subpial transections, with electrocorticography during surgery, Craniectomy or craniotomy; with excision of foreign body from brain, Craniectomy or craniotomy; with treatment of penetrating wound of brain, Transoral approach to skull base, brain stem or upper spinal cord for biopsy, decompression or excision of lesion, Transoral approach to skull base, brain stem or upper spinal cord for biopsy, decompression or excision of lesion; requiring splitting of tongue and/or mandible (including tracheostomy), Craniofacial approach to anterior cranial fossa; extradural, including lateral rhinotomy, ethmoidectomy, sphenoidectomy, without maxillectomy or orbital exenteration, Craniofacial approach to anterior cranial fossa; extradural, including lateral rhinotomy, orbital exenteration, ethmoidectomy, sphenoidectomy and/or maxillectomy, Craniofacial approach to anterior cranial fossa; extradural, including unilateral or bifrontal craniotomy, elevation of frontal lobe(s), osteotomy of base of anterior cranial fossa, Craniofacial approach to anterior cranial fossa; intradural, including unilateral or bifrontal craniotomy, elevation or resection of frontal lobe, osteotomy of base of anterior cranial fossa, Orbitocranial approach to anterior cranial fossa, extradural, including supraorbital ridge osteotomy and elevation of frontal and/or temporal lobe(s); without orbital exenteration, Orbitocranial approach to anterior cranial fossa, extradural, including supraorbital ridge osteotomy and elevation of frontal and/or temporal



Precipitant	Code Type	Codes	Code Descriptions
		58800, 58805, 58820, 58822, 58825, 58900, 58920, 58925, 58940, 58943, 58950, 58952, 58970, 33202, 33203, 33206, 33207, 33208, 33212, 33213, 33214, 33215, 33216, 33217, 33218, 33220, 33221, 33222, 33223, 33224, 33225, 33226, 33227, 33228, 33229, 33230, 33231, 33233, 33234, 33235, 33236, 33237, 33238, 33240, 33241, 33243, 33244, 33249, 33262, 33263, 33264, 33270, 33271, 33272, 33273, 55705, 55810, 55812, 55815, 55821, 55831, 55840, 55842, 55845, 55866, 35512, 35516, 35518, 35521, 35522, 35523, 35525, 35533, 35556, 35558, 35566, 35570, 35571, 35583, 35585, 35587, 35616, 35621, 35623, 35650, 35654, 35656, 35661, 35666, 35671, 35686, 45110, 45111, 45112, 45113, 45114, 45116, 45119, 45120, 45121, 45126, 45395, 45397, 45562, 45563, 43496, 44010, 44015, 44020, 44021, 44120, 44121, 44125, 44126, 44127, 44128, 44186, 44187, 44202, 44203, 44300, 44310, 44312, 44314, 44316, 44602, 44603, 44615, 44640,	lobe(s); with orbital exenteration, Bicoronal, transzygomatic and/or LeFort I osteotomy approach to anterior cranial fossa with or without internal fixation, without bone graft, Infratemporal pre-auricular approach to middle cranial fossa (parapharyngeal space, infratemporal and midline skull base, nasopharynx), with or without disarticulation of the mandible, including parotidectomy, craniotomy, decompression and/or mobilization of facial nerve and/or petrous cartoid artery, Infratemporal post-auricular approach to middle cranial fossa (internal auditory meatus, petrous apex, tentorium, cavernous sinus, parasellar area, infratemporal fossa) including mastoidectomy, resection of sigmoid sinus, with or without decompression and/or mobilization of contents of audiotory canal or petrous cartoid artery, Orbitocranial zygomatic approach to middle cranial fossa (cavernous sinus and carotid artery, clivus, basilar artery or petrous apex) including osteotomy of zygoma, craniotomy, extra- or intradural elevation of temporal lobe, Transtemporal approach to posterior cranial fossa, jugular foramen or midline skull base, including mastoidectomy, decompression of sigmoid sinus and/or facial nerve, with or without mobilization, Transpetrosal approach to posterior cranial fossa, clivus or foramen magnum, including ligation of superior petrosal sinus and/or sigmoid sinus, Resection or excision of neoplastic, vascular or infectious lesion of base of anterior cranial fossa; extradural, Resection or excision of neoplastic, vascular or infectious lesion of base of anterior cranial fossa; intradural, including dural repair, with or without graft, Resection or excision of neoplastic, vascular or infectious lesion of infratemporal fossa, parapharyngeal space, petrous apex; extradural, Resection or excision of neoplastic, vascular or infectious lesion of infratemporal fossa, parapharyngeal space, petrous apex; intradural, including dural repair, with or without graft, Resection or excision of neoplastic, vascular or infectious lesion of parasellar area, cavernous sinus, clivus or midline skull base; extradural, Resection or excision of neoplastic, vascular or infectious lesion of parasellar area, cavernous sinus, clivus or midline skull base; intradural, including dural repair, with or without graft, Transection or ligation, carotid artery in cavernous sinus; with repair by anastomosis or graft (List separately in addition to code for primary procedure), Transection or ligation, carotid artery in petrous canal; with repair by anastomosis or graft (List separately in addition to code for primary procedure), Resection or excision of neoplastic, vascular or infectious lesion of base of posterior cranial fossa, jugular foramen, foramen magnum, or C1-C3 vertebral bodies; extradural, Resection or excision of neoplastic, vascular or infectious lesion of base of posterior cranial fossa, jugular foramen, foramen magnum, or C1-C3 vertebral bodies; intradural, including dural repair, with or without graft, Secondary repair of dura for cerebrospinal fluid leak, anterior, middle or posterior cranial fossa following surgery of the skull base; by free tissue graft (eg, pericranium, fascia, tensor fascia lata, adipose tissue, homologous or synthetic grafts), Secondary repair of dura for cerebrospinal fluid leak, anterior, middle or posterior cranial fossa following surgery of the skull base; by local or regionalized vascularized pedicle flap or myocutaneous flap (including galea, temporalis, frontalis or occipitalis muscle), Surgery of intracranial arteriovenous malformation; supratentorial, simple, Surgery of intracranial arteriovenous malformation; supratentorial, complex, Surgery of intracranial arteriovenous malformation; infratentorial, simple, Surgery of intracranial arteriovenous malformation; infratentorial, complex, Surgery of intracranial arteriovenous malformation; dural, simple, Surgery of intracranial arteriovenous malformation; dural, complex, Surgery of complex intracranial aneurysm, intracranial approach; carotid circulation, Surgery of complex intracranial aneurysm, intracranial approach; vertebrobasilar circulation, Surgery of simple intracranial aneurysm, intracranial approach; carotid circulation, Surgery of simple intracranial aneurysm, intracranial approach; vertebrobasilar circulation, Surgery of intracranial aneurysm, cervical approach by application of occluding clamp to cervical carotid artery (Selverstone-Crutchfield type), Surgery of aneurysm, vascular malformation or carotid-cavernous fistula; by intracranial and cervical occlusion of carotid artery, Surgery of aneurysm, vascular malformation or carotid-cavernous fistula; by intracranial electrothrombosis, Surgery of aneurysm, vascular malformation or carotid-cavernous fistula; by intra-arterial embolization, injection procedure, or balloon catheter, Anastomosis, arterial, extracranial-intracranial (eg, middle cerebral/cortical) arteries, Creation of lesion by stereotactic method, including burr

Precipitant	Code Type	Codes	Code Descriptions
		44650, 44800, 45136, 38100, 38101, 38102, 38115, 38120, 38200, 60000, 60200, 60210, 60212, 60220, 60225, 60240, 60252, 60254, 60260, 60270, 60271, 60280, 60281, 60500, 60502, 60505, 60512, 51925, 58260, 58262, 58263, 58267, 58270, 58275, 58280, 58285, 58290, 58291, 58292, 58293, 58294, 58550, 58552, 58553, 58554, 62160, 62180, 62190, 62192, 62194, 62200, 62201, 62220, 62223, 62225, 62230, 62256, 62258, 20102, 35840, 39503, 39540, 39541, 43332, 43333, 44005, 44180, 44700, 44820, 44850, 49000, 49002, 49010, 49020, 49040, 49060, 49203, 49204, 49205, 49215, 49220, 49250, 49255, 49320, 49321, 49324, 49325, 49326, 49402, 49412, 49419, 49421, 49425, 49426, 49900, 49905, 49906, 58960	<p>hole(s) and localizing and recording techniques, single or multiple stages; globus pallidus or thalamus, Creation of lesion by stereotactic method, including burr hole(s) and localizing and recording techniques, single or multiple stages; subcortical structure(s) other than globus pallidus or thalamus, Stereotactic biopsy, aspiration, or excision, including burr hole(s), for intracranial lesion, Stereotactic biopsy, aspiration, or excision, including burr hole(s), for intracranial lesion; with computed tomography and/or magnetic resonance guidance, Stereotactic implantation of depth electrodes into the cerebrum for long-term seizure monitoring, Stereotactic localization, including burr hole(s), with insertion of catheter(s) or probe(s) for placement of radiation source, Twist drill or burr hole(s) for implantation of neurostimulator electrodes, cortical, Craniectomy or craniotomy for implantation of neurostimulator electrodes, cerebral, cortical, Twist drill, burr hole, craniotomy, or craniectomy with stereotactic implantation of neurostimulator electrode array in subcortical site (eg, thalamus, globus pallidus, subthalamic nucleus, periventricular, periaqueductal gray), without use of intraoperative microelectrode recording; first array, Twist drill, burr hole, craniotomy, or craniectomy with stereotactic implantation of neurostimulator electrode array in subcortical site (eg, thalamus, globus pallidus, subthalamic nucleus, periventricular, periaqueductal gray), with use of intraoperative microelectrode recording; first array, Craniectomy for implantation of neurostimulator electrodes, cerebellar; cortical, Craniectomy for implantation of neurostimulator electrodes, cerebellar; subcortical, Revision or removal of intracranial neurostimulator electrodes, Insertion or replacement of cranial neurostimulator pulse generator or receiver, direct or inductive coupling; with connection to 2 or more electrode arrays, Revision or removal of cranial neurostimulator pulse generator or receiver, Elevation of depressed skull fracture; simple, extradural, Elevation of depressed skull fracture; compound or comminuted, extradural, Elevation of depressed skull fracture; with repair of dura and/or debridement of brain, Craniotomy for repair of dural/cerebrospinal fluid leak, including surgery for rhinorrhea/otorrhea, Repair of encephalocele, skull vault, including cranioplasty, Craniotomy for repair of encephalocele, skull base, Neuroendoscopy, intracranial; with dissection of adhesions, fenestration of septum pellucidum or intraventricular cysts (including placement, replacement, or removal of ventricular catheter), Neuroendoscopy, intracranial; with retrieval of foreign body, Neuroendoscopy, intracranial; with excision of brain tumor, including placement of external ventricular catheter for drainage, Neuroendoscopy, intracranial; with excision of pituitary tumor, transnasal or trans-sphenoidal approach, Hysterotomy, abdominal (e.g., for hydatidiform mole, abortion), Routine obstetric care including antepartum care, cesarean delivery, and postpartum care, Cesarean delivery only, Cesarean delivery only; including postpartum care, Routine obstetric care including antepartum care, cesarean delivery, and postpartum care, following attempted vaginal delivery after previous cesarean delivery, Cesarean delivery only, following attempted vaginal delivery after previous cesarean delivery, Cesarean delivery only, following attempted vaginal delivery after previous cesarean delivery; including postpartum care, Induced abortion, by 1 or more vaginal suppositories (e.g., prostaglandin) with or without cervical dilation (e.g., laminaria), including hospital admission and visits, delivery of fetus and secundines; with hysterotomy (failed medical evacuation), Arthrodesis, pre-sacral interbody technique, disc space preparation, discectomy, without instrumentation, with image guidance, includes bone graft when performed; L5-S1 interspace, Arthrodesis, pre-sacral interbody technique, disc space preparation, discectomy, without instrumentation, with image guidance, includes bone graft when performed; L4-L5 interspace (List separately in addition to code for primary procedure), Arthrodesis, lateral extracavitary technique, including minimal discectomy to prepare interspace (other than for decompression); thoracic, Arthrodesis, lateral extracavitary technique, including minimal discectomy to prepare interspace (other than for decompression); lumbar, Arthrodesis, anterior transoral or extraoral technique, clivus-C1-C2 (atlas-axis), with or without excision of odontoid process, Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophyctomy and decompression of spinal cord and/or nerve roots; cervical below C2, Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); cervical below C2, Arthrodesis, anterior interbody technique, including minimal discectomy to</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>prepare interspace (other than for decompression); thoracic, Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); lumbar, Arthrodesis, pre-sacral interbody technique, including disc space preparation, discectomy, with posterior instrumentation, with image guidance, includes bone graft when performed, L5-S1 interspace, Arthrodesis, posterior technique, craniocervical (occiput-C2), Arthrodesis, posterior technique, atlas-axis (C1-C2), Arthrodesis, posterior or posterolateral technique, single level; cervical below C2 segment, Arthrodesis, posterior or posterolateral technique, single level; thoracic (with lateral transverse technique, when performed), Arthrodesis, posterior or posterolateral technique, single level; lumbar (with lateral transverse technique, when performed), Arthrodesis, posterior interbody technique, including laminectomy and/or discectomy to prepare interspace (other than for decompression), single interspace; lumbar, Arthrodesis, combined posterior or posterolateral technique with posterior interbody technique including laminectomy and/or discectomy sufficient to prepare interspace (other than for decompression), single interspace and segment; lumbar, Arthrodesis, posterior, for spinal deformity, with or without cast; up to 6 vertebral segments, Arthrodesis, posterior, for spinal deformity, with or without cast; 7 to 12 vertebral segments, Arthrodesis, posterior, for spinal deformity, with or without cast; 13 or more vertebral segments, Arthrodesis, anterior, for spinal deformity, with or without cast; 2 to 3 vertebral segments, Arthrodesis, anterior, for spinal deformity, with or without cast; 4 to 7 vertebral segments, Arthrodesis, anterior, for spinal deformity, with or without cast; 8 or more vertebral segments, Arthrodesis, sacroiliac joint (including obtaining graft), Open treatment of proximal humeral (surgical or anatomical neck) fracture, includes internal fixation, when performed, includes repair of tuberosity(s), when performed, Open treatment of proximal humeral (surgical or anatomical neck) fracture, includes internal fixation, when performed, includes repair of tuberosity(s), when performed; with proximal humeral prosthetic replacement, Open treatment of greater humeral tuberosity fracture, includes internal fixation, when performed, Open treatment of shoulder dislocation, with fracture of greater humeral tuberosity, includes internal fixation, when performed, Open treatment of shoulder dislocation, with surgical or anatomical neck fracture, includes internal fixation, when performed, Open treatment of humeral shaft fracture with plate/screws, with or without cerclage, Treatment of humeral shaft fracture, with insertion of intramedullary implant, with or without cerclage and/or locking screws, Open treatment of humeral supracondylar or transcondylar fracture, includes internal fixation, when performed; without intercondylar extension, Open treatment of humeral supracondylar or transcondylar fracture, includes internal fixation, when performed; with intercondylar extension, Open treatment of humeral epicondylar fracture, medial or lateral, includes internal fixation, when performed, Open treatment of humeral condylar fracture, medial or lateral, includes internal fixation, when performed, Open treatment of periarticular fracture and/or dislocation of the elbow (fracture distal humerus and proximal ulna and/or proximal radius), Open treatment of periarticular fracture and/or dislocation of the elbow (fracture distal humerus and proximal ulna and/or proximal radius); with implant arthroplasty, Open treatment of Monteggia type of fracture dislocation at elbow (fracture proximal end of ulna with dislocation of radial head), includes internal fixation, when performed, Open treatment of radial head or neck fracture, includes internal fixation or radial head excision, when performed, Open treatment of radial head or neck fracture, includes internal fixation or radial head excision, when performed; with radial head prosthetic replacement, Open treatment of ulnar fracture, proximal end (eg, olecranon or coronoid process[es]), includes internal fixation, when performed, Reconstruction for stabilization of unstable distal ulna or distal radioulnar joint, secondary by soft tissue stabilization (eg, tendon transfer, tendon graft or weave, or tenodesis) with or without open reduction of distal radioulnar joint, Open treatment of radial shaft fracture, includes internal fixation, when performed, Open treatment of radial shaft fracture, includes internal fixation, when performed, and open treatment of distal radioulnar joint dislocation (Galeazzi fracture/ dislocation), includes percutaneous skeletal fixation when performed,</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>Open treatment of radial shaft fracture, includes internal fixation, when performed, and open treatment of distal radioulnar joint dislocation (Galeazzi fracture/ dislocation), includes internal fixation, when performed, includes repair of triangular fibrocartilage complex, Open treatment of ulnar shaft fracture, includes internal fixation, when performed, Open treatment of radial AND ulnar shaft fractures, with internal fixation, when performed; of radius OR ulna, Open treatment of radial AND ulnar shaft fractures, with internal fixation, when performed; of radius AND ulna, Open treatment of distal radial extra-articular fracture or epiphyseal separation, with internal fixation, Open treatment of distal radial intra-articular fracture or epiphyseal separation; with internal fixation of 2 fragments, Open treatment of distal radial intra-articular fracture or epiphyseal separation; with internal fixation of 3 or more fragments, Open treatment of ulnar styloid fracture, Open treatment of slipped femoral epiphysis; single or multiple pinning or bone graft (includes obtaining graft), Open treatment of slipped femoral epiphysis; closed manipulation with single or multiple pinning, Open treatment of slipped femoral epiphysis; osteoplasty of femoral neck (Heyman type procedure), Open treatment of slipped femoral epiphysis; osteotomy and internal fixation, Treatment of intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture; with plate/screw type implant, with or without cerclage, Treatment of intertrochanteric, peritrochanteric, or subtrochanteric femoral fracture; with intramedullary implant, with or without interlocking screws and/or cerclage, Open treatment of greater trochanteric fracture, includes internal fixation, when performed, Open treatment of hip dislocation, traumatic, with acetabular wall and femoral head fracture, with or without internal or external fixation, Open treatment of femoral fracture, proximal end, head, includes internal fixation, when performed, Open treatment of femoral shaft fracture, with or without external fixation, with insertion of intramedullary implant, with or without cerclage and/or locking screws, Open treatment of femoral shaft fracture with plate/screws, with or without cerclage, Open treatment of femoral supracondylar or transcondylar fracture without intercondylar extension, includes internal fixation, when performed, Open treatment of femoral supracondylar or transcondylar fracture with intercondylar extension, includes internal fixation, when performed, Open treatment of femoral fracture, distal end, medial or lateral condyle, includes internal fixation, when performed, Open treatment of distal femoral epiphyseal separation, includes internal fixation, when performed, Open treatment of tibial fracture, proximal (plateau); unicondylar, includes internal fixation, when performed, Open treatment of tibial fracture, proximal (plateau); bicondylar, with or without internal fixation, Open treatment of intercondylar spine(s) and/or tuberosity fracture(s) of the knee, includes internal fixation, when performed, Open treatment of tibial shaft fracture (with or without fibular fracture), with plate/screws, with or without cerclage, Treatment of tibial shaft fracture (with or without fibular fracture) by intramedullary implant, with or without interlocking screws and/or cerclage, Open treatment of medial malleolus fracture, includes internal fixation, when performed, Open treatment of posterior malleolus fracture, includes internal fixation, when performed, Open treatment of proximal fibula or shaft fracture, includes internal fixation, when performed, Open treatment of distal fibular fracture (lateral malleolus), includes internal fixation, when performed, Open treatment of bimalleolar ankle fracture (eg, lateral and medial malleoli, or lateral and posterior malleoli, or medial and posterior malleoli), includes internal fixation, when performed, Open treatment of trimalleolar ankle fracture, includes internal fixation, when performed, medial and/or lateral malleolus; without fixation of posterior lip, Open treatment of trimalleolar ankle fracture, includes internal fixation, when performed, medial and/or lateral malleolus; with fixation of posterior lip, Open treatment of fracture of weight bearing articular surface/portion of distal tibia (eg, pilon or tibial plafond), with internal fixation, when performed; of fibula only, Open treatment of fracture of weight bearing articular surface/portion of distal tibia (eg, pilon or tibial plafond), with internal fixation, when performed; of tibia only, Open treatment of fracture of weight bearing articular surface/portion of distal tibia (eg, pilon or tibial plafond), with internal fixation, when performed; of both tibia and fibula, Open treatment of distal tibiofibular joint (syndesmosis) disruption, includes internal fixation, when performed, Partial esophagectomy, distal two-thirds, with thoracotomy and separate abdominal incision, with or without proximal gastrectomy; with thoracic</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>esophagogastrostomy, with or without pyloroplasty (Ivor Lewis), Partial esophagectomy, distal two-thirds, with thoracotomy and separate abdominal incision, with or without proximal gastrectomy; with colon interposition or small intestine reconstruction, including intestine mobilization, preparation, and anastomosis(es), Partial esophagectomy, distal two-thirds, with thoracotomy only, with or without proximal gastrectomy, with thoracic esophagogastrostomy, with or without pyloroplasty, Partial esophagectomy, thoracoabdominal or abdominal approach, with or without proximal gastrectomy; with esophagogastrostomy, with or without pyloroplasty, Laparoscopy, surgical, esophagogastric fundoplasty (eg, Nissen, Toupet procedures), Esophagogastrostomy (cardioplasty), with or without vagotomy and pyloroplasty, transabdominal or transthoracic approach, Esophagogastric fundoplasty; with fundic patch (Thal-Nissen procedure), Esophagogastric fundoplasty partial or complete; laparotomy, Esophagogastric fundoplasty partial or complete; thoracotomy, Gastrointestinal reconstruction for previous esophagectomy, for obstructing esophageal lesion or fistula, or for previous esophageal exclusion; with stomach, with or without pyloroplasty, Gastrotomy; with exploration or foreign body removal, Gastrotomy; with suture repair of bleeding ulcer, Gastrotomy; with suture repair of pre-existing esophagogastric laceration (eg, Mallory-Weiss), Pylomyotomy - cutting of pyloric muscle (Fredet-Ramstedt type operation), Biopsy of stomach, by laparotomy, Excision, local; ulcer or benign tumor of stomach, Excision, local; malignant tumor of stomach, Gastrectomy, total; with esophagoenterostomy, Gastrectomy, total; with Roux-en-Y reconstruction, Gastrectomy, total; with formation of intestinal pouch, any type, Gastrectomy, partial, distal; with gastroduodenostomy, Gastrectomy, partial, distal; with gastrojejunostomy, Gastrectomy, partial, distal; with Roux-en-Y reconstruction, Gastrectomy, partial, distal; with formation of intestinal pouch, Vagotomy including pyloroplasty, with or without gastrotomy; truncal or selective, Vagotomy including pyloroplasty, with or without gastrotomy; parietal cell (highly selective), Laparoscopy, surgical, gastric restrictive procedure; with gastric bypass and Roux-en-Y gastroenterostomy (roux limb 150 cm or less), Laparoscopy, surgical, gastric restrictive procedure; with gastric bypass and small intestine reconstruction to limit absorption, Laparoscopy, surgical, gastric restrictive procedure; placement of adjustable gastric restrictive device (eg, gastric band and subcutaneous port components), Laparoscopy, surgical, gastric restrictive procedure; revision of adjustable gastric restrictive device component only, Laparoscopy, surgical, gastric restrictive procedure; removal of adjustable gastric restrictive device component only, Laparoscopy, surgical, gastric restrictive procedure; removal and replacement of adjustable gastric restrictive device component only, Laparoscopy, surgical, gastric restrictive procedure; removal of adjustable gastric restrictive device and subcutaneous port components, Laparoscopy, surgical, gastric restrictive procedure; longitudinal gastrectomy (ie, sleeve gastrectomy), Pyloroplasty, Gastroduodenostomy, Gastrojejunostomy; without vagotomy, Gastrojejunostomy; with vagotomy, any type, Gastrorrhaphy, suture of perforated duodenal or gastric ulcer, wound, or injury, Gastric restrictive procedure, without gastric bypass, for morbid obesity; vertical-banded gastroplasty, Gastric restrictive procedure, without gastric bypass, for morbid obesity; other than vertical-banded gastroplasty, Gastric restrictive procedure with partial gastrectomy, pylorus-preserving duodenoileostomy and ileoileostomy (50 to 100 cm common channel) to limit absorption (biliopancreatic diversion with duodenal switch), Gastric restrictive procedure, with gastric bypass for morbid obesity; with short limb (150 cm or less) Roux-en-Y gastroenterostomy, Gastric restrictive procedure, with gastric bypass for morbid obesity; with small intestine reconstruction to limit absorption, Revision, open, of gastric restrictive procedure for morbid obesity, other than adjustable gastric restrictive device (separate procedure), Revision of gastroduodenal anastomosis (gastroduodenostomy) with reconstruction; without vagotomy, Revision of gastroduodenal anastomosis (gastroduodenostomy) with reconstruction; with vagotomy, Revision of gastrojejunal anastomosis (gastrojejunostomy) with reconstruction, with or without partial gastrectomy or intestine resection; without vagotomy, Revision of gastrojejunal anastomosis (gastrojejunostomy) with reconstruction, with or without partial gastrectomy or intestine resection; with vagotomy, Closure of gastrotomy, surgical, Closure of gastrocolic fistula, Gastric restrictive procedure, open; revision of subcutaneous port component only, Gastric</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>restrictive procedure, open; removal of subcutaneous port component only, Gastric restrictive procedure, open; removal and replacement of subcutaneous port component only, Removal of prosthetic material or mesh, abdominal wall for infection (eg, for chronic or recurrent mesh infection or necrotizing soft tissue infection) (List separately in addition to code for primary procedure), Repair, initial inguinal hernia, preterm infant (younger than 37 weeks gestation at birth), performed from birth up to 50 weeks postconception age, with or without hydrocelectomy; reducible, Repair, initial inguinal hernia, preterm infant (younger than 37 weeks gestation at birth), performed from birth up to 50 weeks postconception age, with or without hydrocelectomy; incarcerated or strangulated, Repair, initial inguinal hernia, full term infant younger than age 6 months, or preterm infant older than 50 weeks postconception age and younger than age 6 months at the time of surgery, with or without hydrocelectomy; reducible, Repair, initial inguinal hernia, full term infant younger than age 6 months, or preterm infant older than 50 weeks postconception age and younger than age 6 months at the time of surgery, with or without hydrocelectomy; incarcerated or strangulated, Repair initial inguinal hernia, age 6 months to younger than 5 years, with or without hydrocelectomy; reducible, Repair initial inguinal hernia, age 6 months to younger than 5 years, with or without hydrocelectomy; incarcerated or strangulated, Repair initial inguinal hernia, age 5 years or older; reducible, Repair initial inguinal hernia, age 5 years or older; incarcerated or strangulated, Repair recurrent inguinal hernia, any age; reducible, Repair recurrent inguinal hernia, any age; incarcerated or strangulated, Repair inguinal hernia, sliding, any age, Repair initial femoral hernia, any age; reducible, Repair initial femoral hernia, any age; reducible incarcerated or strangulated, Repair recurrent femoral hernia; reducible, Repair recurrent femoral hernia; incarcerated or strangulated, Repair initial incisional or ventral hernia; reducible, Repair initial incisional or ventral hernia; incarcerated or strangulated, Repair recurrent incisional or ventral hernia; reducible, Repair recurrent incisional or ventral hernia; incarcerated or strangulated, Repair epigastric hernia (eg, preperitoneal fat); reducible (separate procedure), Repair epigastric hernia (eg, preperitoneal fat); incarcerated or strangulated, Repair umbilical hernia, younger than age 5 years; reducible, Repair umbilical hernia, younger than age 5 years; incarcerated or strangulated, Repair umbilical hernia, age 5 years or older; reducible, Repair umbilical hernia, age 5 years or older; incarcerated or strangulated, Repair spigelian hernia, Repair of small omphalocele, with primary closure, Repair of large omphalocele or gastroschisis; with or without prosthesis, Repair of large omphalocele or gastroschisis; with removal of prosthesis, final reduction and closure, in operating room, Repair of omphalocele (Gross type operation); first stage, Repair of omphalocele (Gross type operation); second stage, Laparoscopy, surgical; repair initial inguinal hernia, Laparoscopy, surgical; repair recurrent inguinal hernia, Laparoscopy, surgical, repair, ventral, umbilical, spigelian or epigastric hernia (includes mesh insertion, when performed); reducible, Laparoscopy, surgical, repair, ventral, umbilical, spigelian or epigastric hernia (includes mesh insertion, when performed); incarcerated or strangulated, Laparoscopy, surgical, repair, incisional hernia (includes mesh insertion, when performed); reducible, Laparoscopy, surgical, repair, incisional hernia (includes mesh insertion, when performed); incarcerated or strangulated, Laparoscopy, surgical, repair, recurrent incisional hernia (includes mesh insertion, when performed); reducible, Laparoscopy, surgical, repair, recurrent incisional hernia (includes mesh insertion, when performed); incarcerated or strangulated, Unlisted laparoscopy procedure, hernioplasty, herniorrhaphy, herniotomy, Hemiarthroplasty, hip, partial (eg, femoral stem prosthesis, bipolar arthroplasty), Arthroplasty, acetabular and proximal femoral prosthetic replacement (total hip arthroplasty), with or without autograft or allograft, Conversion of previous hip surgery to total hip arthroplasty, with or without autograft or allograft, Revision of total hip arthroplasty; both components, with or without autograft or allograft, Revision of total hip arthroplasty; acetabular component only, with or without autograft or allograft, Revision of total hip arthroplasty; femoral component only, with or without allograft, Open treatment of femoral fracture, proximal end, neck, internal fixation or prosthetic replacement, Heart transplant, with or without recipient cardiectomy, Total abdominal hysterectomy (corpus and cervix), with or without removal of tube(s), with or without removal of ovary(s), Total abdominal hysterectomy (corpus and cervix), with or without</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>removal of tube(s), with or without removal of ovary(s); with colpo-urethrocystopexy (eg, Marshall-Marchetti-Krantz, Burch), Supracervical abdominal hysterectomy (subtotal hysterectomy), with or without removal of tube(s), with or without removal of ovary(s), Total abdominal hysterectomy, including partial vaginectomy, with para-aortic and pelvic lymph node sampling, with or without removal of tube(s), with or without removal of ovary(s), Radical abdominal hysterectomy, with bilateral total pelvic lymphadenectomy and para-aortic lymph node sampling (biopsy), with or without removal of tube(s), with or without removal of ovary(s), Pelvic exenteration for gynecologic malignancy, with total abdominal hysterectomy or cervicectomy, with or without removal of tube(s), with or without removal of ovary(s), with removal of bladder and ureteral transplantations, and/or abdominoperineal resection of rectum and colon and colostomy, or any combination thereof, Laparoscopy, surgical, supracervical hysterectomy, for uterus 250 g or less, Laparoscopy, surgical, supracervical hysterectomy, for uterus 250 g or less; with removal of tube(s) and/or ovary(s), Laparoscopy, surgical, supracervical hysterectomy, for uterus greater than 250 g, Laparoscopy, surgical, supracervical hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), Laparoscopy, surgical, with radical hysterectomy, with bilateral total pelvic lymphadenectomy and para-aortic lymph node sampling (biopsy), with removal of tube(s) and ovary(s), if performed, Laparoscopy, surgical, with total hysterectomy, for uterus 250 g or less, Laparoscopy, surgical, with total hysterectomy, for uterus 250 g or less; with removal of tube(s) and/or ovary(s), Laparoscopy, surgical, with total hysterectomy, for uterus greater than 250 g, Laparoscopy, surgical, with total hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), Resection (initial) of ovarian, tubal or primary peritoneal malignancy with bilateral salpingo-oophorectomy and omentectomy; with total abdominal hysterectomy, pelvic and limited para-aortic lymphadenectomy, Bilateral salpingo-oophorectomy with omentectomy, total abdominal hysterectomy and radical dissection for debulking, Bilateral salpingo-oophorectomy with omentectomy, total abdominal hysterectomy and radical dissection for debulking; with pelvic lymphadenectomy and limited para-aortic lymphadenectomy, Bilateral salpingo-oophorectomy with total omentectomy, total abdominal hysterectomy for malignancy, Subtotal or total hysterectomy after cesarean delivery (List separately in addition to code for primary procedure), Arthroplasty, patella; with prosthesis, Arthroplasty, knee, tibial plateau, Arthroplasty, knee, tibial plateau; with debridement and partial synovectomy, Arthroplasty, femoral condyles or tibial plateau(s), knee, Arthroplasty, femoral condyles or tibial plateau(s), knee; with debridement and partial synovectomy, Arthroplasty, knee, hinge prosthesis (eg, Walldius type), Arthroplasty, knee, condyle and plateau; medial OR lateral compartment, Arthroplasty, knee, condyle and plateau; medial AND lateral compartments with or without patella resurfacing (total knee arthroplasty), Revision of total knee athroplasty, with or without allograft, one compnent, Revision of total knee arthroplasty, with or without allograft; femoral and entire tibial component, Recipient nephrectomy (separate procedure), Renal allotransplantation, implantation of graft; without recipient nephrectomy, Renal allotransplantation, implantation of graft; with recipient nephrectomy, Renal autotransplantation, reimplantation of kidney, Insertion of posterior spinous process distraction device (including necessary removal of bone or ligament for insertion and imaging guidance), lumbar; single level, Posterior vertebral joint(s) arthroplasty (eg, facet joint[s] replacement), including facetectomy, laminectomy, foraminotomy, and vertebral column fixation, injection of bone cement, when performed, including fluoroscopy, single level, lumbar spine, Placement of a posterior intrafacet implant(s), unilateral or bilateral, including imaging and placement of bone graft(s) or synthetic device(s), single level; cervical, Placement of a posterior intrafacet implant(s), unilateral or bilateral, including imaging and placement of bone graft(s) or synthetic device(s), single level; thoracic, Placement of a posterior intrafacet implant(s), unilateral or bilateral, including imaging and placement of bone graft(s) or synthetic device(s), single level; lumbar, Total disc arthroplasty (artificial disc), anterior approach, including discectomy with end plate preparation (includes osteophyctectomy for nerve root or spinal cord decompression and microdissection), cervical, three or more levels, Osteotomy of spine, including discectomy, anterior approach, single vertebral segment; cervical, Osteotomy of spine, including discectomy, anterior approach, single</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>vertebral segment; thoracic, Osteotomy of spine, including discectomy, anterior approach, single vertebral segment; lumbar, Total disc arthroplasty (artificial disc), anterior approach, including discectomy with end plate preparation (includes osteophylectomy for nerve root or spinal cord decompression and microdissection); single interspace, cervical, Total disc arthroplasty (artificial disc), anterior approach, including discectomy to prepare interspace (other than for decompression), single interspace, lumbar, Revision including replacement of total disc arthroplasty (artificial disc), anterior approach, single interspace; cervical, Revision including replacement of total disc arthroplasty (artificial disc), anterior approach, single interspace; lumbar, Decompression procedure, percutaneous, of nucleus pulposus of intervertebral disc, any method utilizing needle based technique to remove disc material under fluoroscopic imaging or other form of indirect visualization, with the use of an endoscope, with discography and/or epidural injection(s) at the treated level(s), when performed, single or multiple levels, lumbar, Implantation, revision or repositioning of tunneled intrathecal or epidural catheter, for long-term medication administration via an external pump or implantable reservoir/infusion pump; with laminectomy, Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), 1 or 2 vertebral segments; cervical, Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), 1 or 2 vertebral segments; thoracic, Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), 1 or 2 vertebral segments; lumbar, except for spondylolisthesis, Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), 1 or 2 vertebral segments; sacral, Laminectomy with removal of abnormal facets and/or pars inter-articularis with decompression of cauda equina and nerve roots for spondylolisthesis, lumbar (Gill type procedure), Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), more than 2 vertebral segments; cervical, Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), more than 2 vertebral segments; thoracic, Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (eg, spinal stenosis), more than 2 vertebral segments; lumbar, Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, cervical, Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; 1 interspace, lumbar, Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc; each additional interspace, cervical or lumbar (List separately in addition to code for primary procedure), Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc, reexploration, single interspace; cervical, Laminotomy (hemilaminectomy), with decompression of nerve root(s), including partial facetectomy, foraminotomy and/or excision of herniated intervertebral disc, reexploration, single interspace; lumbar, Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; cervical, Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; thoracic, Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; lumbar, Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [eg, spinal or lateral recess stenosis]), single vertebral segment; each additional segment, cervical, thoracic, or lumbar (List separately in addition to code for primary procedure), Laminoplasty, cervical, with</p>



Precipitant	Code Type	Codes	Code Descriptions
			<p>decompression of the spinal cord, 2 or more vertebral segments, Laminoplasty, cervical, with decompression of the spinal cord, 2 or more vertebral segments; with reconstruction of the posterior bony elements (including the application of bridging bone graft and non-segmental fixation devices [eg, wire, suture, mini-plates], when performed), Transpedicular approach with decompression of spinal cord, equina and/or nerve root(s) (eg, herniated intervertebral disc), single segment; thoracic, Transpedicular approach with decompression of spinal cord, equina and/or nerve root(s) (eg, herniated intervertebral disc), single segment; thoracic or lumbar (including transfacet, or lateral extraforaminal approach) (eg, far lateral herniated intervertebral disc, Costovertebral approach with decompression of spinal cord or nerve root(s), (eg, herniated intervertebral disc), thoracic; single segment, Discectomy, anterior, with decompression of spinal cord and/or nerve root(s), including osteophyctectomy; cervical, single interspace, Discectomy, anterior, with decompression of spinal cord and/or nerve root(s), including osteophyctectomy; thoracic, single interspace, Vertebral corpectomy (vertebral body resection), partial or complete, anterior approach with decompression of spinal cord and/or nerve root(s); cervical, single segment, Vertebral corpectomy (vertebral body resection), partial or complete, anterior approach with decompression of spinal cord and/or nerve root(s); cervical, each additional segment (List separately in addition to code for primary procedure), Vertebral corpectomy (vertebral body resection), partial or complete, transthoracic approach with decompression of spinal cord and/or nerve root(s); thoracic, single segment, Vertebral corpectomy (vertebral body resection), partial or complete, transthoracic approach with decompression of spinal cord and/or nerve root(s); thoracic, each additional segment (List separately in addition to code for primary procedure), Vertebral corpectomy (vertebral body resection), partial or complete, combined thoracolumbar approach with decompression of spinal cord, cauda equina or nerve root(s), lower thoracic or lumbar; single segment, Vertebral corpectomy (vertebral body resection), partial or complete, combined thoracolumbar approach with decompression of spinal cord, cauda equina or nerve root(s), lower thoracic or lumbar; each additional segment (List separately in addition to code for primary procedure), Vertebral corpectomy (vertebral body resection), partial or complete, transperitoneal or retroperitoneal approach with decompression of spinal cord, cauda equina or nerve root(s), lower thoracic, lumbar, or sacral; single segment, Vertebral corpectomy (vertebral body resection), partial or complete, transperitoneal or retroperitoneal approach with decompression of spinal cord, cauda equina or nerve root(s), lower thoracic, lumbar, or sacral; each additional segment (List separately in addition to code for primary procedure), Vertebral corpectomy (vertebral body resection), partial or complete, lateral extracavitary approach with decompression of spinal cord and/or nerve root(s) (eg, for tumor or retropulsed bone fragments); thoracic, single segment, Vertebral corpectomy (vertebral body resection), partial or complete, lateral extracavitary approach with decompression of spinal cord and/or nerve root(s) (eg, for tumor or retropulsed bone fragments); lumbar, single segment, Vertebral corpectomy (vertebral body resection), partial or complete, lateral extracavitary approach with decompression of spinal cord and/or nerve root(s) (eg, for tumor or retropulsed bone fragments); thoracic or lumbar, each additional segment (List separately in addition to code for primary procedure), Laminectomy with myelotomy (eg, Bischof or DREZ type), cervical, thoracic, or thoracolumbar, Laminectomy with drainage of intramedullary cyst/syrinx; to subarachnoid space, Laminectomy with drainage of intramedullary cyst/syrinx; to peritoneal or pleural space, Laminectomy and section of dentate ligaments, with or without dural graft, cervical; 1 or 2 segments, Laminectomy and section of dentate ligaments, with or without dural graft, cervical; more than 2 segments, Laminectomy with rhizotomy; 1 or 2 segments, Laminectomy with rhizotomy; more than 2 segments, Laminectomy with section of spinal accessory nerve, Laminectomy with cordotomy, with section of 1 spinothalamic tract, 1 stage; cervical, Laminectomy with cordotomy, with section of 1 spinothalamic tract, 1 stage; thoracic, Laminectomy with cordotomy, with section of both spinothalamic tracts, 1 stage; cervical, Laminectomy with cordotomy, with section of both spinothalamic tracts, 1 stage; thoracic, Laminectomy with cordotomy with section of both spinothalamic tracts, 2 stages within 14 days; cervical, Liver allotransplantation; orthotopic, partial or whole, from cadaver or living donor,</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>any age, Unlisted liver procedures, Laryngotomy (thyrotomy, laryngofissure); with removal of tumor or laryngocele, corpectomy, Laryngectomy; total, with radical neck dissection, Laryngectomy; subtotal supraglottic, without radical neck dissection, Laryngectomy; subtotal supraglottic, with radical neck dissection, Partial laryngectomy (hemilaryngectomy); horizontal, Partial laryngectomy (hemilaryngectomy); laterovertical, Partial laryngectomy (hemilaryngectomy); anterovertical, Partial laryngectomy (hemilaryngectomy); antero-latero-vertical, Pharyngolaryngectomy, with radical neck dissection; without reconstruction, Pharyngolaryngectomy, with radical neck dissection; with reconstruction, Arytenoidectomy or arytenoidopexy, external approach, Epiglottidectomy, Laryngoscopy, direct, operative, with arytenoidectomy;, Laryngoscopy, direct, operative, with arytenoidectomy; with operating microscope or telescope, Unlisted procedure, larynx, Lymphangiomy or other operations on lymphatic channels, Dissection, deep jugular node(s), Cervical lymphadenectomy (complete), Cervical lymphadenectomy (modified radical neck dissection), Glossectomy; partial, with unilateral radical neck dissection, Glossectomy; complete or total, with or without tracheostomy, without radical neck dissection, Glossectomy; complete or total, with or without tracheostomy, with unilateral radical neck dissection, Glossectomy; composite procedure with resection floor of mouth, mandibular resection, and radical neck dissection (Commando type), Excision of parotid tumor or parotid gland; total, with dissection and preservation of facial nerve, Excision of parotid tumor or parotid gland; total, en bloc removal with sacrifice of facial nerve, Excision of parotid tumor or parotid gland; total, with unilateral radical neck dissection, Radical excision external auditory canal lesion; without neck dissection, Radical excision external auditory canal lesion; with neck dissection, Renal exploration, not necessitating other specific procedures, Drainage of perirenal or renal abscess, open, Nephrostomy, nephrotomy with drainage, Nephrotomy, with exploration, Nephrolithotomy; removal of calculus, Nephrolithotomy; secondary surgical operation for calculus, Nephrolithotomy; complicated by congenital kidney abnormality, Nephrolithotomy; removal of large staghorn calculus filling renal pelvis and calyces (including anastrophic pyelolithotomy), Pyelotomy; with exploration, Pyelotomy; with drainage, pyelostomy, Pyelotomy; with removal of calculus (pyelolithotomy, pelviolithotomy, including coagululum pyelolithotomy), Pyelotomy; complicated (e.g., secondary operation, congenital kidney abnormality), Renal biopsy; by surgical exposure of kidney, Nephrectomy, including partial ureterectomy, any open approach including rib resection;, Nephrectomy, including partial ureterectomy, any open approach including rib resection; complicated because of previous surgery on same kidney, Nephrectomy, including partial ureterectomy, any open approach including rib resection; radical, with regional lymphadenectomy and/or vena caval thrombectomy, Nephrectomy with total ureterectomy and bladder cuff; through same incision, Nephrectomy with total ureterectomy and bladder cuff; through separate incision, Nephrectomy, partial, Ablation, open, 1 or more renal mass lesion(s), cryosurgical, including intraoperative ultrasound guidance and monitoring, if performed, Excision or unroofing of cyst(s) of kidney, Excision of perinephric cyst, Donor nephrectomy (including cold preservation); open, from living donor, Pyeloplasty (Foley Y-pyeloplasty), plastic operation on renal pelvis, with or without plastic operation on ureter, nephropexy, nephrostomy, pyelostomy, or ureteral splinting; simple, Pyeloplasty (Foley Y-pyeloplasty), plastic operation on renal pelvis, with or without plastic operation on ureter, nephropexy, nephrostomy, pyelostomy, or ureteral splinting; complicated (congenital kidney abnormality, secondary pyeloplasty, solitary kidney, calycolasty), Laparoscopy, surgical; ablation of renal cysts, Laparoscopy, surgical; ablation of renal mass lesion(s), including intraoperative ultrasound guidance and monitoring, when performed, Laparoscopy, surgical; partial nephrectomy, Laparoscopy, surgical; radical nephrectomy (includes removal of Gerota's fascia and surrounding fatty tissue, removal of regional lymph nodes, and adrenalectomy), Laparoscopy, surgical; nephrectomy, including partial ureterectomy, Laparoscopy, surgical; donor nephrectomy (including cold preservation), from living donor, Laparoscopy, surgical; nephrectomy with total ureterectomy, Unlisted laparoscopic nephrectomy, Laparoscopy, surgical; with lysis of adhesions (salpingolysis, ovariolysis) (separate procedure), Laparoscopy, surgical; with removal of adnexal structures</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>(partial or total oophorectomy and/or salpingectomy), Laparoscopy, surgical; with fulguration or excision of lesions of the ovary, pelvic viscera, or peritoneal surface by any method, Unlisted laparoscopy procedure, oviduct, ovary, Salpingo-oophorectomy, complete or partial, unilateral or bilateral (separate procedure), Lysis of adhesions (salpingolysis, ovariolysis), Drainage of ovarian cyst(s), unilateral or bilateral (separate procedure); vaginal approach, Drainage of ovarian cyst(s), unilateral or bilateral (separate procedure); abdominal approach, Drainage of ovarian abscess; vaginal approach, open, Drainage of ovarian abscess; abdominal approach, Transposition, ovary(s), Biopsy of ovary, unilateral or bilateral (separate procedure), Wedge resection or bisection of ovary, unilateral or bilateral, Ovarian cystectomy, unilateral or bilateral, Oophorectomy, partial or total, unilateral or bilateral, Oophorectomy, partial or total, unilateral or bilateral; for ovarian, tubal or primary peritoneal malignancy, with para-aortic and pelvic lymph node biopsies, peritoneal washings, peritoneal biopsies, diaphragmatic assessments, with or without salpingectomy(s), with or without omentectomy, Resection (initial) of ovarian, tubal or primary peritoneal malignancy with bilateral salpingo-oophorectomy and omentectomy, Resection (initial) of ovarian, tubal or primary peritoneal malignancy with bilateral salpingo-oophorectomy and omentectomy; with radical dissection for debulking (i.e., radical excision or destruction, intra-abdominal or retroperitoneal tumors), Follicle puncture for oocyte retrieval, any method, Insertion of epicardial electrode(s); open incision (e.g., thoracotomy, median sternotomy, subxiphoid approach), Insertion of epicardial electrode(s); endoscopic approach (e.g., thoracoscopy, pericardioscopy), Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial, Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); ventricular, Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial and ventricular, Insertion of pacemaker pulse generator only; with existing single lead, Insertion of pacemaker pulse generator only; with existing dual leads, Upgrade of implanted pacemaker system, conversion of single chamber system to dual chamber system (includes removal of previously placed pulse generator, testing of existing lead, insertion of new lead, insertion of new pulse generator), Repositioning of previously implanted transvenous pacemaker or implantable defibrillator (right atrial or right ventricular) electrode, Insertion of a single transvenous electrode, permanent pacemaker or implantable defibrillator, Insertion of 2 transvenous electrodes, permanent pacemaker or implantable defibrillator, Repair of single transvenous electrode, permanent pacemaker or implantable defibrillator, Repair of 2 transvenous electrodes for permanent pacemaker or implantable defibrillator, Insertion of pacemaker pulse generator only; with existing multiple leads, Relocation of skin pocket for pacemaker, Relocation of skin pocket for implantable defibrillator, Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, with attachment to previously placed pacemaker or implantable defibrillator pulse generator (including revision of pocket, removal, insertion, and/or replacement of existing generator), Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, at time of insertion of implantable defibrillator or pacemaker pulse generator (e.g., for upgrade to dual chamber system) (List separately in addition to code for primary procedure), Repositioning of previously implanted cardiac venous system (left ventricular) electrode (including removal, insertion and/or replacement of existing generator), Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; single lead system, Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; dual lead system, Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; multiple lead system, Insertion of implantable defibrillator pulse generator only; with existing dual leads, Insertion of implantable defibrillator pulse generator only; with existing multiple leads, Removal of permanent pacemaker pulse generator only, Removal of transvenous pacemaker electrode(s); single lead system, atrial or ventricular, Removal of transvenous pacemaker electrode(s); dual lead system, Removal of permanent epicardial pacemaker and electrodes by thoracotomy; single lead system, atrial or ventricular, Removal of permanent epicardial pacemaker and electrodes by thoracotomy; dual lead system, Removal of permanent transvenous electrode(s) by thoracotomy, Insertion of implantable defibrillator pulse generator only; with existing single lead, Removal of</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>implantable defibrillator pulse generator only, Removal of single or dual chamber implantable defibrillator electrode(s); by thoracotomy, Removal of single or dual chamber implantable defibrillator electrode(s); by transvenous extraction, Insertion or replacement of permanent implantable defibrillator system, with transvenous lead(s), single or dual chamber, Removal of implantable defibrillator pulse generator with replacement of implantable defibrillator pulse generator; single lead system, Removal of implantable defibrillator pulse generator with replacement of implantable defibrillator pulse generator; dual lead system, Removal of implantable defibrillator pulse generator with replacement of implantable defibrillator pulse generator; multiple lead system, Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters, when performed, Insertion of subcutaneous implantable defibrillator electrode, Removal of subcutaneous implantable defibrillator electrode, Repositioning of previously implanted subcutaneous implantable defibrillator electrode, Biopsy, prostate; incisional, any approach, Prostatectomy, perineal radical, Prostatectomy, perineal radical; with lymph node biopsy(s) (limited pelvic lymphadenectomy), Prostatectomy, perineal radical; with bilateral pelvic lymphadenectomy, including external iliac, hypogastric and obturator nodes, Prostatectomy (including control of postoperative bleeding, vasectomy, meatotomy, urethral calibration and/or dilation, and internal urethrotomy); suprapubic, subtotal, 1 or 2 stages, Prostatectomy (including control of postoperative bleeding, vasectomy, meatotomy, urethral calibration and/or dilation, and internal urethrotomy); retropubic, subtotal, Prostatectomy, retropubic radical, with or without nerve sparing, Prostatectomy, retropubic radical, with or without nerve sparing; with lymph node biopsy(s) (limited pelvic lymphadenectomy), Prostatectomy, retropubic radical, with or without nerve sparing; with bilateral pelvic lymphadenectomy, including external iliac, hypogastric, and obturator nodes, Laparoscopy, surgical prostatectomy, retropubic radical, including nerve sparing, includes robotic assistance, when performed, Bypass graft subclavian- brachial, Bypass graft, with vein; subclavian-axillary, Bypass graft, with vein; axillary-axillary, Bypass graft, with vein; axillary-femoral, Bypass graft, with vein; axillary-brachial, Bypass graft, with vein; brachial-ulnar or -radial, Bypass graft, with vein; brachial-brachial, Bypass graft, with vein; axillary-femoral-femoral, Bypass graft, with vein; femoral-popliteal, Bypass graft, with vein; femoral-femoral, Bypass graft, with vein; femoral-anterior tibial, posterior tibial, peroneal artery or other distal vessels, Bypass graft, with vein; tibial-tibial, peroneal-tibial, or tibial/peroneal trunk-tibial, Bypass graft, with vein; popliteal-tibial, -peroneal artery or other distal vessels, In-situ vein bypass; femoral-popliteal, In-situ vein bypass; femoral-anterior tibial, posterior tibial, or peroneal artery, In-situ vein bypass; popliteal-tibial, peroneal, Bypass graft, with other than vein; subclavian-axillary, Bypass graft, with other than vein; axillary-femoral, Bypass graft, with other than vein; axillary-popliteal or -tibial, Bypass graft, with other than vein; axillary-axillary, Bypass graft, with other than vein; axillary-femoral-femoral, Bypass graft, with other than vein; femoral-popliteal, Bypass graft, with other than vein; femoral-femoral, Bypass graft, with other than vein; femoral-anterior tibial, posterior tibial, or peroneal artery, Bypass graft, with other than vein; popliteal-tibial or -peroneal artery, Creation of distal arteriovenous fistula during lower extremity bypass surgery (non-hemodialysis) (List separately in addition to code for primary procedure), Proctectomy; complete, combined abdominoperineal, with colostomy, Proctectomy; partial resection of rectum, transabdominal approach, Proctectomy, combined abdominoperineal, pull-through procedure (eg, colo-anal anastomosis), Proctectomy, partial, with rectal mucosectomy, ileoanal anastomosis, creation of ileal reservoir (S or J), with or without loop ileostomy, Proctectomy, partial, with anastomosis; abdominal and transsacral approach, Proctectomy, partial, with anastomosis; transsacral approach only (Kraske type), Proctectomy, combined abdominoperineal pull-through procedure (eg, colo-anal anastomosis), with creation of colonic reservoir (eg, J-pouch), with diverting enterostomy when performed, Proctectomy, complete (for congenital megacolon), abdominal and perineal approach; with pull-through procedure and anastomosis (eg, Swenson, Duhamel, or Soave type operation), Proctectomy, complete (for congenital megacolon),</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>abdominal and perineal approach; with subtotal or total colectomy, with multiple biopsies, Pelvic exenteration for colorectal malignancy, with proctectomy (with or without colostomy), with removal of bladder and ureteral transplantations, and/or hysterectomy, or cervicectomy, with or without removal of tube(s), with or without removal of ovary(s), or any combination thereof, Laparoscopy, surgical; proctectomy, complete, combined abdominoperineal, with colostomy, Laparoscopy, surgical; proctectomy, combined abdominoperineal pull-through procedure (eg, colo-anal anastomosis), with creation of colonic reservoir (eg, J-pouch), with diverting enterostomy, when performed, Exploration, repair, and presacral drainage for rectal injury, Exploration, repair, and presacral drainage for rectal injury; with colostomy, Free jejunum transfer with microvascular anastomosis, Duodenotomy, for exploration, biopsy(s), or foreign body removal, Tube or needle catheter jejunostomy for enteral alimentation, intraoperative, any method (List separately in addition to primary procedure), Enterotomy, small intestine, other than duodenum; for exploration, biopsy(s), or foreign body removal, Enterotomy, small intestine, other than duodenum; for decompression (eg, Baker tube), Enterectomy, resection of small intestine; single resection and anastomosis, Enterectomy, resection of small intestine; each additional resection and anastomosis (List separately in addition to code for primary procedure), Enterectomy, resection of small intestine; with enterostomy, Enterectomy, resection of small intestine for congenital atresia, single resection and anastomosis of proximal segment of intestine; without tapering, Enterectomy, resection of small intestine for congenital atresia, single resection and anastomosis of proximal segment of intestine; with tapering, Enterectomy, resection of small intestine for congenital atresia, single resection and anastomosis of proximal segment of intestine; each additional resection and anastomosis (List separately in addition to code for primary procedure), Laparoscopy, surgical; jejunostomy (eg, for decompression or feeding) (separate procedure), Laparoscopy, surgical; ileostomy or jejunostomy, non-tube, Laparoscopy, surgical; enterectomy, resection of small intestine, single resection and anastomosis, Laparoscopy, surgical; each additional small intestine resection and anastomosis (List separately in addition to code for primary procedure), Placement, enterostomy or cecostomy, tube open (eg, for feeding or decompression), Ileostomy or jejunostomy, non-tube, Revision of ileostomy; simple (release of superficial scar) (separate procedure), Revision of ileostomy; complicated (reconstruction in-depth) (separate procedure), Continent ileostomy (Kock procedure) (separate procedure), Suture of small intestine (enterorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture; single perforation, Suture of small intestine (enterorrhaphy) for perforated ulcer, diverticulum, wound, injury or rupture; multiple perforations, Intestinal stricturoplasty (enterotomy and enterorrhaphy) with or without dilation, for intestinal obstruction, Closure of intestinal cutaneous fistula, Closure of enteroenteric or enterocolic fistula, Excision of Meckel's diverticulum (diverticulectomy) or omphalomesenteric duct, Excision of ileoanal reservoir with ileostomy, Splenectomy; total (separate procedure), Splenectomy; partial (separate procedure), Splenectomy; total, en bloc for extensive disease, in conjunction with other procedure (List in addition to code for primary procedure), Repair of ruptured spleen (splenorrhaphy) with or without partial splenectomy, Laparoscopy, surgical, splenectomy, Injection procedure for splenoportography, Incision and drainage of thyroglossal duct cyst, infected, Excision of cyst or adenoma of thyroid, or transection of isthmus, Partial thyroid lobectomy, unilateral; with or without isthmusectomy, Partial thyroid lobectomy, unilateral; with contralateral subtotal lobectomy, including isthmusectomy, Total thyroid lobectomy, unilateral; with or without isthmusectomy, Total thyroid lobectomy, unilateral; with contralateral subtotal lobectomy, including isthmusectomy, Thyroidectomy, total or complete, Thyroidectomy, total or subtotal for malignancy; with limited neck dissection, Thyroidectomy, total or subtotal for malignancy; with radical neck dissection, Thyroidectomy, removal of all remaining thyroid tissue following previous removal of a portion of thyroid, Thyroidectomy, including substernal thyroid; sternal split or transthoracic approach, Thyroidectomy, including substernal thyroid; cervical approach, Excision of thyroglossal duct cyst or sinus;, Excision of thyroglossal duct cyst or sinus; recurrent, Parathyroidectomy or exploration of parathyroid(s), Parathyroidectomy or exploration of parathyroid(s); re-exploration, Parathyroidectomy or exploration of</p>

Precipitant	Code Type	Codes	Code Descriptions
			<p>parathyroid(s); with mediastinal exploration, sternal split or transthoracic approach, Parathyroid autotransplantation (List separately in addition to code for primary procedure), Closure of vesicouterine fistula; with hysterectomy, Vaginal hysterectomy, for uterus 250 g or less, Vaginal hysterectomy, for uterus 250 g or less; with removal of tube(s), and/or ovary(s), Vaginal hysterectomy, for uterus 250 g or less; with removal of tube(s), and/or ovary(s), with repair of enterocele, Vaginal hysterectomy, for uterus 250 g or less; with colpo-urethrocytopexy (Marshall-Marchetti-Krantz type, Pereyra type) with or without endoscopic control, Vaginal hysterectomy, for uterus 250 g or less; with repair of enterocele, Vaginal hysterectomy, for uterus 250 g or less, Vaginal hysterectomy, for uterus 250 g or less; with repair of enterocele, Vaginal hysterectomy, radical (Schauta type operation), Vaginal hysterectomy, for uterus greater than 250 g, Vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), Vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), with repair of enterocele, Vaginal hysterectomy, for uterus greater than 250 g; with colpo-urethrocytopexy (Marshall-Marchetti-Krantz type, Pereyra type) with or without endoscopic control, Vaginal hysterectomy, for uterus greater than 250 g; with repair of enterocele, Vaginal hysterectomy, for uterus greater than 250 g, Vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), Laparoscopy, surgical, with vaginal hysterectomy, for uterus greater than 250 g, Laparoscopy, surgical, with vaginal hysterectomy, for uterus greater than 250 g; with removal of tube(s) and/or ovary(s), Neuroendoscopy, intracranial, for placement or replacement of ventricular catheter and attachment to shunt system or external drainage (List separately in addition to code for primary procedure), Ventriculocisternostomy (Torkildsen type operation), Creation of shunt; subarachnoid/subdural-atrial, -jugular, -auricular, Creation of shunt; subarachnoid/subdural-peritoneal, -pleural, other terminus, Replacement or irrigation, subarachnoid/subdural catheter, Ventriculocisternostomy, third ventricle, Ventriculocisternostomy, third ventricle; stereotactic, neuroendoscopic method, Creation of shunt; ventriculo-atrial, -jugular, -auricular, Creation of shunt; ventriculo-peritoneal, -pleural, other terminus, Replacement or irrigation, ventricular catheter, Replacement or revision of cerebrospinal fluid shunt, obstructed valve, or distal catheter in shunt system, Removal of complete cerebrospinal fluid shunt system; without replacement, Removal of complete cerebrospinal fluid shunt system; with replacement by similar or other shunt at same operation, Exploration of penetrating wound (separate procedure); abdomen/flank/back, Exploration for postoperative hemorrhage, thrombosis or infection; abdomen, Repair, neonatal diaphragmatic hernia, with or without chest tube insertion and with or without creation of ventral hernia, Repair, diaphragmatic hernia (other than neonatal), traumatic; acute, Repair, diaphragmatic hernia (other than neonatal), traumatic; chronic, Repair, paraesophageal hiatal hernia (including fundoplication), via laparotomy, except neonatal; without implantation of mesh or other prosthesis, Repair, paraesophageal hiatal hernia (including fundoplication), via laparotomy, except neonatal; with implantation of mesh or other prosthesis, Enterolysis (freeing of intestinal adhesion) (separate procedure), Laparoscopy, surgical, enterolysis (freeing of intestinal adhesion) (separate procedure), Exclusion of small intestine from pelvis by mesh or other prosthesis, or native tissue (eg, bladder or omentum), Excision of lesion of mesentery (separate procedure), Suture of mesentery (separate procedure), Exploratory laparotomy, exploratory celiotomy with or without biopsy(s) (separate procedure), Reopening of recent laparotomy, Exploration, retroperitoneal area with or without biopsy(s) (separate procedure), Drainage of peritoneal abscess or localized peritonitis, exclusive of appendiceal abscess, open, Drainage of subdiaphragmatic or subphrenic abscess, open, Drainage of retroperitoneal abscess, open, Excision or destruction, open, intra-abdominal tumors, cysts or endometriomas, 1 or more peritoneal, mesenteric, or retroperitoneal primary or secondary tumors; largest tumor 5 cm diameter or less, Excision or destruction, open, intra-abdominal tumors, cysts or endometriomas, 1 or more peritoneal, mesenteric, or retroperitoneal primary or secondary tumors; largest tumor 5.1-10.0 cm diameter, Excision or destruction, open, intra-abdominal tumors, cysts or endometriomas, 1 or more peritoneal, mesenteric, or retroperitoneal primary or secondary tumors; largest tumor greater than 10.0 cm diameter, Excision of presacral or sacrococcygeal tumor, Staging laparotomy for Hodgkins disease or lymphoma (includes splenectomy,</p>

Precipitant	Code Type	Codes	Code Descriptions
			needle or open biopsies of both liver lobes, possibly also removal of abdominal nodes, abdominal node and/or bone marrow biopsies, ovarian repositioning), Umbilectomy, omphalectomy, excision of umbilicus (separate procedure), Omentectomy, epiploectomy, resection of omentum (separate procedure), Laparoscopy, abdomen, peritoneum, and omentum, diagnostic, with or without collection of specimen(s) by brushing or washing (separate procedure), Laparoscopy, surgical; with biopsy (single or multiple), Laparoscopy, surgical; with insertion of tunneled intraperitoneal catheter, Laparoscopy, surgical; with revision of previously placed intraperitoneal cannula or catheter, with removal of intraluminal obstructive material if performed, Laparoscopy, surgical; with omentopexy (omental tacking procedure) (List separately in addition to code for primary procedure), Removal of peritoneal foreign body from peritoneal cavity, Placement of interstitial device(s) for radiation therapy guidance (eg, fiducial markers, dosimeter), open, intra-abdominal, intrapelvic, and/or retroperitoneum, including image guidance, if performed, single or multiple (List separately in addition to code for primary procedure), Insertion of tunneled intraperitoneal catheter, with subcutaneous port (ie, totally implantable), Insertion of tunneled intraperitoneal catheter for dialysis, open, Insertion of peritoneal-venous shunt, Revision of peritoneal-venous shunt, Suture, secondary, of abdominal wall for evisceration or dehiscence, Omental flap, intra-abdominal (List separately in addition to code for primary procedure), Free omental flap with microvascular anastomosis, Laparotomy, for staging or restaging of ovarian, tubal, or primary peritoneal malignancy (second look), with or without omentectomy, peritoneal washing, biopsy of abdominal and pelvic peritoneum, diaphragmatic assessment with pelvic and limited para-aortic lymphadenectomy
Sepsis	ICD-9	995.92, 785.52	Severe sepsis, Septic shock
Sepsis	ICD-10	A03.9, A02.1, A04.7, A20.7, A21.7, A22.7, A23.9, A24.1, A26.7, A28.0, A28.2, A32.7, A39.2, A39.3, A39.4, A40, A40.0, A40.1, A40.2, A40.3, A40.8, A40.9, A41, A41.0, A41.1, A41.2, A41.3, A41.4, A41.5, A41.50, A41.51, A41.52, A41.58, A41.8, A41.80, A41.88, A41.9, A42.7, B00.7, B37.7, 790.7, 038, 038.1, 038.10, 038.11, 038.12, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.8, 038.9	Shigellosis, unspecified, Salmonella sepsis, Enterocolitis due to Clostridium difficile, Septicaemic plague, Generalised tularaemia, Anthrax sepsis, Brucellosis, unspecified, Acute and fulminating melioidosis, Erysipelothrix sepsis, Pasteurellosis, Extraintestinal yersiniosis, Listerial sepsis, Acute meningococcaemia, Chronic meningococcaemia, Meningococcaemia, unspecified, Streptococcal sepsis, Sepsis due to Streptococcus, group A, Sepsis due to Streptococcus, group B, Sepsis due to Streptococcus, group D, Sepsis due to Streptococcus pneumoniae, Other streptococcal sepsis, Streptococcal sepsis, unspecified, Other sepsis, Sepsis due to Staphylococcus aureus, Other sepsis, Sepsis due to unspecified Staphylococcus, Sepsis due to Haemophilus influenzae, Sepsis due to anaerobes, Sepsis due to other Gram-negative organisms, Sepsis due to Escherichia coli, Sepsis due to Pseudomonas, Sepsis due to Serratia, Sepsis due to other Gram-negative organisms, NOS, Other specified sepsis, Sepsis due to Enterococcus, Other specified sepsis, Sepsis, unspecified, includes: septicaemia, Actinomycotic sepsis, Disseminated herpes viral disease, includes: herpes viral sepsis, Candidal sepsis, bacteremia, Septicemia, Staphylococcal septicemia, Staphylococcal septicemia, unspecified, Methicillin susceptible staphylococcus aureus septicemia, MRSA septicemia, Other staphylococcal septicemia, Pneumococcal septicemia, Anaerobic septicemia, Septicemia due to other gram-negative organisms, H. Influenae septicemia, E coli septicemia, Pseudomonas septicemia, Serratia septicemia, Other specified septicemias, Unspecified septicemia

Outcome	Code Type	Codes	Code Descriptions
Ischemic Stroke	ICD-9	362.31, 362.32, 362.33, 362.34, 388.02, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, 435.8, 436, 437.1	Central retinal artery occlusion, arterial branch occlusion, partial arterial occlusion, transient arterial occlusion, transient ischemic deafness, occlusion and stenosis of basilar artery with infarction, occlusion and stenosis of carotid artery with cerebral infarction, occlusion and stenosis of vertebral artery with cerebral infarction, occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction, occlusion and stenosis of other specified precerebral artery with cerebral infarction, occlusion and stenosis of unspecified precerebral artery with cerebral infarction, cerebral thrombosis with cerebral infarction, cerebral embolism with cerebral infarction, cerebral artery occlusion, unspecified with cerebral infarction, other specified transient cerebral ischemias, acute but ill-defined cerebrovascular disease, other generalized ischemic cerebrovascular disease
Ischemic Stroke	ICD-10	G45.0, G45.1, G45.2, G45.3, G45.8, G46.3, G46.4, H34.00, H34.01, H34.02, H34.03, H34.10, H34.11, H34.12, H34.13, H34.211, H34.212, H34.213, H34.219, H34.231, H34.232, H34.233, H34.239, I63.00, I63.011, I63.012, I63.019, I63.111, I63.112, I63.119, I63.12, I63.131, I63.132, I63.139, I63.19, I63.20, I63.211, I63.212, I63.219, I63.22, I63.231, I63.232, I63.239, I63.29, I63.30, I63.311, I63.312, I63.319, I63.321, I63.322, I63.329, I63.331, I63.332, I63.339, I63.341, I63.342, I63.349, I63.40, I63.411, I63.412, I63.419, I63.421, I63.422, I63.429, I63.431, I63.432, I63.439, I63.49, I63.50, I63.511,	Vertebro-Basilar Artery Syndrome, Carotid Artery Syndrome, Multiple and bilateral precerebral artery syndromes, Amaurosis fugax, Other transient cerebral ischemic attacks and related syndromes, Brain stem stroke syndrome, Cerebellar stroke syndrome, Transient Retinal Artery Occlusion, Unspecified Eye, Transient retinal artery occlusion, right eye, Transient retinal artery occlusion, left eye, Transient retinal artery occlusion, bilateral, Central retinal artery occlusion, unspecified eye, Central retinal artery occlusion, right eye, Central retinal artery occlusion, left eye, Central retinal artery occlusion, bilateral, Partial retinal artery occlusion, right eye, Partial retinal artery occlusion, left eye, Partial retinal artery occlusion, bilateral, Partial Retinal Artery Occlusion, Unspecified Eye, Retinal artery branch occlusion, right eye, Retinal artery branch occlusion, left eye, Retinal artery branch occlusion, bilateral, Retinal Artery Branch Occlusion, Unspecified Eye, Cerebral infarction due to thrombosis of unspecified precerebral artery, Cerebral infarction due to thrombosis of right vertebral artery, Cerebral infarction due to thrombosis of left vertebral artery, Cerebral infarction due to thrombosis of unspecified vertebral artery, Cerebral infarction due to embolism of right vertebral artery, Cerebral infarction due to embolism of left vertebral artery, Cerebral infarction due to embolism of unspecified vertebral artery, Cerebral infarction due to embolism of basilar artery, Cerebral infarction due to embolism of right carotid artery, Cerebral infarction due to embolism of left carotid artery, Cerebral infarction due to embolism of unspecified carotid artery, Cerebral infarction due to embolism of other precerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of right vertebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of left vertebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries, Cerebral Infarction Due to Unspecified Occlusion or Stenosis of Basilar Arteries, Cerebral infarction due to unspecified occlusion or stenosis of right carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of left carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of other precerebral arteries, Cerebral infarction due to thrombosis of unspecified cerebral artery, Cerebral infarction due to thrombosis of right middle cerebral artery, Cerebral infarction due to thrombosis of left middle cerebral artery, Cerebral infarction due to thrombosis of unspecified middle cerebral artery, Cerebral infarction due to thrombosis of right anterior cerebral artery, Cerebral infarction due to thrombosis of left anterior cerebral artery, Cerebral infarction due to thrombosis of unspecified anterior cerebral artery, Cerebral infarction due to thrombosis of right posterior cerebral artery, Cerebral infarction due to thrombosis of left posterior cerebral artery, Cerebral infarction due to thrombosis of unspecified posterior cerebral artery, Cerebral infarction due to thrombosis of right cerebellar artery, Cerebral infarction due to thrombosis of left cerebellar artery, Cerebral infarction due to thrombosis of unspecified cerebellar artery, Cerebral infarction due to embolism of unspecified cerebral artery, Cerebral infarction due to embolism of right middle cerebral artery, Cerebral infarction due to embolism of left middle cerebral artery, Cerebral infarction due to embolism of unspecified middle cerebral artery, Cerebral infarction due to embolism of right anterior cerebral artery, Cerebral infarction due to embolism of left anterior cerebral artery, Cerebral infarction due to embolism of unspecified anterior cerebral artery, Cerebral infarction due to embolism of right posterior cerebral artery,



		<p>I63.512, I63.519, I63.521, I63.522, I63.529, I63.531, I63.532, I63.539, I63.541, I63.542, I63.549, I63.59, I63.6, I63.8, I63.9, I66.01, I66.02, I66.03, I66.09, I66.11, I66.12, I66.13, I66.19, I66.21, I66.22, I66.23, I66.29, I66.3, I66.8, I66.9, I69.80, I69.81, I69.820, I69.821, I69.822, I69.823, I69.828, I69.831, I69.832, I69.833, I69.834, I69.839, I69.841, I69.842, I69.843, I69.844, I69.849, I69.851, I69.852, I69.853, I69.854, I69.859, I69.861, I69.862, I69.863, I69.864, I69.865, I69.869, I69.890, I69.891, I69.892, I69.893, I69.898, I69.90, I69.91, I69.920, I69.921, I69.922, I69.923, I69.928, I69.931, I69.932, I69.933, I69.934, I69.939, I69.941, I69.942, I69.943, I69.944, I69.949, I69.951, I69.952, I69.953, I69.954</p>	<p>Cerebral infarction due to embolism of left posterior cerebral artery, Cerebral infarction due to embolism of unspecified posterior cerebral artery, Cerebral infarction due to embolism of other cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery, Cerebral infarction due to cerebral venous thrombosis, nonpyogenic, Other cerebral infarction, Cerebral infarction, unspecified, Occlusion and stenosis of right middle cerebral artery, Occlusion and stenosis of left middle cerebral artery, Occlusion and stenosis of bilateral middle cerebral arteries, Occlusion and stenosis of unspecified middle cerebral artery, Occlusion and stenosis of right anterior cerebral artery, Occlusion and stenosis of left anterior cerebral artery, Occlusion and stenosis of bilateral anterior cerebral arteries, Occlusion and stenosis of unspecified anterior cerebral artery, Occlusion and stenosis of right posterior cerebral artery, Occlusion and stenosis of left posterior cerebral artery, Occlusion and stenosis of bilateral posterior cerebral arteries, Occlusion and stenosis of unspecified posterior cerebral artery, Occlusion and stenosis of cerebellar arteries, Occlusion and stenosis of other cerebral arteries, Occlusion and stenosis of unspecified cerebral artery, Unspecified sequelae of other cerebrovascular disease, Cognitive deficits following other cerebrovascular disease, Aphasia following other cerebrovascular disease, Dysphasia following other cerebrovascular disease, Dysarthria following other cerebrovascular disease, Fluency disorder following other cerebrovascular disease, Other speech and language deficits following other cerebrovascular disease, Monoplegia of upper limb following other cerebrovascular disease affecting right dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting left dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting right non-dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting left non-dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting unspecified side, Monoplegia of lower limb following other cerebrovascular disease affecting right dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting left dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting right non-dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting left non-dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting unspecified side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting right dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting left dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting right non-dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting left non-dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting unspecified side, Other paralytic syndrome following other cerebrovascular disease affecting right dominant side, Other paralytic syndrome following other cerebrovascular disease affecting left dominant side, Other paralytic syndrome following other cerebrovascular disease affecting right non-dominant side, Other paralytic syndrome following other cerebrovascular disease affecting left non-dominant side, Other paralytic syndrome following other cerebrovascular disease affecting unspecified side, Apraxia following other cerebrovascular disease, Dysphagia following other cerebrovascular disease, Facial weakness following other cerebrovascular disease, Ataxia following other cerebrovascular disease, Other sequelae of other cerebrovascular disease, Unspecified Sequelae of unspecified cerebrovascular disease,</p>
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			<p>Cognitive deficits following unspecified cerebrovascular disease, Aphasia following unspecified cerebrovascular disease, Dysphasia following unspecified cerebrovascular disease, Dysarthria following unspecified Cerebrovascular disease, Fluency disorder following unspecified cerebrovascular disease, Other speech and language deficits following unspecified cerebrovascular disease, Monoplegia of upper limb following unspecified cerebrovascular disease affecting right dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting left dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting right non-dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting left non-dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting unspecified side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting right dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting left dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting right non-dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting left non-dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting unspecified side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting right dominant side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting left dominant side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting right non-dominant side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting left non-dominant side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting unspecified side, Other paralytic syndrome following unspecified cerebrovascular disease affecting right dominant side</p>
Heart Failure	ICD-9	<p>398.91, 404.01, 402.11, 402.91, 404.11, 404.13, 404.91, 402.01, 404.03, 404.93, 428.21, 428.22, 428.23, 428.31, 428.32, 428.33, 428.1, 428.42, 428.43, 428.4, 428.3, 428.9, 428, 428.2, 428.41</p>	<p>Rheumatic Heart Failure, Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Benign hypertensive heart disease with heart failure, Unspecified hypertensive heart disease with heart failure, Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Malignant hypertensive heart disease with heart failure, Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease, Acute systolic heart failure, Chronic systolic heart failure, Acute on chronic systolic heart failure, Acute diastolic heart failure, Chronic diastolic heart failure, Acute on chronic diastolic heart failure, Left heart failure, Chronic combined systolic and diastolic heart failure, Acute on chronic combined systolic and diastolic heart failure, Combined systolic and diastolic heart failure, unspecified, Diastolic heart failure, unspecified, Heart failure,</p>

			unspecified, Congestive heart failure, unspecified, Systolic heart failure, unspecified, Acute combined systolic and diastolic heart failure heart failure following cardiac surgery
Heart Failure	ICD-10	I11.0, I09.81, I13.0, I13.2, I50.1, I50.20, I50.21, I50.22, I50.23, I50.30, I50.31, I50.32, I50.33, I50.40, I50.41, I50.42, I50.43, I50.9, I97.130, I97.131	Hypertensive Heart Disease With Heart Failure, Rheumatic Heart Failure, Hypertensive Heart And Chronic Kidney Disease With Heart Failure And Stage 1 Through Stage 4 Chronic Kidney Disease, Or Unspecified Chronic Kidney Disease, Hypertensive Heart And Chronic Kidney Disease With Heart Failure And With Stage 5 Chronic Kidney Disease, Or End Stage Renal Disease, Left Ventricular Failure, Unspecified Systolic (Congestive) Heart Failure, Acute Systolic (Congestive) Heart Failure, Chronic Systolic (Congestive) Heart Failure, Acute On Chronic Systolic (Congestive) Heart Failure, Unspecified Diastolic (Congestive) Heart Failure, Acute Diastolic (Congestive) Heart Failure, Chronic Diastolic (Congestive) Heart Failure, Acute On Chronic Diastolic (Congestive) Heart Failure, Unspecified Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Acute Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Chronic Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Acute On Chronic Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Heart Failure, Unspecified, Postprocedural heart failure following cardiac surgery, Postprocedural heart failure following other surgery

Covariate	Code type	Data codes	Data code definitions
Diabetes	ICD-9	249, 249.01, 249.1, 249.11, 249.2, 249.21, 249.3, 249.31, 249.4, 249.41, 249.5, 249.51, 249.6, 249.61, 249.7, 249.71, 249.8, 249.81, 249.9, 249.91, 250, 250.01, 250.02, 250.03, 250.1, 250.11, 250.12, 250.13, 250.2, 250.21, 250.22, 250.23, 250.3, 250.31, 250.32, 250.33, 250.4, 250.41, 250.42, 250.43, 250.5, 250.51, 250.52, 250.53, 250.6, 250.61, 250.62, 250.63, 250.7, 250.71, 250.72, 250.73, 250.8, 250.81, 250.82, 250.83, 250.9, 250.91, 250.92, 250.93, 357.2, 362.01, 362.02, 362.03, 362.04, 362.05, 362.06, 362.07, 366.41, 791.6	Secondary diabetes mellitus without mention of complication, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus without mention of complication, uncontrolled, Secondary diabetes mellitus with ketoacidosis, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with ketoacidosis, uncontrolled, Secondary diabetes mellitus with hyperosmolarity, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with hyperosmolarity, uncontrolled, Secondary diabetes mellitus with other coma, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with other coma, uncontrolled, Secondary diabetes mellitus with renal manifestations, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with renal manifestations, uncontrolled, Secondary diabetes mellitus with ophthalmic manifestations, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with ophthalmic manifestations, uncontrolled, Secondary diabetes mellitus with neurological manifestations, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with neurological manifestations, uncontrolled, Secondary diabetes mellitus with peripheral circulatory disorders, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with peripheral circulatory disorders, uncontrolled, Secondary diabetes mellitus with other specified manifestations, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with other specified manifestations, uncontrolled, Secondary diabetes mellitus with unspecified complication, not stated as uncontrolled, or unspecified, Secondary diabetes mellitus with unspecified complication, uncontrolled, Diabetes mellitus without mention of complication, type II or unspecified type, not stated as uncontrolled, Diabetes mellitus without mention of complication, type I [juvenile type], not stated as uncontrolled, Diabetes mellitus without mention of complication, type II or unspecified type, uncontrolled, Diabetes mellitus without mention of complication, type I [juvenile type], uncontrolled, Diabetes with ketoacidosis, type II or unspecified type, not stated as uncontrolled, Diabetes with ketoacidosis, type I [juvenile type], not stated as uncontrolled, Diabetes with ketoacidosis, type II or unspecified type, uncontrolled, Diabetes with ketoacidosis, type I [juvenile type], uncontrolled, Diabetes with hyperosmolarity, type II or unspecified type, not stated as uncontrolled, Diabetes with hyperosmolarity, type I [juvenile type], not stated as uncontrolled, Diabetes with hyperosmolarity, type II or unspecified type, uncontrolled, Diabetes with hyperosmolarity, type I [juvenile type], not stated as uncontrolled, Diabetes with other coma, type II or unspecified type, not stated as uncontrolled, Diabetes with other coma, type I [juvenile type], not stated as uncontrolled, Diabetes with other coma, type II or unspecified type, uncontrolled, Diabetes with other coma, type I [juvenile type], uncontrolled, Diabetes with renal manifestations, type II or unspecified type, not stated as uncontrolled, Diabetes with renal manifestations, type I [juvenile type], not stated as uncontrolled, Diabetes with renal manifestations, type II or unspecified type, uncontrolled, Diabetes with renal manifestations, type I [juvenile type], uncontrolled, Diabetes with ophthalmic manifestations, type II or unspecified type, not stated as uncontrolled, Diabetes with ophthalmic manifestations, type I [juvenile type], not stated as uncontrolled, Diabetes with ophthalmic manifestations, type II or unspecified type, uncontrolled, Diabetes with ophthalmic manifestations, type I [juvenile type], uncontrolled, Diabetes with neurological manifestations, type II or unspecified type, not stated as uncontrolled, Diabetes with neurological manifestations, type I [juvenile type], not stated as uncontrolled, Diabetes with neurological manifestations, type II or unspecified type, uncontrolled, Diabetes with neurological manifestations, type I [juvenile type], uncontrolled, Diabetes with peripheral circulatory disorders, type II or unspecified type, not stated as uncontrolled, Diabetes with peripheral circulatory disorders, type I [juvenile type], not stated as uncontrolled, Diabetes with peripheral circulatory disorders, type II or unspecified type, uncontrolled, Diabetes with peripheral circulatory disorders, type I [juvenile type], uncontrolled, Diabetes with other specified manifestations, type II or unspecified type, not stated as uncontrolled, Diabetes with other specified manifestations, type I [juvenile type], uncontrolled, Diabetes with other specified manifestations, type II or unspecified type, uncontrolled, Diabetes with other specified manifestations, type I [juvenile type], uncontrolled, Diabetes with unspecified complication, type II or unspecified type, not stated as uncontrolled, Diabetes with unspecified complication, type I [juvenile type], not stated as uncontrolled, Diabetes with unspecified complication, type II or unspecified type, uncontrolled, Diabetes with unspecified complication, type I [juvenile type], uncontrolled, Polyneuropathy in diabetes, Background diabetic retinopathy, Proliferative diabetic retinopathy, Nonproliferative diabetic

Covariate	Code type	Data codes	Data code definitions
			retinopathy NOS, Mild nonproliferative diabetic retinopathy, Moderate nonproliferative diabetic retinopathy, Severe nonproliferative diabetic retinopathy, Diabetic macular edema, Diabetic cataract, Acetonuria
Diabetes	ICD-10	E08.00, E08.01, E08.10, E08.11, E08.21, E08.22, E08.29, E08.311, E08.319, E08.321, E08.329, E08.331, E08.339, E08.341, E08.349, E08.351, E08.359, E08.36, E08.39, E08.40, E08.41, E08.42, E08.43, E08.44, E08.49, E08.51, E08.52, E08.610, E08.618, E08.620, E08.621, E08.622, E08.628, E08.630, E08.638, E08.641, E08.649, E08.65, E08.69, E08.8, E08.9, E08.90, E09.00, E09.01, E09.10, E09.11, E09.21, E09.22, E09.29, E09.311, E09.319, E09.321, E09.329, E09.331, E09.339, E09.341, E09.349, E09.351, E09.359, E09.36, E09.39, E09.40, E09.41, E09.42, E09.43, E09.44, E09.49, E09.51, E09.52, E09.59, E09.610, E09.618, E09.620, E09.621, E09.622, E09.628, E09.630, E09.638, E09.641, E09.649, E09.65, E09.69, E09.8, E09.9, E10.10, E10.11, E10.21, E10.22, E10.29, E10.311, E10.319, E10.321, E10.329, E10.331, E10.339, E10.341, E10.349, E10.351, E10.359, E10.36, E10.39, E10.40, E10.41, E10.42, E10.43, E10.44, E10.49, E10.51, E10.52, E10.59, E10.610, E10.618, E10.620, E10.621, E10.622, E10.628, E10.630, E10.638, E10.641, E10.649, E10.65, E10.69, E10.8,	Diabetes Mellitus Due To Underlying Condition With Hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC), Diabetes Mellitus Due To Underlying Condition With Hyperosmolarity With Coma, Diabetes Mellitus Due To Underlying Condition With Ketoacidosis Without Coma, Diabetes Mellitus Due To Underlying Condition With Ketoacidosis With Coma, Diabetes Mellitus Due To Underlying Condition With Diabetic Nephropathy, Diabetes Mellitus Due To Underlying Condition With Diabetic chronic kidney disease, Diabetes Mellitus Due to underlying condition with other diabetic kidney complication, Diabetes Mellitus Due To Underlying Condition With Unspecified Diabetic Retinopathy With Macular Edema, Diabetes Mellitus Due To Underlying Condition With Unspecified Diabetic Retinopathy Without Macular Edema, Diabetes Mellitus due to underlying condition with mild nonproliferative diabetic retinopathy with macular edema, Diabetes mellitus due to underlying condition with mild nonproliferative diabetic retinopathy without macular edema, Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy with macular edema, Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy without macular edema, Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy with macular edema, Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy without macular edema, Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy with macular edema, Diabetes mellitus due to underlying condition with proliferative diabetic retinopathy without macular edema, Diabetes Mellitus Due To Underlying Condition With Diabetic Cataract, Diabetes Mellitus Due To Underlying Condition With Other Diabetic Ophthalmic Complication, Diabetes Mellitus Due To Underlying Condition With Diabetic Neuropathy, Unspecified, Diabetes Mellitus Due To Underlying Condition With Diabetic Mononeuropathy, Diabetes Mellitus Due To Underlying Condition With Diabetic Polyneuropathy, Diabetes Mellitus Due To Underlying Condition With Diabetic Autonomic (Poly)Neuropathy, Diabetes Mellitus Due To Underlying Condition With Diabetic Amyotrophy, Diabetes Mellitus Due To Underlying Condition With Other Diabetic Neurological Complication, Diabetes Mellitus Due To Underlying Condition With Diabetic Peripheral Angiopathy Without Gangrene, Diabetes Mellitus Due To Underlying Condition With Diabetic Neuropathic Arthropathy, Diabetes Mellitus Due To Underlying Condition with diabetic neuropathic arthropathy, Diabetes Mellitus Due To Underlying Condition With Diabetic arthropathy, Diabetes Mellitus Due To Underlying Condition With diabetic dermatitis, Diabetes Mellitus Due To Underlying Condition With Foot Ulcer, Diabetes Mellitus Due To Underlying Condition With Other Skin ulcer, Diabetes Mellitus Due To Underlying Condition With other skin complications, Diabetes Mellitus Due To Underlying Condition With periodontal disease, Diabetes Mellitus Due To Underlying Condition With other oral complications, Diabetes Mellitus Due To Underlying Condition With hypoglycemia with coma, Diabetes mellitus due to underlying condition with hypoglycemia without coma, Diabetes Mellitus Due To Underlying Condition With Hyperglycemia, Diabetes Mellitus Due To Underlying Condition With Other Specified Complication, Diabetes Mellitus Due To Underlying Condition With Unspecified Complications, Diabetes mellitus due to underlying condition without Complications, Diabetes Mellitus Due To Underlying Condition Without Complications, Drug or Chemical induced diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC), Drug Or Chemical Induced Diabetes Mellitus With Hyperosmolarity With Coma, Drug Or Chemical Induced Diabetes Mellitus With Ketoacidosis Without Coma, Drug Or Chemical Induced Diabetes Mellitus With Ketoacidosis With Coma, Drug Or Chemical Induced Diabetes Mellitus With Diabetic Nephropathy, Drug Or Chemical Induced Diabetes Mellitus With diabetic chronic kidney disease, Drug or chemical induced diabetes mellitus with other diabetic kidney complication, Drug Or Chemical Induced Diabetes Mellitus With Unspecified Diabetic Retinopathy With Macular Edema, Drug Or Chemical Induced Diabetes Mellitus With Unspecified Diabetic Retinopathy Without Macular Edema, Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, Drug or chemical induced diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, Drug or chemical induced diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, Drug or chemical induced diabetes mellitus with severe

Covariate	Code type	Data codes	Data code definitions
		E10.9, E11.00, E11.01, E11.21, E11.22, E11.29, E11.311, E11.319, E11.321, E11.329, E11.331, E11.339, E11.341, E11.349, E11.351, E11.359, E11.36, E11.39, E11.40, E11.41, E11.42, E11.51, E11.52, E11.59, E11.610, E11.618, E11.620, E11.621, E11.622, E11.628, E11.630, E11.638, E11.641, E11.649, E11.65, E11.69, E11.8, E11.9, E13.00, E13.01, E13.10, E13.11, E13.21, E13.22, E13.29, E13.311, E13.319, E13.321, E13.329, E13.331, E13.339, E13.341, E13.349, E13.351, E13.359, E13.36, E13.39, E13.40, E13.41, E13.42, E13.43, E13.44, E13.49, E13.51, E13.52, E13.59, E13.610, E13.618, E13.620, E13.621, E13.622, E13.628, E13.630, E13.638, E13.641, E13.649, E13.65, E13.69, E13.8, E13.9, R82.4	nonproliferative diabetic retinopathy with macular edema, Drug or chemical induced diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy with macular edema, Drug or chemical induced diabetes mellitus with proliferative diabetic retinopathy without macular edema, Drug Or Chemical Induced Diabetes Mellitus With Diabetic Cataract, Drug Or Chemical Induced Diabetes Mellitus With Other Diabetic Ophthalmic Complication, Drug Or Chemical Induced Diabetes Mellitus With Neurological Complications With Diabetic Neuropathy, Unspecified, Drug Or Chemical Induced Diabetes Mellitus With Neurological Complications With Diabetic Mononeuropathy, Drug Or Chemical Induced Diabetes Mellitus With Neurological Complications With Diabetic Polyneuropathy, Drug Or Chemical Induced Diabetes Mellitus With Neurological Complications With Diabetic Autonomic (Poly)Neuropathy, Drug Or Chemical Induced Diabetes Mellitus With Neurological Complications With Diabetic Amyotrophy, Drug Or Chemical Induced Diabetes Mellitus With Neurological Complications With Other Diabetic Neurological Complication, Drug Or Chemical Induced Diabetes Mellitus With Diabetic Peripheral Angiopathy Without Gangrene, Drug Or Chemical Induced Diabetes Mellitus With Diabetic peripheral angiopathy with gangrene, Drug or chemical induced diabetes mellitus with other circulatory complications, Drug Or Chemical Induced Diabetes Mellitus With Diabetic neuropathic Arthropathy, Drug or chemical induced diabetes mellitus with other diabetic arthropathy, Drug Or Chemical Induced Diabetes Mellitus With diabetic dermatitis, Drug Or Chemical Induced Diabetes Mellitus With foot ulcer, Drug Or Chemical Induced Diabetes Mellitus With Other Skin ulcer, Drug Or Chemical Induced Diabetes Mellitus With other skin complications, Drug Or Chemical Induced Diabetes Mellitus With periodontal disease, Drug Or Chemical Induced Diabetes Mellitus With other oral complications, Drug Or Chemical Induced Diabetes Mellitus With Hypoglycemia with coma, Drug Or Chemical Induced Diabetes Mellitus With hypoglycemia without coma, Drug Or Chemical Induced Diabetes Mellitus With Hyperglycemia, Drug Or Chemical Induced Diabetes Mellitus With Other Specified Complication, Drug Or Chemical Induced Diabetes Mellitus With Unspecified Complications, Drug Or Chemical Induced Diabetes Mellitus without complications, Type 1 Diabetes Mellitus With Ketoacidosis Without Coma, Type 1 Diabetes Mellitus With Ketoacidosis With Coma, Type 1 Diabetes Mellitus With Diabetic Nephropathy, Type 1 Diabetes Mellitus With diabetic chronic kidney disease, Type 1 Diabetes Mellitus With other diabetic kidney complication, Type 1 Diabetes Mellitus With Unspecified Diabetic Retinopathy With Macular Edema, Type 1 Diabetes Mellitus With Unspecified Diabetic Retinopathy Without Macular Edema, Type 1 Diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, Type 1 Diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, Type 1 diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, Type 1 diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema, Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema, Type 1 Diabetes Mellitus With Diabetic Cataract, Type 1 Diabetes Mellitus With Other Diabetic Ophthalmic Complication, Type 1 Diabetes Mellitus With Diabetic Neuropathy, Unspecified, Type 1 Diabetes Mellitus With diabetic mononeuropathy, Type 1 Diabetes Mellitus With Diabetic polyneuropathy, Type 1 Diabetes mellitus with diabetic autonomic (poly)neuropathy, Type 1 diabetes mellitus with diabetic amyotrophy, Type 1 diabetes mellitus with other diabetic neurological complication, Type 1 Diabetes Mellitus With Diabetic Peripheral Angiopathy Without Gangrene, Type 1 diabetes mellitus with diabetic peripheral angiopathy with gangrene, Type 1 diabetes mellitus with other circulatory complications, Type 1 diabetes mellitus with diabetic neuropathic arthropathy, Type 1 Diabetes Mellitus With Diabetic arthropathy, Type 1 Diabetes Mellitus With diabetic dermatitis, Type 1 Diabetes Mellitus With Other foot ulcer, Type 1 Diabetes Mellitus With Other Skin ulcer, Type 1 Diabetes Mellitus With other skin complications, Type 1 Diabetes Mellitus With periodontal disease, Type 1 Diabetes Mellitus With other oral complications, Type 1 Diabetes Mellitus With Hypoglycemia With Coma, Type 1 Diabetes Mellitus With Hypoglycemia without coma, Type 1 Diabetes Mellitus With Hyperglycemia, Type 1 Diabetes Mellitus With Other Specified Complication, Type 1 Diabetes Mellitus With Unspecified Complications, Type 1 Diabetes Mellitus Without Complications, Type 2 Diabetes Mellitus With Hyperosmolarity Without Nonketotic Hyperglycemic-Hyperosmolar Coma (Nkhhc), Type 2 Diabetes Mellitus With Hyperosmolarity With Coma,

Covariate	Code type	Data codes	Data code definitions
			<p>Type 2 diabetes mellitus with diabetic nephropathy, Type 2 diabetes mellitus with diabetic chronic kidney disease, Type 2 diabetes mellitus with other diabetic kidney complication, Type 2 Diabetes Mellitus With Unspecified Diabetic Retinopathy With Macular Edema, Type 2 Diabetes Mellitus With Unspecified Diabetic Retinopathy Without Macular Edema, Type 2 Diabetes Mellitus With Mild Nonproliferative Diabetic Retinopathy With Macular Edema, Type 2 Diabetes Mellitus With Mild Nonproliferative Diabetic Retinopathy Without Macular Edema, Type 2 Diabetes Mellitus With Moderate Nonproliferative Diabetic Retinopathy With Macular Edema, Type 2 Diabetes Mellitus with moderate nonproliferative diabetic retinopathy Without Macular Edema, Type 2 Diabetes Mellitus With Severe Nonproliferative Diabetic Retinopathy With Macular Edema, Type 2 Diabetes Mellitus With severe nonproliferative Diabetic Retinopathy Without Macular Edema, Type 2 Diabetes Mellitus with proliferative diabetic retinopathy with macular edema, Type 2 Diabetes Mellitus With proliferative diabetic retinopathy without macular edema, Type 2 Diabetes Mellitus With Diabetic Cataract, Type 2 Diabetes Mellitus With Other Diabetic Ophthalmic Complication, Type 2 Diabetes Mellitus With Diabetic Neuropathy, Unspecified, Type 2 Diabetes Mellitus With Diabetic mononeuropathy, Type 2 Diabetes Mellitus with diabetic polyneuropathy, Type 2 Diabetes Mellitus With Diabetic Peripheral Angiopathy Without Gangrene, Type 2 Diabetes Mellitus With diabetic peripheral Angiopathy With Gangrene, Type 2 Diabetes Mellitus with other circulatory complications, Type 2 diabetes mellitus with diabetic neuropathic arthropathy, Type 2 diabetes mellitus with other diabetic arthropathy, Type 2 Diabetes Mellitus with diabetic dermatitis, Type 2 Diabetes Mellitus With foot ulcer, Type 2 Diabetes Mellitus With Other Skin ulcer, Type 2 Diabetes Mellitus With other skin complications, Type 2 Diabetes Mellitus With periodontal disease, Type 2 Diabetes Mellitus With other oral complications, Type 2 Diabetes Mellitus With Hypoglycemia With Coma, Type 2 Diabetes Mellitus With Hypoglycemia without coma, Type 2 Diabetes Mellitus With Hyperglycemia, Type 2 Diabetes Mellitus With Other Specified Complication, Type 2 Diabetes Mellitus With Unspecified Complications, Type 2 Diabetes Mellitus Without Complications, Other specified diabetes mellitus with hyperosmolarity without nonketotic hyperglycemic-hyperosmolar coma (NKHHC), Other specified diabetes mellitus with hyperosmolarity with coma, Other specified diabetes mellitus with ketoacidosis without coma, Other specified diabetes mellitus with ketoacidosis with coma, Other specified diabetes mellitus with diabetic nephropathy, Other specified diabetes mellitus with diabetic chronic kidney disease, Other specified diabetes mellitus with other diabetic kidney complication, Other specified diabetes mellitus with unspecified diabetic retinopathy with macular edema, Other specified diabetes mellitus with unspecified diabetic retinopathy without macular edema, Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy with macular edema, Other specified diabetes mellitus with mild nonproliferative diabetic retinopathy without macular edema, Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy with macular edema, Other specified diabetes mellitus with moderate nonproliferative diabetic retinopathy without macular edema, Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy with macular edema, Other specified diabetes mellitus with severe nonproliferative diabetic retinopathy without macular edema, Other specified diabetes mellitus with proliferative diabetic retinopathy with macular edema, Other specified diabetes mellitus with proliferative diabetic retinopathy without macular edema, Other Specified Diabetes Mellitus With diabetic cataract, Other Specified Diabetes Mellitus With other diabetic ophthalmic complication, Other Specified Diabetes Mellitus With Diabetic neuropathy, unspecified, Other Specified Diabetes Mellitus With Diabetic mononeuropathy, Other Specified Diabetes Mellitus With Diabetic Polyneuropathy, Other Specified Diabetes Mellitus With Diabetic Autonomic (Poly)Neuropathy, Other Specified Diabetes Mellitus With Diabetic Amyotrophy, Other Specified Diabetes Mellitus With Other Diabetic Neurological Complication, Other specified diabetes mellitus with diabetic peripheral angiopathy without gangrene, Other specified diabetes mellitus with diabetic peripheral angiopathy with gangrene, Other Specified Diabetes Mellitus With Other Circulatory Complications, Other specified diabetes mellitus with diabetic neuropathic arthropathy, Other specified diabetes mellitus with other diabetic arthropathy, Other Specified Diabetes Mellitus With Diabetic Dermatitis, Other Specified Diabetes Mellitus With Foot Ulcer, Other Specified Diabetes Mellitus With Other Skin Ulcer, Other specified diabetes mellitus with other skin complications, Other specified diabetes mellitus with periodontal disease, Other specified diabetes mellitus with other oral complications, Other Specified Diabetes Mellitus With Hypoglycemia With Coma, Other Specified Diabetes Mellitus With Hypoglycemia Without Coma, Other Specified Diabetes Mellitus With Hyperglycemia, Other Specified Diabetes Mellitus With Other Specified</p>

Covariate	Code type	Data codes	Data code definitions
			Complication, Other Specified Diabetes Mellitus With Unspecified Complications, Other Specified Diabetes Mellitus Without Complications, Acetonuria
Diabetes	Med	metformin, glucophage, riomet, fortamet, glumetzia, chlorpropamide, glimepiride, glyburide, glipizide, tolazamide, tolbutamide, diabinese, amaryl, diabeta, micronase, glucocontrol, glynase, tolinase, orinase, tolbutamide, repaglinide, nateglinide, prandin, starlix, pioglitazone, rosiglitazone, actos, avandia, sitagliptin, saxagliptin, linagliptin, alogliptin, januvia, onglyza, tradjenta, nesina, acarbose, miglitol, precose, glyset, pramlintide, symlin, liraglutide, exenatide, albiglutide, dulaglutide, victoza, bydureon, byetta, tanzeum, trulicity, canagliflozin, dapagliflozin, empagliflozin, invokana, farxiga, jardiance, actoplus, glucovance, metaglip, janumet, kombiglyze, prandimet, duetact, kazano, invokamet, xigduo, synjardy, jentaducto, avandamet, oseni, glyxambi, avandaryl, juvisync, glargine, basaglar, lantus, toujeo, detemir, degludec, levemir, tresiba	Biguanides, Sulfonylureas, Meglitinides, Thiazolidinediones, DPP-4 Inhibitors, Alpha-glucosidase inhibitors, Amylin analogue, GLP-1 Agonist, SGLT2 Inhibitor, Combination pills, long-actin insulin
Heart Failure	ICD-9	398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428, 428.1, 428.2, 428.21, 428.22, 428.23, 428.3, 428.31, 428.32, 428.33, 428.4, 428.41, 428.42, 428.43, 428.9	Rheumatic heart failure (congestive), Malignant hypertensive heart disease with heart failure, Benign hypertensive heart disease with heart failure, Unspecified hypertensive heart disease with heart failure, Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease, Congestive heart failure, unspecified, Left heart failure, Systolic heart failure,



Covariate	Code type	Data codes	Data code definitions
			unspecified, Acute systolic heart failure, Chronic systolic heart failure, Acute on chronic systolic heart failure, Diastolic heart failure, unspecified, Acute diastolic heart failure, Chronic diastolic heart failure, Acute on chronic diastolic heart failure, Combined systolic and diastolic heart failure, unspecified, Acute combined systolic and diastolic heart failure, Chronic combined systolic and diastolic heart failure, Acute on chronic combined systolic and diastolic heart failure, Heart failure, unspecified
Heart Failure	ICD-10	I09.81, I11.0, I13.0, I13.2, I50.1, I50.20, I50.21, I50.22, I50.23, I50.30, I50.31, I50.32, I50.33, I50.40, I50.41, I50.42, I50.43, I50.9, I97.130, I97.131	Rheumatic Heart Failure, Hypertensive Heart Disease With Heart Failure, Hypertensive Heart And Chronic Kidney Disease With Heart Failure And Stage 1 Through Stage 4 Chronic Kidney Disease, Or Unspecified Chronic Kidney Disease, Hypertensive Heart And Chronic Kidney Disease With Heart Failure And With Stage 5 Chronic Kidney Disease, Or End Stage Renal Disease, Left Ventricular Failure, Unspecified Systolic (Congestive) Heart Failure, Acute Systolic (Congestive) Heart Failure, Chronic Systolic (Congestive) Heart Failure, Acute On Chronic Systolic (Congestive) Heart Failure, Unspecified Diastolic (Congestive) Heart Failure, Acute Diastolic (Congestive) Heart Failure, Chronic Diastolic (Congestive) Heart Failure, Acute On Chronic Diastolic (Congestive) Heart Failure, Unspecified Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Acute Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Chronic Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Acute On Chronic Combined Systolic (Congestive) And Diastolic (Congestive) Heart Failure, Heart Failure, Unspecified, Postprocedural heart failure following cardiac surgery, Postprocedural heart failure following other surgery
Coronary Heart Disease	ICD-9	411, 411.1, 411.81, 411.89, 413, 413.9, 414, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.1, 414.11, 414.19, 414.2, 414.3, 414.4, 414.8, 414.9, 429.2, 996.03, V45.81, V45.82	Postmyocardial infarction syndrome, Intermediate coronary syndrome, Acute coronary occlusion without myocardial infarction, Other acute and subacute forms of ischemic heart disease, other, Angina decubitus, Other and unspecified angina pectoris, Coronary atherosclerosis of unspecified type of vessel, native or graft, Coronary atherosclerosis of native coronary artery, Coronary atherosclerosis of autologous vein bypass graft, Coronary atherosclerosis of nonautologous biological bypass graft, Coronary atherosclerosis of artery bypass graft, Coronary atherosclerosis of unspecified bypass graft, Coronary atherosclerosis of native coronary artery of transplanted heart, Coronary atherosclerosis of bypass graft (artery) (vein) of transplanted heart, Aneurysm of heart (wall), Aneurysm of coronary vessels, Chronic ischemic heart disease, unspecified, Chronic total occlusion of coronary artery, Coronary atherosclerosis due to lipid rich plaque, Coronary atherosclerosis due to calcified coronary lesion, Other specified forms of chronic ischemic heart disease, Chronic ischemic heart disease, unspecified, Cardiovascular disease, unspecified, Mechanical complication due to coronary bypass graft, Aortocoronary bypass status, Percutaneous transluminal coronary angioplasty status
Coronary Heart Disease	ICD-10	I20.0, I20.1, I20.8, I20.9, I21.01, I21.02, I21.09, I21.11, I21.19, I21.21, I21.29, I21.3, I21.4, I22.0, I22.1, I22.2, I22.8, I22.9, I23.0, I23.1, I23.2, I23.3, I23.4, I23.5, I23.6, I23.7, I23.8, I24.0, I24.8, I25.10, I25.110, I25.111, I25.118, I25.119, I25.3, I25.41, I25.42, I25.6, I25.700, I25.701, I25.708, I25.709, I25.710, I25.711, I25.718, I25.719, I25.720, I25.721, I25.728, I25.729, I25.730, I25.731, I25.738, I25.739, I25.790, I25.791, I25.798, I25.799, I25.810, I25.811, I25.812, I25.82,	Unstable angina, Angina pectoris with documented spasm, Other forms of angina pectoris, Angina pectoris, unspecified, ST elevation (STEMI) myocardial infarction involving left main coronary artery, ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery, ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall, ST elevation (STEMI) myocardial infarction involving right coronary artery, ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall, ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery, ST elevation (STEMI) myocardial infarction involving other sites, ST elevation (STEMI) myocardial infarction of unspecified site, Non-ST elevation (NSTEMI) myocardial infarction, Subsequent ST elevation (STEMI) myocardial infarction of anterior wall, Subsequent ST elevation (STEMI) myocardial infarction of inferior wall, Subsequent non-ST elevation (NSTEMI) myocardial infarction, Subsequent ST elevation (STEMI) myocardial infarction of other sites, Subsequent ST elevation (STEMI) myocardial infarction of unspecified site, Hemopericardium as current complication following acute myocardial infarction, Atrial septal defect as current complication following acute myocardial infarction, Ventricular septal defect as current complication following acute myocardial infarction, Rupture of cardiac wall without hemopericardium as current complication following acute myocardial infarction, Rupture of chordae tendineae as current complication following acute myocardial infarction, Rupture of papillary muscle as current complication following acute myocardial infarction, Thrombosis of atrium, auricular appendage, and ventricle as current complications following acute myocardial infarction, Postinfarction angina, Other current complications following acute myocardial infarction, Acute coronary thrombosis not resulting in myocardial infarction, Other forms of acute ischemic heart disease, Atherosclerotic heart disease of native coronary artery without angina pectoris, Atherosclerotic heart disease of native coronary artery with unstable angina pectoris, Atherosclerotic heart disease of native coronary artery with angina pectoris with documented spasm, Atherosclerotic heart disease of native coronary artery with other forms of angina pectoris, Atherosclerotic



Covariate	Code type	Data codes	Data code definitions
			kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease, Malignant renovascular hypertension, Other malignant secondary hypertension, Benign renovascular hypertension, Other benign secondary hypertension, Unspecified renovascular hypertension, Other unspecified secondary hypertension, Hypertensive encephalopathy, Elevated blood pressure reading without diagnosis of hypertension
Hypertension	ICD-10	I10, I11.0, I11.9, I12.0, I12.9, I13.0, I13.10, I13.11, I13.2, I15.0, I15.1, I15.2, I15.8, I15.9	Essential (Primary) Hypertension, Hypertensive Heart Disease with Heart Failure, Hypertensive Heart Disease without Heart Failure, Hypertensive Chronic Kidney Disease with Stage 5 Chronic Kidney Disease or end stage renal disease, Hypertensive Chronic Kidney Disease with Stage 1 through Stage 4 Chronic Kidney Disease, or unspecified chronic kidney disease, Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease, Hypertensive heart and chronic kidney disease without heart failure, with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease, Hypertensive heart and chronic kidney disease without heart failure, with stage 5 chronic kidney disease, or end stage renal disease, Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease, Renovascular Hypertension, Hypertension secondary to other renal disorders, Hypertension secondary to endocrine disorders, Other Secondary Hypertension, Secondary hypertension, unspecified
Valvular Disease	ICD-9	35.05, 35.06, 35.1, 35.11, 35.12, 35.13, 35.14, 35.2, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28, 35.96, 394, 394.1, 394.2, 394.9, 396, 396.1, 396.2, 396.3, 396.8, 396.9, V42.2, V43.3	Endovascular replacement of aortic valve, Transapical replacement of aortic valve, Open heart valvuloplasty without replacement, unspecified valve, Open heart valvuloplasty of aortic valve without replacement, Open heart valvuloplasty of mitral valve without replacement, Open heart valvuloplasty of pulmonary valve without replacement, Open heart valvuloplasty of tricuspid valve without replacement, Open and other replacement of unspecified heart valve, Open and other replacement of aortic valve with tissue graft, Open and other replacement of aortic valve, Open and other replacement of mitral valve with tissue graft, Open and other replacement of mitral valve, Open and other replacement of pulmonary valve with tissue graft, Open and other replacement of pulmonary valve, Open and other replacement of tricuspid valve with tissue graft, Open and other replacement of tricuspid valve, Percutaneous balloon valvuloplasty, Mitral stenosis, Rheumatic Mitral Insufficiency, Mitral stenosis with insufficiency, Other unspecified mitral valve disease, Mitral valve stenosis and aortic valve stenosis, Mitral valve stenosis and aortic valve insufficiency, Mitral valve insufficiency and aortic valve stenosis, Mitral valve insufficiency and aortic valve insufficiency, Multiple involvement of mitral and aortic valves, Mitral and aortic valve diseases, unspecified, Heart valve replaced by transplant, Heart valve replaced by other means
Valvular Disease	ICD-10	I05.0, I05.1, I05.2, I05.8, I05.9, I06.8, I06.9, I07.8, I07.9, I08.0, I08.1, I08.3, I08.8, I08.9, I09.1, I34.0, I34.1, I34.2, I34.8, I34.9, I35.0, I35.1, I35.2, I35.8, I35.9, I36.0, I36.1, I36.2, I36.8, I36.9, I37.0, I37.1, I37.2, I37.8, I37.9, I38	Rheumatic Mitral Stenosis, Rheumatic Mitral Insufficiency, Rheumatic Mitral Stenosis With Insufficiency, Other Rheumatic Mitral Valve Diseases, Rheumatic mitral valve disease, unspecified, Other rheumatic aortic valve diseases, Rheumatic aortic valve disease, unspecified, Other rheumatic tricuspid valve diseases, Rheumatic tricuspid valve disease, unspecified, Rheumatic Disorders Of Both Mitral And Aortic Valves, Rheumatic Disorders Of Both Mitral And tricuspid Valves, Combined rheumatic disorders of mitral, aortic, and tricuspid valves, Other Rheumatic Multiple Valve Diseases, Rheumatic Multiple Valve Disease, Unspecified, Rheumatic diseases of endocardium, valve unspecified, Nonrheumatic mitral (valve) insufficiency, Nonrheumatic mitral (valve) prolapse, Nonrheumatic mitral (valve) stenosis, Other nonrheumatic mitral valve disorders, Nonrheumatic mitral valve disorder, unspecified, Nonrheumatic aortic (valve) stenosis, Nonrheumatic aortic (valve) insufficiency, Nonrheumatic aortic (valve) stenosis with insufficiency, Other nonrheumatic aortic valve disorders, Nonrheumatic aortic valve disorder, unspecified, Nonrheumatic tricuspid (valve) stenosis, Nonrheumatic tricuspid (valve) insufficiency, Nonrheumatic tricuspid (valve) stenosis with insufficiency, Other nonrheumatic tricuspid valve disorders, Nonrheumatic tricuspid valve disorder, unspecified, Nonrheumatic pulmonary valve stenosis, Nonrheumatic pulmonary valve insufficiency, Nonrheumatic pulmonary valve stenosis with insufficiency, Other nonrheumatic pulmonary valve disorders, Nonrheumatic pulmonary valve disorder, unspecified, Endocarditis, valve unspecified
Valvular Disease	CPT	33400, 33401, 33403, 33405, 33406, 33411, 33412, 33413, 33420, 33422, 33425, 33426, 33427, 33430, 33606, 33611,	Repair Of Aortic Valve, Valvuloplasty, Open, Valvuloplasty, W/Cp Bypass, Replacement Of Aortic Valve, Replacement Of Aortic Valve, Replacement Of Aortic Valve, Replacement Of Aortic Valve, Revision Of Mitral Valve, Revision Of Mitral Valve, Repair Of Mitral Valve, Repair Of Mitral Valve, Repair Of Mitral Valve, Replacement Of Mitral Valve, Anastomosis/artery-aorta, Repair double ventricle, Repair double ventricle, Revision of heart veins, Repair of heart defects, Repair

Covariate	Code type	Data codes	Data code definitions
		33612, 33645, 33665, 33670, 33681, 33684, 33688, 33690	of heart chambers , Repair heart septum defect , Repair heart septum defect , Repair heart septum defect , Reinforce pulmonary artery
Stroke/TIA	ICD-9	362.31, 362.32, 362.33, 362.34, 388.02, 430, 431, 432.9, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434, 434.01, 434.1, 434.11, 434.9, 434.91, 435, 435.1, 435.2, 435.3, 435.8, 435.9, 437.1, 437.7, 437.9, 438.1, 438.11, 438.12, 438.13, 438.14, 438.2, 438.21, 438.22, 438.81, 438.82, 438.83, 438.89, 438.9, 997.02, V12.54	Central retinal artery occlusion, Retinal arterial branch occlusion, Partial retinal arterial occlusion, Transient retinal arterial occlusion, Transient ischemic deafness, Subarachnoid hemorrhage, Intracerebral hemorrhage, Unspecified intracranial hemorrhage, Occlusion and stenosis of basilar artery with cerebral infarction, Occlusion and stenosis of carotid artery with cerebral infarction, Occlusion and stenosis of vertebral artery with cerebral infarction, Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction, Occlusion and stenosis of other specified precerebral artery with cerebral infarction, Occlusion and stenosis of unspecified precerebral artery with cerebral infarction, Cerebral thrombosis without mention of cerebral infarction, Cerebral thrombosis with cerebral infarction, Cerebral embolism without mention of cerebral infarction, Cerebral embolism with cerebral infarction, Cerebral artery occlusion, unspecified without mention of cerebral infarction, Cerebral artery occlusion, unspecified with cerebral infarction, Basilar artery syndrome, Vertebral artery syndrome , Subclavian steal syndrome, Vertebrobasilar artery syndrome, Other specified transient cerebral ischemias, Unspecified transient cerebral ischemia, Other generalized ischemic cerebrovascular disease, Transient global amnesia, Unspecified cerebrovascular disease, Late effects of cerebrovascular disease, speech and language deficit, unspecified, Late effects of cerebrovascular disease, aphasia, Late effects of cerebrovascular disease, dysphasia, Late effects of cerebrovascular disease, dysarthria, Late effects of cerebrovascular disease, fluency disorder, Late effects of cerebrovascular disease, hemiplegia affecting unspecified side, Late effects of cerebrovascular disease, hemiplegia affecting dominant side, Late effects of cerebrovascular disease, hemiplegia affecting nondominant side, Other late effects of cerebrovascular disease, apraxia, Other late effects of cerebrovascular disease, dysphagia, Other late effects of cerebrovascular disease, facial weakness, Other late effects of cerebrovascular disease, Unspecified late effects of cerebrovascular disease, Iatrogenic cerebrovascular infarction or hemorrhage, Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits
Stroke/TIA	IDC10	G45.0, G45.1, G45.2, G45.3, G45.4, G45.8, G46.3, G46.4, H34.00, H34.01, H34.02, H34.03, H34.10, H34.11, H34.12, H34.13, H34.211, H34.212, H34.213, H34.219, H34.231, H34.232, H34.233, H34.239, H93.099, I60.9, I61.9, I62.9, I63.00, I63.011, I63.012, I63.019, I63.111, I63.112, I63.119, I63.12, I63.131, I63.132, I63.139, I63.19, I63.20, I63.211, I63.212, I63.219, I63.22, I63.231, I63.232, I63.239, I63.29, I63.30, I63.311, I63.312, I63.319, I63.321, I63.322, I63.329, I63.331, I63.332, I63.339, I63.341, I63.342, I63.349, I63.40, I63.411, I63.412, I63.419, I63.421, I63.422, I63.429,	Vertebro-Basilar Artery Syndrome, Carotid Artery Syndrome, Multiple and bilateral precerebral artery syndromes, Amaurosis fugax, Transient Global Amnesia, Other transient cerebral ischemic attacks and related syndromes, Brain stem stroke syndrome, Cerebellar stroke syndrome, Transient Retinal Artery Occlusion, Unspecified Eye, Transient retinal artery occlusion, right eye, Transient retinal artery occlusion, left eye, Transient retinal artery occlusion, bilateral, Central retinal artery occlusion, unspecified eye, Central retinal artery occlusion, right eye, Central retinal artery occlusion, left eye, Central retinal artery occlusion, bilateral, Partial retinal artery occlusion, right eye, Partial retinal artery occlusion, left eye, Partial retinal artery occlusion, bilateral, Partial Retinal Artery Occlusion, Unspecified Eye, Retinal artery branch occlusion, right eye, Retinal artery branch occlusion, left eye, Retinal artery branch occlusion, bilateral, Retinal Artery Branch Occlusion, Unspecified Eye, Unspecified Degenerative and Vascular Disorders of Unspecified Ear, Nontraumatic Subarachnoid Hemorrhage, Unspecified, Nontraumatic intracerebral Hemorrhage, unspecified, Nontraumatic Intracranial Hemorrhage, Unspecified, Cerebral infarction due to thrombosis of unspecified precerebral artery, Cerebral infarction due to thrombosis of right vertebral artery, Cerebral infarction due to thrombosis of left vertebral artery, Cerebral infarction due to thrombosis of unspecified vertebral artery, Cerebral infarction due to embolism of right vertebral artery, Cerebral infarction due to embolism of left vertebral artery, Cerebral infarction due to embolism of unspecified vertebral artery , Cerebral infarction due to embolism of basilar artery, Cerebral infarction due to embolism of right carotid artery, Cerebral infarction due to embolism of left carotid artery, Cerebral infarction due to embolism of unspecified carotid artery, Cerebral infarction due to embolism of other precerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries , Cerebral infarction due to unspecified occlusion or stenosis of right vertebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of left vertebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries, Cerebral Infarction Due to Unspecified Occlusion or Stenosis of Basilar Arteries, Cerebral infarction due to unspecified occlusion or stenosis of right carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of left carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of other precerebral arteries, Cerebral infarction due to thrombosis of unspecified

Covariate	Code type	Data codes	Data code definitions
		I63.431, I63.432, I63.439, I63.49, I63.50, I63.511, I63.512, I63.519, I63.521, I63.522, I63.529, I63.531, I63.532, I63.539, I63.541, I63.542, I63.549, I63.59, I63.6, I63.8, I63.9, I66.01, I66.02, I66.03, I66.09, I66.11, I66.12, I66.13, I66.19, I66.21, I66.22, I66.23, I66.29, I66.3, I66.8, I66.9, I67.81, I67.82, I67.841, I67.848, I67.89, I67.9, I69.80, I69.81, I69.820, I69.821, I69.822, I69.823, I69.828, I69.831, I69.832, I69.833, I69.834, I69.839, I69.841, I69.842, I69.843, I69.844, I69.849, I69.851, I69.852, I69.853, I69.854, I69.859, I69.861, I69.862, I69.863, I69.864, I69.865, I69.869, I69.890, I69.891, I69.892, I69.893, I69.898, I69.90, I69.91, I69.920, I69.921, I69.922, I69.923, I69.928, I69.931, I69.932, I69.933, I69.934, I69.939, I69.941, I69.942, I69.943, I69.944, I69.949, I69.951, I69.952, I69.953, I69.954, I69.959, I69.961, I69.962, I69.963, I69.964, I69.965, I69.969, I69.990, I69.991, I69.992, I69.993, I69.998, I97.810, I97.811, I97.820, I97.821, Z86.73	<p>cerebral artery , Cerebral infarction due to thrombosis of right middle cerebral artery, Cerebral infarction due to thrombosis of left middle cerebral artery, Cerebral infarction due to thrombosis of unspecified middle cerebral artery, Cerebral infarction due to thrombosis of right anterior cerebral artery, Cerebral infarction due to thrombosis of left anterior cerebral artery, Cerebral infarction due to thrombosis of unspecified anterior cerebral artery, Cerebral infarction due to thrombosis of right posterior cerebral artery, Cerebral infarction due to thrombosis of left posterior cerebral artery, Cerebral infarction due to thrombosis of unspecified posterior cerebral artery, Cerebral infarction due to thrombosis of right cerebellar artery, Cerebral infarction due to thrombosis of left cerebellar artery, Cerebral infarction due to thrombosis of unspecified cerebellar artery, Cerebral infarction due to embolism of unspecified cerebral artery , Cerebral infarction due to embolism of right middle cerebral artery, Cerebral infarction due to embolism of left middle cerebral artery, Cerebral infarction due to embolism of unspecified middle cerebral artery, Cerebral infarction due to embolism of right anterior cerebral artery, Cerebral infarction due to embolism of left anterior cerebral artery, Cerebral infarction due to embolism of unspecified anterior cerebral artery, Cerebral infarction due to embolism of right posterior cerebral artery, Cerebral infarction due to embolism of left posterior cerebral artery, Cerebral infarction due to embolism of unspecified posterior cerebral artery , Cerebral infarction due to embolism of other cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery , Cerebral infarction due to unspecified occlusion or stenosis of right middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery , Cerebral infarction due to cerebral venous thrombosis, nonpyogenic, Other cerebral infarction, Cerebral infarction, unspecified, Occlusion and stenosis of right middle cerebral artery, Occlusion and stenosis of left middle cerebral artery, Occlusion and stenosis of bilateral middle cerebral arteries, Occlusion and stenosis of unspecified middle cerebral artery, Occlusion and stenosis of right anterior cerebral artery, Occlusion and stenosis of left anterior cerebral artery, Occlusion and stenosis of bilateral anterior cerebral arteries, Occlusion and stenosis of unspecified anterior cerebral artery, Occlusion and stenosis of right posterior cerebral artery, Occlusion and stenosis of left posterior cerebral artery, Occlusion and stenosis of bilateral posterior cerebral arteries, Occlusion and stenosis of unspecified posterior cerebral artery , Occlusion and stenosis of cerebellar arteries, Occlusion and stenosis of other cerebral arteries, Occlusion and stenosis of unspecified cerebral artery, Acute cerebrovascular insufficiency, Cerebral ischemia, Reversible cerebrovascular vasoconstriction syndrome, Other cerebrovascular vasospasm and vasoconstriction , Other cerebrovascular disease, Cerebrovascular Disease, unspecified, Unspecified sequelae of other cerebrovascular disease, Cognitive deficits following other cerebrovascular disease, Aphasia following other cerebrovascular disease, Dysphasia following other cerebrovascular disease, Dysarthria following other cerebrovascular disease, Fluency disorder following other cerebrovascular disease, Other speech and language deficits following other cerebrovascular disease, Monoplegia of upper limb following other cerebrovascular disease affecting right dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting left dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting right non-dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting left non-dominant side, Monoplegia of upper limb following other cerebrovascular disease affecting unspecified side, Monoplegia of lower limb following other cerebrovascular disease affecting right dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting left dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting right non-dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting left non-dominant side, Monoplegia of lower limb following other cerebrovascular disease affecting unspecified side,</p>

Covariate	Code type	Data codes	Data code definitions
			<p>Hemiplegia and hemiparesis following other cerebrovascular disease affecting right dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting left dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting right non-dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting left non-dominant side, Hemiplegia and hemiparesis following other cerebrovascular disease affecting unspecified side, Other paralytic syndrome following other cerebrovascular disease affecting right dominant side, Other paralytic syndrome following other cerebrovascular disease affecting left dominant side, Other paralytic syndrome following other cerebrovascular disease affecting right non-dominant side, Other paralytic syndrome following other cerebrovascular disease affecting left non-dominant side, Other paralytic syndrome following other cerebrovascular disease, bilateral, Other paralytic syndrome following other cerebrovascular disease affecting unspecified side, Apraxia following other cerebrovascular disease, Dysphagia following other cerebrovascular disease, Facial weakness following other cerebrovascular disease, Ataxia following other cerebrovascular disease, Other sequelae of other cerebrovascular disease , Unspecified Sequelae of unspecified cerebrovascular disease, Cognitive deficits following unspecified cerebrovascular disease, Aphasia following unspecified cerebrovascular disease, Dysphasia following unspecified cerebrovascular disease , Dysarthria following unspecified Cerebrovascular disease, Fluency disorder following unspecified cerebrovascular disease , Other speech and language deficits following unspecified cerebrovascular disease, Monoplegia of upper limb following unspecified cerebrovascular disease affecting right dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting left dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting right non-dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting left non-dominant side, Monoplegia of upper limb following unspecified cerebrovascular disease affecting unspecified side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting right dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting left dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting right non-dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting left non-dominant side, Monoplegia of lower limb following unspecified cerebrovascular disease affecting unspecified side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting right dominant side , Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting left dominant side , Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting right non-dominant side, Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting left non-dominant side , Hemiplegia and hemiparesis following unspecified cerebrovascular disease affecting unspecified side , Other paralytic syndrome following unspecified cerebrovascular disease affecting right dominant side, Other paralytic syndrome following unspecified cerebrovascular disease affecting left dominant side, Other paralytic syndrome following unspecified cerebrovascular disease affecting right non-dominant side, Other paralytic syndrome following unspecified cerebrovascular disease affecting left non-dominant side, Other paralytic syndrome following unspecified cerebrovascular disease, bilateral, Other paralytic syndrome following unspecified cerebrovascular disease affecting unspecified side, Apraxia following unspecified cerebrovascular disease, Dysphagia following unspecified cerebrovascular disease , Facial weakness following unspecified cerebrovascular disease , Ataxia following unspecified cerebrovascular disease, Other sequelae following unspecified cerebrovascular disease , Intraoperative Cerebrovascular Infarction During cardiac surgery, Intraoperative cerebrovascular infarction during other surgery , Postprocedural cerebrovascular infarction during cardiac surgery, Postprocedural cerebrovascular infarction during other surgery, Personal history of transient ischemic attack (TIA), and cerebral infarction without residual deficits</p>
Myocardial Infarction	ICD-9	410, 410.01, 410.02, 410.1, 410.11, 410.12, 410.2, 410.21, 410.22, 410.3, 410.31, 410.32, 410.4, 410.41, 410.42, 410.5, 410.51, 410.52, 410.6, 410.61, 410.62, 410.7,	<p>Acute myocardial infarction of anterolateral wall, episode of care unspecified, Acute myocardial infarction of anterolateral wall, initial episode of care, Acute myocardial infarction of anterolateral wall, subsequent episode of care , Acute myocardial infarction of other anterior wall, episode of care unspecified, Acute myocardial infarction of other anterior wall, initial episode of care, Acute myocardial infarction of other anterior wall, subsequent episode of care, Acute myocardial infarction of inferolateral wall, episode of care unspecified, Acute myocardial infarction of inferolateral wall, initial episode of care, Acute myocardial infarction of inferolateral wall, subsequent episode of care, Acute myocardial infarction of inferoposterior wall, episode of care unspecified, Acute myocardial infarction of inferoposterior wall, initial episode of care, Acute myocardial infarction of inferoposterior wall,</p>

Covariate	Code type	Data codes	Data code definitions
		410.71, 410.72, 410.8, 410.81, 410.82, 410.9, 410.91, 410.92, 412, 429.79	subsequent episode of care, Acute myocardial infarction of other inferior wall, episode of care unspecified, Acute myocardial infarction of other inferior wall, initial episode of care, Acute myocardial infarction of other inferior wall, subsequent episode of care, Acute myocardial infarction of other lateral wall, episode of care unspecified, Acute myocardial infarction of other lateral wall, initial episode of care, Acute myocardial infarction of other lateral wall, subsequent episode of care, True posterior wall infarction, episode of care unspecified, True posterior wall infarction, initial episode of care, True posterior wall infarction, subsequent episode of care, Subendocardial infarction, episode of care unspecified, Subendocardial infarction, initial episode of care, Subendocardial infarction, subsequent episode of care, Acute myocardial infarction of other specified sites, episode of care unspecified, Acute myocardial infarction of other specified sites, initial episode of care, Acute myocardial infarction of other specified sites, subsequent episode of care, Acute myocardial infarction of unspecified site, episode of care unspecified, Acute myocardial infarction of unspecified site, initial episode of care, Acute myocardial infarction of unspecified site, subsequent episode of care, Old myocardial infarction , Certain sequelae of myocardial infarction, not elsewhere classified, other
Myocardial Infarction	ICD-10	I21.01, I21.02, I21.09, I21.11, I21.19, I21.21, I21.29, I21.3, I21.4, I22.0, I22.1, I22.2, I22.8, I22.9, I23.0, I23.1, I23.2, I23.3, I23.4, I23.5, I23.6, I23.7, I23.8, I24.1, I25.2	ST elevation (STEMI) myocardial infarction involving left main coronary artery, ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery, ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall, ST elevation (STEMI) myocardial infarction involving right coronary artery, ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall, ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery, ST elevation (STEMI) myocardial infarction involving other sites, ST elevation (STEMI) myocardial infarction of unspecified site , Non-ST elevation (NSTEMI) myocardial infarction , Subsequent ST elevation (STEMI) myocardial infarction of anterior wall, Subsequent ST elevation (STEMI) myocardial infarction of inferior wall, Subsequent non-ST elevation (NSTEMI) myocardial infarction , Subsequent ST elevation (STEMI) myocardial infarction of other sites, Subsequent ST elevation (STEMI) myocardial infarction of unspecified site, Hemopericardium as current complication following acute myocardial infarction, Atrial septal defect as current complication following acute myocardial infarction, Ventricular septal defect as current complication following acute myocardial infarction, Rupture of cardiac wall without hemopericardium as current complication following acute myocardial infarction, Rupture of chordae tendineae as current complication following acute myocardial infarction, Rupture of papillary muscle as current complication following acute myocardial infarction, Thrombosis of atrium, auricular appendage, and ventricle as current complications following acute myocardial infarction, Postinfarction angina, Other current complications following acute myocardial infarction, Dressler's syndrome, Old myocardial infarction
Peripheral Artery Disease	ICD-9	440, 440.1, 440.2, 440.21, 440.22, 440.23, 440.24, 440.29, 440.3, 440.31, 440.32, 440.4, 440.8, 440.9, 442, 442.1, 442.2, 442.3, 442.81, 442.82, 442.83, 442.84, 442.89, 442.9, 443.21, 443.22, 443.23, 443.24, 443.29, 443.81, 443.89, 443.89, 443.9, 443.9, V43.4	Aortic atherosclerosis, Atherosclerosis of renal artery, Atherosclerosis of native arteries of the extremities, unspecified, Atherosclerosis of native arteries of the extremities with intermittent claudication, Atherosclerosis of native arteries of the extremities with rest pain, Atherosclerosis of native arteries with ulceration, Atherosclerosis of native arteries of the extremities with gangrene, Other atherosclerosis of native arteries of the extremities, Atherosclerosis of unspecified bypass graft of the extremities, Atherosclerosis of autologous vein bypass graft of the extremities, Atherosclerosis of nonautologous biological bypass graft of the extremities, Chronic total occlusion of artery of the extremities, Atherosclerosis of other specified arteries, Generalized and unspecified atherosclerosis, Upper extremity aneurysm, Aneurysm of renal artery, Aneurysm of renal artery, Aneurysm of artery of lower extremity, Aneurysm of artery of neck, Aneurysm of subclavian artery, Aneurysm of splenic artery, Aneurysm of other visceral artery, Aneurysm of other specified artery, Aneurysm of unspecified site, Dissection of carotid artery, Dissection of iliac artery, Dissection of renal artery, Dissection of vertebral artery, Dissection of other artery, Peripheral angiopathy in diseases classified elsewhere, Other specified peripheral vascular diseases, Other specified peripheral vascular diseases, Peripheral vascular disease, unspecified, Peripheral vascular disease, unspecified, Blood vessel replaced by other means
Peripheral Artery Disease	ICD-10	I170.203, I70.1, I70.201, I70.202, I70.208, I70.209, I70.211, I70.212, I70.213, I70.218, I70.219, I70.221, I70.222, I70.223, I70.228,	Unspecified atherosclerosis of native arteries of extremities, bilateral legs, Atherosclerosis of renal artery, Unspecified atherosclerosis of native arteries of extremities, right leg, Unspecified atherosclerosis of native arteries of extremities, left leg, Unspecified atherosclerosis of native arteries of extremities, other extremity, Unspecified atherosclerosis of native arteries of extremities, unspecified extremity , Atherosclerosis of native arteries of extremities with intermittent claudication, right leg, Atherosclerosis of native arteries of extremities with intermittent claudication, left leg, Atherosclerosis of native arteries of

Covariate	Code type	Data codes	Data code definitions
		I70.229, I70.231, I70.232, I70.233, I70.234, I70.235, I70.238, I70.239, I70.241, I70.242, I70.243, I70.244, I70.245, I70.248, I70.249, I70.25, I70.261, I70.262, I70.263, I70.268, I70.269, I70.291, I70.292, I70.293, I70.298, I70.299, I70.301, I70.302, I70.303, I70.308, I70.309, I70.311, I70.312, I70.313, I70.318, I70.319, I70.321, I70.322, I70.323, I70.328, I70.329, I70.331, I70.332, I70.333, I70.334, I70.335, I70.338, I70.339, I70.341, I70.342, I70.343, I70.344, I70.345, I70.348, I70.349, I70.35, I70.361, I70.362, I70.363, I70.368, I70.369, I70.391, I70.392, I70.393, I70.398, I70.399, I70.501, I70.502, I70.503, I70.508, I70.509, I70.511, I70.512, I70.513, I70.518, I70.519, I70.521, I70.522, I70.523, I70.528, I70.529, I70.531, I70.532, I70.533, I70.534, I70.535, I70.538, I70.539, I70.541, I70.542, I70.543, I70.544, I70.545, I70.548, I70.549, I70.55, I70.561, I70.562, I70.563, I70.568, I70.569, I70.591, I70.592, I70.593, I70.598, I70.599, I70.601, I70.602, I70.603, I70.608, I70.609, I70.611, I70.612, I70.613, I70.618, I70.619, I70.621, I70.622, I70.623, I70.628, I70.629, I70.631, I70.632, I70.633, I70.634, I70.635, I70.638, I70.639, I70.641,	extremities with intermittent claudication, bilateral legs, Atherosclerosis of native arteries of extremities with intermittent claudication, other extremity , Atherosclerosis of native arteries of extremities with intermittent claudication, unspecified extremity , Atherosclerosis of native extremities with rest pain, right leg, Atherosclerosis of native extremities with rest pain, left leg, Atherosclerosis of native extremities with rest pain, bilateral legs, Atherosclerosis of native arteries of extremities with rest pain, other extremity, Atherosclerosis of native arteries of extremities with rest pain, unspecified extremity, Atherosclerosis of native arteries of right leg with ulceration of thigh, Atherosclerosis of native arteries of right leg with ulceration of calf, Atherosclerosis of native arteries of right leg with ulceration of ankle, Atherosclerosis of native arteries of right leg with ulceration of heel and midfoot, Atherosclerosis of native arteries of right leg with ulceration of other part of foot, Atherosclerosis of native arteries of right leg with ulceration of other part of lower right leg, Atherosclerosis of native arteries of right leg with ulceration of unspecified site, Atherosclerosis of native arteries of left leg with ulceration of thigh, Atherosclerosis of native arteries of left leg with ulceration of calf, Atherosclerosis of native arteries of left leg with ulceration of ankle, Atherosclerosis of native arteries of left leg with ulceration of heel and midfoot, Atherosclerosis of native arteries of left leg with ulceration of other part of foot, Atherosclerosis of native arteries of left leg with ulceration of other part of lower right leg, Atherosclerosis of native arteries of left leg with ulceration of unspecified site, Atherosclerosis of native arteries of other extremities with ulceration, Atherosclerosis of native arteries of extremities with gangrene, right leg, Atherosclerosis of native arteries of extremities with gangrene, left leg, Atherosclerosis of native arteries of extremities with gangrene, bilateral legs, Atherosclerosis of native arteries of extremities with gangrene, other extremity, Atherosclerosis of native arteries of extremities with gangrene, unspecified extremity, Other atherosclerosis of native arteries of extremities, right leg, Other atherosclerosis of native arteries of extremities, left leg, Other atherosclerosis of native arteries of extremities, bilateral legs, Other atherosclerosis of native arteries of extremities, other extremity, Other atherosclerosis of native arteries of extremities, unspecified extremity, Unspecified atherosclerosis of unspecified type of bypass graft(s) of the extremities, right leg, Unspecified atherosclerosis of unspecified type of bypass graft(s) of the extremities, left leg, Unspecified atherosclerosis of unspecified type of bypass graft(s) of the extremities, bilateral legs, Unspecified atherosclerosis of unspecified type of bypass graft(s) of the extremities, other extremity, Unspecified atherosclerosis of unspecified type of bypass graft(s) of the extremities, unspecified extremity, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with intermittent claudication, right leg, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with intermittent claudication, left leg, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with intermittent claudication, bilateral legs, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with intermittent claudication, other extremity, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with intermittent claudication, unspecified extremity, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with rest pain, right leg, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with rest pain, left leg, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with rest pain, other extremity, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with rest pain, unspecified extremity, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of the thigh, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of the calf, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of the ankle, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of the heel and midfoot, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of other part of foot, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of other part of lower leg, Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of unspecified site, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of the thigh, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of the calf, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of the ankle, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of the heel and midfoot, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of other part of foot, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of other part of lower leg, Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of unspecified site, Atherosclerosis of



Covariate	Code type	Data codes	Data code definitions
		I70.642, I70.643, I70.644, I70.645, I70.648, I70.649, I70.65, I70.661, I70.662, I70.663, I70.668, I70.669, I70.691, I70.692, I70.693, I70.698, I70.699, I70.701, I70.702, I70.703, I70.708, I70.709, I70.711, I70.712, I70.713, I70.718, I70.719, I70.721, I70.722, I70.723, I70.728, I70.729, I70.731, I70.732, I70.733, I70.734, I70.735, I70.738, I70.739, I70.741, I70.742, I70.743, I70.744, I70.745, I70.748, I70.749, I70.75, I70.761, I70.762, I70.763, I70.768, I70.769, I70.791, I70.792, I70.793, I70.798, I70.799, I70.8, I70.90, I70.91, I70.92, I72.0, I72.1, I72.2, I72.3, I72.4, I72.8, I72.9, I73.89, I73.9, I77.71, I77.72, I77.73, I77.74, I77.79, I79.8, Z95.820, Z95.828	<p>unspecified type of bypass graft(s) of other extremity with ulceration, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with gangrene, right leg, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with gangrene, left leg, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with gangrene, bilateral legs, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with gangrene, other extremity, Atherosclerosis of unspecified type of bypass graft(s) of the extremities with gangrene, unspecified extremity, Other atherosclerosis of unspecified type of bypass graft(s) of the extremities, right leg, Other atherosclerosis of unspecified type of bypass graft(s) of the extremities, left leg, Other atherosclerosis of unspecified type of bypass graft(s) of the extremities, bilateral legs, Other atherosclerosis of unspecified type of bypass graft(s) of the extremities, other extremity, Other atherosclerosis of unspecified type of bypass graft(s) of the extremities, unspecified extremity, Unspecified atherosclerosis of nonautologous biological bypass graft(s) of the extremities, right leg, Unspecified atherosclerosis of nonautologous biological bypass graft(s) of the extremities, left leg, Unspecified atherosclerosis of nonautologous biological bypass graft(s) of the extremities, bilateral legs, Unspecified atherosclerosis of nonautologous biological bypass graft(s) of the extremities, other extremity, Unspecified atherosclerosis of nonautologous biological bypass graft(s) of the extremities, unspecified extremity, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with intermittent claudication, right leg, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with intermittent claudication, left leg, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with intermittent claudication, bilateral legs, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with intermittent claudication, other extremity, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with intermittent claudication, unspecified extremity, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with rest pain, right leg, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with rest pain, left leg, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with rest pain, bilateral legs, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with rest pain, other extremity, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with rest pain, unspecified extremity, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of thigh, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of calf, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of ankle, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of heel and midfoot, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of other part of foot, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of other part of lower leg, Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of unspecified site, Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of thigh, Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of calf, Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of heel and midfoot, Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of other part of foot, Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of other part of lower leg, Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of unspecified site, Atherosclerosis of nonautologous biological bypass graft(s) of other extremity with ulceration, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with gangrene, right leg, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with gangrene, left leg, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with gangrene, bilateral legs, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with gangrene, other extremity, Atherosclerosis of nonautologous biological bypass graft(s) of the extremities with gangrene, unspecified extremity, Other atherosclerosis of nonautologous biological bypass graft(s) of the extremities, right leg, Other atherosclerosis of nonautologous biological bypass graft(s) of the extremities, left leg, Other atherosclerosis of nonautologous biological bypass graft(s) of the extremities, bilateral legs, Other atherosclerosis of nonautologous biological bypass graft(s) of the extremities, other extremity, Other atherosclerosis of nonautologous biological bypass graft(s) of the extremities, unspecified extremity, Unspecified atherosclerosis of nonbiological bypass graft(s) of the extremities, right leg, Unspecified atherosclerosis of nonbiological bypass graft(s) of the extremities, left leg,</p>



Covariate	Code type	Data codes	Data code definitions
			<p>Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of other part of foot, Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of other part of lower leg, Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of unspecified site, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of thigh, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of calf, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of ankle, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of heel and midfoot, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of other part of foot, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of other part of lower leg, Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of unspecified site, Atherosclerosis of other type of bypass graft(s) of other extremity with ulceration, Atherosclerosis of other type of bypass graft(s) of the extremities with gangrene, right leg, Atherosclerosis of other type of bypass graft(s) of the extremities with gangrene, left leg, Atherosclerosis of other type of bypass graft(s) of the extremities with gangrene, bilateral legs, Atherosclerosis of other type of bypass graft(s) of the extremities with gangrene, other extremity, Atherosclerosis of other type of bypass graft(s) of the extremities with gangrene, unspecified extremity, Other atherosclerosis of other type of bypass graft(s) of the extremities, right leg, Other atherosclerosis of other type of bypass graft(s) of the extremities, left leg, Other atherosclerosis of other type of bypass graft(s) of the extremities, bilateral legs, Other atherosclerosis of other type of bypass graft(s) of the extremities, other extremity, Other atherosclerosis of other type of bypass graft(s) of the extremities, unspecified extremity, Atherosclerosis of other arteries , Unspecified atherosclerosis , Generalized Atherosclerosis, Chronic total occlusion of artery of the extremities, Aneurysm of carotid artery, Aneurysm of artery of upper extremity, Aneurysm of renal artery, Aneurysm of iliac artery, Aneurysm of artery of lower extremity, Aneurysm of other specified arteries , Aneurysm of unspecified site, Other specified peripheral vascular diseases, Peripheral vascular disease, unspecified, Dissection of carotid artery, Dissection of iliac artery, Dissection of renal artery, Dissection of vertebral artery, Dissection of other artery, Other disorders of arteries, arterioles and capillaries in diseases classified elsewhere , Peripheral vascular angioplasty status with implants and grafts, Presence of other vascular implants and grafts</p>
Peripheral Artery Disease	CPT	33877, 34151, 34151, 34151, 34201, 34808, 34820, 34825, 34826, 35081, 35102, 35131, 35132, 35141, 35142, 35450, 35450, 35452, 35454, 35471, 35472, 35473, 35480, 35490, 35537, 35538, 35540, 35548, 35549, 35563, 35566, 35621, 35637, 35638, 35646, 35647, 35651, 35654, 35656, 35661, 35663, 35665, 35666	<p>Repair of thoracoabdominal aortic aneurysm with graft, with or without cardiopulmonary bypass, Embolectomy or thrombectomy, with or without catheter; renal, celiac, mesentery, aortoiliac artery, by abdominal incision, Embolectomy or thrombectomy, with or without catheter; renal, celiac, mesentery, aortoiliac artery, by abdominal incision, Embolectomy or thrombectomy, with or without catheter; femoropopliteal, aortoiliac artery, by leg incision, Endovascular placement of iliac artery occlusion device (list separately in addition to code for primary procedure), Open iliac artery exposure for delivery of endovascular prosthesis or iliac occlusion during endovascular therapy, by abdominal or retroperitoneal incision, unilateral, Placement of proximal or distal extension prosthesis for endovascular repair of infrarenal abdominal aortic or iliac aneurysm, false aneurysm, or dissection; initial vessel, Placement of proximal or distal extension prosthesis for endovascular repair of infrarenal abdominal aortic or iliac aneurysm, false aneurysm, or dissection; each additional vessel (list separately in addition to code for primary procedure), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta, Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta involving iliac vessels (common, hypogastric, external), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, iliac artery (common, hypogastric, external), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, iliac artery (common, hypogastric, external), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, common femoral artery (profunda femoris, superficial femoral), Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, common femoral artery (profunda femoris, superficial femoral), Transluminal balloon angioplasty, open; renal or other visceral artery, Transluminal balloon angioplasty, open;</p>

Covariate	Code type	Data codes	Data code definitions
			renal or other visceral artery, Transluminal balloon angioplasty, open; aortic, Transluminal balloon angioplasty, open; iliac, Transluminal balloon angioplasty, percutaneous; renal or visceral artery, Transluminal balloon angioplasty, percutaneous; aortic, Transluminal balloon angioplasty, percutaneous; iliac, Transluminal peripheral atherectomy, open; renal or other visceral artery, Transluminal peripheral atherectomy, percutaneous; renal or other visceral artery, Bypass graft, with vein; aortoiliac, Bypass graft, with vein; aortobi-iliac, Bypass graft, with vein; aortobifemoral, Bypass graft, with vein; aortoiliofemoral, unilateral, Bypass graft, with vein; aortoiliofemoral, bilateral, Bypass graft, with vein; ilioiliac, Bypass graft, with vein; femoral-anterior tibial, posterior tibial, peroneal artery or other distal vessels, Bypass graft, with other than vein; axillary-femoral, Bypass graft, with other than vein; aortoiliac, Bypass graft, with other than vein; aortobi-iliac, Bypass graft, with other than vein; aortobifemoral, Bypass graft, with other than vein; aortofemoral, Bypass graft, with other than vein; aortofemoral-popliteal, Bypass graft, with other than vein; axillary-femoral-femoral, Bypass graft, with other than vein; femoral-popliteal, Bypass graft, with other than vein; femoral-femoral, Bypass graft, with other than vein; ilioiliac, Bypass graft, with other than vein; iliofemoral, Bypass graft, with other than vein; femoral-anterior tibial, posterior tibial, or peroneal artery
Cerebral Atherosclerosis	ICD-9	433, 433.01, 433.1, 433.11, 433.2, 433.21, 433.3, 433.31, 433.8, 433.81, 433.91, 434.9, 434.91, 435, 435.1, 435.2, 435.3, 437, 437.1, 438.13, 438.14	Occlusion and stenosis of basilar artery without mention of cerebral infarction, Occlusion and stenosis of basilar artery with cerebral infarction, Occlusion and stenosis of carotid artery without mention of cerebral infarction, Occlusion and stenosis of carotid artery with cerebral infarction, Occlusion and stenosis of vertebral artery without mention of cerebral infarction, Occlusion and stenosis of vertebral artery with cerebral infarction, Occlusion and stenosis of multiple and bilateral precerebral arteries without mention of cerebral infarction, Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction, Occlusion and stenosis of other specified precerebral artery without mention of cerebral infarction, Occlusion and stenosis of other specified precerebral artery with cerebral infarction, Occlusion and stenosis of unspecified precerebral artery with cerebral infarction, Cerebral artery occlusion, unspecified without mention of cerebral infarction, Cerebral artery occlusion, unspecified with cerebral infarction, Basilar artery syndrome, Vertebral artery syndrome, Subclavian steal syndrome, Vertebrobasilar artery syndrome, Cerebral atherosclerosis, Other generalized ischemic cerebrovascular disease, Late effects of cerebrovascular disease, dysarthria, Late effects of cerebrovascular disease, fluency disorder
Cerebral Atherosclerosis	ICD-10	G45.0, G45.8, I63.00, I63.011, I63.012, I63.019, I63.111, I63.112, I63.119, I63.12, I63.131, I63.132, I63.139, I63.19, I63.20, I63.211, I63.212, I63.219, I63.22, I63.231, I63.232, I63.239, I63.29, I63.30, I63.311, I63.312, I63.319, I63.321, I63.322, I63.329, I63.331, I63.332, I63.339, I63.341, I63.342, I63.349, I63.40, I63.411, I63.412, I63.419, I63.421, I63.422, I63.429, I63.431, I63.432, I63.439, I63.49, I63.50, I63.511, I63.512, I63.519, I63.521, I63.522, I63.529, I63.531, I63.532, I63.539, I63.541, I63.542, I63.549,	Vertebro-basilar artery syndrome, Other Transient Cerebral Ischemic Attacks and related syndromes, Cerebral infarction due to thrombosis of unspecified precerebral artery, Cerebral infarction due to thrombosis of right vertebral artery, Cerebral infarction due to thrombosis of left vertebral artery, Cerebral infarction due to thrombosis of unspecified vertebral artery, Cerebral infarction due to embolism of right vertebral artery, Cerebral infarction due to embolism of left vertebral artery, Cerebral infarction due to embolism of unspecified vertebral artery, Cerebral infarction due to embolism of basilar artery, Cerebral infarction due to embolism of right carotid artery, Cerebral infarction due to embolism of left carotid artery, Cerebral infarction due to embolism of unspecified carotid artery, Cerebral infarction due to embolism of other precerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of right vertebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of left vertebral arteries, Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries, Cerebral Infraction Due to Unspecified Occlusion or Stenosis of Basilar Arteries, Cerebral infarction due to unspecified occlusion or stenosis of right carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of left carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries, Cerebral infarction due to unspecified occlusion or stenosis of other precerebral arteries, Cerebral infarction due to thrombosis of unspecified cerebral artery, Cerebral infarction due to thrombosis of right middle cerebral artery, Cerebral infarction due to thrombosis of left middle cerebral artery, Cerebral infarction due to thrombosis of unspecified middle cerebral artery, Cerebral infarction due to thrombosis of right anterior cerebral artery, Cerebral infarction due to thrombosis of left anterior cerebral artery, Cerebral infarction due to thrombosis of unspecified anterior cerebral artery, Cerebral infarction due to thrombosis of right posterior cerebral artery, Cerebral infarction due to thrombosis of left posterior cerebral artery, Cerebral infarction due to thrombosis of unspecified posterior cerebral artery, Cerebral infarction due to thrombosis of right cerebellar artery, Cerebral infarction due to thrombosis of left cerebellar artery, Cerebral infarction due to thrombosis of unspecified cerebellar artery, Cerebral infarction due to embolism of

Covariate	Code type	Data codes	Data code definitions
		I63.59, I65.01, I65.02, I65.03, I65.09, I65.1, I65.21, I65.22, I65.23, I65.29, I65.8, I65.9, I66.9, I67.2, I67.81, I67.82, I67.89	unspecified cerebral artery , Cerebral infarction due to embolism of right middle cerebral artery, Cerebral infarction due to embolism of left middle cerebral artery, Cerebral infarction due to embolism of unspecified middle cerebral artery, Cerebral infarction due to embolism of right anterior cerebral artery, Cerebral infarction due to embolism of left anterior cerebral artery, Cerebral infarction due to embolism of unspecified anterior cerebral artery, Cerebral infarction due to embolism of right posterior cerebral artery, Cerebral infarction due to embolism of left posterior cerebral artery, Cerebral infarction due to embolism of unspecified posterior cerebral artery , Cerebral infarction due to embolism of other cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery , Cerebral infarction due to unspecified occlusion or stenosis of right middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified middle cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified anterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of left posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of unspecified posterior cerebral artery, Cerebral infarction due to unspecified occlusion or stenosis of right cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of left cerebellar artery, Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery , Occlusion and stenosis of right vertebral artery, Occlusion and stenosis of left vertebral artery , Occlusion and stenosis of bilateral vertebral arteries, Occlusion and stenosis of unspecified vertebral artery , Occlusion and stenosis of basilar artery , Occlusion and stenosis of right carotid artery, Occlusion and stenosis of left carotid artery, Occlusion and stenosis of bilateral carotid arteries, Occlusion and stenosis of unspecified carotid artery , Occlusion and stenosis of other precerebral arteries , Occlusion and stenosis of unspecified precerebral artery, Occlusion and stenosis of unspecified cerebral artery, Cerebral atherosclerosis, Acute cerebrovascular insufficiency , Cerebral ischemia , Other cerebrovascular disease
Smoking	ICD-9	305.1, 989.84, V15.82	Tobacco use disorder, Toxic effect of tobacco, Personal history of tobacco use
Smoking	ICD-10	F17.200, F17.220, F17.221, F17.223, F17.228, F17.229, F17.290, F17.291, F17.293, F17.298, F17.299, T65.211A, T65.211D, T65.211S, T65.212A, T65.212D, T65.212S, T65.213A, T65.213D, T65.213S, T65.214A, T65.214D, T65.214S, T65.221A, T65.221D, T65.221S, T65.222A, T65.222D, T65.222S, T65.223A, T65.223D, T65.223S, T65.224A, T65.224D, T65.224S, T65.291A, T65.291D, T65.291S, T65.292A, T65.292D, T65.292S, T65.293A,	Nicotine dependence, unspecified, uncomplicated, Nicotine dependence, chewing tobacco, uncomplicated, Nicotine dependence, chewing tobacco, in remission, Nicotine dependence, chewing tobacco, with withdrawal, Nicotine dependence, chewing tobacco, with other nicotine-induced disorders, Nicotine dependence, chewing tobacco, with unspecified nicotine-induced disorders, Nicotine dependence, other tobacco produce, uncomplicated, Nicotine dependence, other tobacco produce, in remission, Nicotine dependence, other tobacco produce, with withdrawal, Nicotine dependence, other tobacco produce, with other nicotine-induced disorders, Nicotine dependence, other tobacco produce, with unspecified nicotine-induced disorder, Toxic effect of chewing tobacco, accidental (unintentional), initial encounter, Toxic effect of chewing tobacco, accidental (unintentional), subsequent encounter, Toxic effect of chewing tobacco, accidental (unintentional), sequela, Toxic effect of chewing tobacco, intentional self-harm, initial encounter, Toxic effect of chewing tobacco, intentional self-harm, subsequent encounter, Toxic effect of chewing tobacco, intentional self-harm, sequela, Toxic effect of chewing tobacco, assault, initial encounter, Toxic effect of chewing tobacco, assault, subsequent encounter, Toxic effect of chewing tobacco, assault, sequela, Toxic effect of chewing tobacco, undetermined, initial encounter, Toxic effect of chewing tobacco, undetermined, subsequent encounter, Toxic effect of chewing tobacco, undetermined, sequela, Toxic effect of tobacco cigarettes, accidental (unintentional), initial encounter, Toxic effect of tobacco cigarettes, accidental (unintentional), subsequent encounter, Toxic effect of tobacco cigarettes, accidental (unintentional), sequela, Toxic effect of tobacco cigarettes, intentional self-harm, initial encounter , Toxic effect of tobacco cigarettes, intentional self-harm, subsequent encounter , Toxic effect of tobacco cigarettes, intentional self-harm, sequela, Toxic effect of tobacco cigarettes, assault, initial encounter , Toxic effect of tobacco cigarettes, assault, subsequent encounter , Toxic effect of tobacco cigarettes, assault, sequela, Toxic effect of tobacco cigarettes, undetermined, initial encounter , Toxic effect of tobacco cigarettes, undetermined, subsequent encounter , Toxic effect of tobacco cigarettes, undetermined, sequela, Toxic effect of other tobacco and nicotine,

Covariate	Code type	Data codes	Data code definitions
		T65.293D, T65.293S, T65.294A, T65.294D, T65.294S, Z71.6, Z72.0, Z87.891	accidental (unintentional), initial encounter, Toxic effect of other tobacco and nicotine, accidental (unintentional), subsequent encounter, Toxic effect of other tobacco and nicotine, accidental (unintentional), sequela, Toxic effect of other tobacco and nicotine, intentional self-harm, initial encounter , Toxic effect of other tobacco and nicotine, intentional self-harm, subsequent encounter , Toxic effect of other tobacco and nicotine, intentional self-harm, sequela, Toxic effect of other tobacco and nicotine, assault, initial encounter , Toxic effect of other tobacco and nicotine, assault, subsequent encounter , Toxic effect of other tobacco and nicotine, assault, sequela, Toxic effect of other tobacco and nicotine, undetermined, initial encounter, Toxic effect of other tobacco and nicotine, undetermined, subsequent encounter, Toxic effect of other tobacco and nicotine, undetermined, sequela, Tobacco abuse counseling, Tobacco abuse , Personal history of nicotine dependence
Smoking	Med	buproban, bupropion, chantix, commit, habitrol, nicoderm, nicorelief, nicorette, nicotine polacrilex, nicotrol, varenicline, zyban	Pulmonary embolism, Phlebitis and thrombophlebitis of deep vessels of lower extremity
Chronic Kidney Disease	ICD-9	250.4, 250.41, 250.42, 250.43, 403, 403.01, 403.1, 403.11, 403.9, 403.91, 404, 404.01, 404.02, 404.03, 404.1, 404.11, 404.12, 404.13, 404.9, 404.91, 404.92, 404.93, 582, 582.1, 582.2, 582.4, 582.81, 582.89, 582.9, 583, 583.1, 583.2, 583.4, 583.6, 583.7, 583.81, 583.89, 583.9, 584.5, 584.6, 584.7, 584.8, 584.9, 585.1, 585.2, 585.3, 586, 587, 588, 588.81, 588.89, 588.9, 753, 753.12, 753.13, 753.14, 753.15, 753.16, 753.17, 753.19, 788.5, 792.5, V42.0, V45.11, V45.12, V56.0, V56.1, V56.2, V56.31, V56.32, V56.8	Diabetes with renal manifestations, Diabetes with renal manifestations, type I [juvenile type], not stated as uncontrolled, Diabetes with renal manifestations, type II or unspecified type, uncontrolled, Diabetes with renal manifestations, type I [juvenile type], uncontrolled, Hypertensive chronic disease, Hypertensive chronic kidney disease, malignant, with chronic kidney disease stage V or end stage renal disease, Benign hypertensive kidney disease, Hypertensive chronic kidney disease, benign, with chronic kidney disease stage V or end stage renal disease, Unspecified hypertensive kidney disease, Hypertensive chronic kidney disease, unspecified, with chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic disease, Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease, Benign hypertensive heart and kidney disease, Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease, Unspecified hypertensive heart and kidney disease, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified, Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage V or end stage renal disease, Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease, Chronic glomerulonephritis, Chronic glomerulonephritis with lesion of membranous glomerulonephritis, Chronic glomerulonephritis with lesion of membranoproliferative glomerulonephritis, Chronic glomerulonephritis with lesion of rapidly progressive glomerulonephritis, Chronic glomerulonephritis in diseases classified elsewhere, Chronic glomerulonephritis with other specified pathological lesion in kidney, Chronic glomerulonephritis with unspecified pathological lesion in kidney, Nephritis and nephropathy, not specified as acute or chronic, Nephritis and nephropathy, not specified as acute or chronic, with lesion of membranous glomerulonephritis, Nephritis and nephropathy, not specified as acute or chronic, with lesion of membranoproliferative glomerulonephritis, Nephritis and nephropathy, not specified as acute or chronic, with lesion of rapidly progressive glomerulonephritis, Nephritis and nephropathy, not specified as acute or chronic, with lesion of renal cortical necrosis, Nephritis and nephropathy, not specified as acute or chronic, with lesion of renal medullary necrosis, Nephritis and nephropathy, not specified as acute or chronic, in diseases classified elsewhere, Nephritis and nephropathy, not specified as acute or chronic, with other specified pathological lesion in kidney, Nephritis and nephropathy, not specified as acute or chronic, with unspecified pathological lesion in kidney, Acute kidney failure with lesion of tubular necrosis, Acute kidney failure with lesion of renal cortical necrosis, Acute kidney failure with lesion of renal medullary [papillary] necrosis, Acute kidney failure with other specified

Covariate	Code type	Data codes	Data code definitions
			pathological lesion in kidney, Acute kidney failure, unspecified, Chronic kidney disease, Stage I, Chronic kidney disease, Stage II (mild), Chronic kidney disease, Stage III (moderate), Renal failure, unspecified, Renal sclerosis, unspecified, Disorders resulting from impaired renal function, Secondary hyperparathyroidism (of renal origin), Other specified disorders resulting from impaired renal function, Unspecified disorder resulting from impaired renal function, Renal agenesis, Polycystic kidney, unspecified type, Polycystic kidney, autosomal dominant, Polycystic kidney, autosomal recessive, Renal dysplasia, Medullary cystic kidney, Medullary sponge kidney, Other specified cystic kidney disease, Oliguria and anuria, Cloudy (hemodialysis) (peritoneal) dialysis effluent, Kidney replaced by transplant, Renal dialysis status, Noncompliance with renal dialysis, Encounter for extracorporeal dialysis, Fitting and adjustment of extracorporeal dialysis catheter, Fitting and adjustment of peritoneal dialysis catheter, Encounter for adequacy testing for hemodialysis, ncounter for adequacy testing for peritoneal dialysis, Encounter for other dialysis
Chronic Kidney Disease	ICD-10	E08.22, E09.22, E10.22, E11.22, E13.22, I12.0, I12.9, I13.0, I13.1, I13.10, I13.11, I13.2, N18.1, N18.2, N18.3, N18.4, N18.5, N18.9, N19, N99.0, R34, Z49.01, Z49.02, Z49.31, Z49.32, Z99.2	Diabetes mellitus due to underlying condition with diabetic chronic kidney disease, Drug or chemical induced diabetes mellitus with diabetic chronic kidney disease, Type 1 diabetes mellitus with diabetic chronic kidney disease, Type 2 diabetes mellitus with diabetic chronic kidney disease, Other specified diabetes mellitus with diabetic chronic kidney disease, Hypertensive Chronic Kidney Disease With Stage 5 Chronic Kidney Disease Or End Stage Renal Disease, Hypertensive Chronic Kidney Disease With Stage 1 Through Stage 4 Chronic Kidney Disease, Or Unspecified Chronic Kidney Disease, Hypertensive Heart And Chronic Kidney Disease With Heart Failure And Stage 1 Through Stage 4 Chronic Kidney Disease, Or Unspecified Chronic Kidney Disease, Hypertensive heart and chronic kidney disease without heart failure, Hypertensive Heart And Chronic Kidney Disease Without Heart Failure, With Stage 1 Through Stage 4 Chronic Kidney Disease, Or Unspecified Chronic Kidney Disease, Hypertensive Heart And Chronic Kidney Disease Without Heart Failure, With Stage 5 Chronic Kidney Disease, Or End Stage Renal Disease, Hypertensive Heart And Chronic Kidney Disease With Heart Failure And With Stage 5 Chronic Kidney Disease, Or End Stage Renal Disease, Chronic Kidney Disease, Stage 1, Chronic Kidney Disease, Stage 2 (Mild), Chronic Kidney Disease, Stage 3 (Moderate), Chronic kidney disease, stage 4 (severe), Chronic kidney disease, stage 5, Chronic kidney disease, unspecified, Unspecified Kidney Failure, Postprocedural (acute)(chronic) kidney failure, Anuria And Oliguria, Encounter For Fitting And Adjustment Of Extracorporeal Dialysis Catheter, Encounter For Fitting And Adjustment Of Peritoneal Dialysis Catheter, Encounter For Adequacy Testing For Hemodialysis, Encounter For Adequacy Testing For Peritoneal Dialysis, Dependence On Renal Dialysis
Chronic Kidney Disease	CPT	36147, 36148, 36818, 36819, 36820, 36821, 36825, 36830, 36831, 36832, 36833, 36870, 50360, 50365, 75791, 90935, 90937, 90945, 90947, 90951, 90952, 90953, 90954, 90955, 90956, 90957, 90958, 90959, 90960, 90961, 90962, 90963, 90964, 90965, 90966, 90967, 90968, 90969, 90970	Access Av Dial Grft For Eval, Access Av Dial Grft For Proc, Av Fuse Uppr Arm Cephalic, Av Fuse Uppr Arm Basilic, Av Fusion/Forearm Vein, Av Fusion Direct Any Site, Artery-Vein Autograft, Artery-Vein Nonautograft, Open Thrombect Av Fistula, Av Fistula Revision Open, Av Fistula Revision, Percut Thrombect Av Fistula, Transplantation Of Kidney, Transplantation Of Kidney, Av Dialysis Shunt Imaging, Hemodialysis One Evaluation, Hemodialysis Repeated Eval, Dialysis One Evaluation, Dialysis Repeated Eval, Esrd Serv 4 Visits P Mo <2Yr, Esrd Serv 2-3 Vsts P Mo <2Yr, Esrd Serv 1 Visit P Mo <2Yrs, Esrd Serv 4 Vsts P Mo 2-11, Esrd Srv 2-3 Vsts P Mo 2-11, Esrd Srv 1 Visit P Mo 2-11, Esrd Srv 4 Vsts P Mo 12-19, Esrd Srv 2-3 Vsts P Mo 12-19, Esrd Serv 1 Vst P Mo 12-19, Esrd Srv 4 Visits P Mo 20+, Esrd Srv 2-3 Vsts P Mo 20+, Esrd Serv 1 Visit P Mo 20+, Esrd Home Pt Serv P Mo <2Yrs, Esrd Home Pt Serv P Mo 2-11, Esrd Home Pt Serv P Mo 12-19, Esrd Home Pt Serv P Mo 20+, Esrd Home Pt Serv P Day <2, Esrd Home Pt Srv P Day 2-11, Esrd Home Pt Srv P Day 12-19, Esrd Home Pt Serv P Day 20+

**Supplemental Table 5. Incidence of outcomes and association with atrial fibrillation recurrence, stratified by presence or absence of initial AF precipitant.**

<b>Outcome</b>	<b>Precipitant group</b>	<b>N outcomes / N at risk*</b>	<b>Incidence of outcome (per 100 person-years)</b>	<b>Hazard ratio for association between AF recurrence with outcome (95% CI)<sup>†</sup></b>	<b><i>p</i>-value for association between AF recurrence with outcome</b>	<b><i>p</i>-value for risk of outcome between precipitant groups<sup>‡</sup></b>
<b>Heart Failure</b>	Precipitant	146/1071	4.2	4.21 (3.01-5.91)	<0.001	0.02
	No Precipitant	644/5575	3.1	2.75 (2.40-3.16)	<0.001	
<b>Ischemic Stroke</b>	Precipitant	102/1837	1.7	1.72 (1.08-2.74)	<0.001	0.71
	No Precipitant	418/7811	1.4	1.56 (1.26-1.93)	<0.001	
<b>All-cause death</b>	Precipitant	581/2089	8.1	3.79 (3.19-4.50)	<0.001	0.002
	No Precipitant	1493/8634	4.4	2.75 (2.48-3.07)	<0.001	

\*N patients at risk for recurrent AF in the sample of 10,723 patients, and without the relevant outcome at baseline

<sup>†</sup>Hazard ratio for association between AF recurrence with outcome. Referent category is individuals without AF recurrence

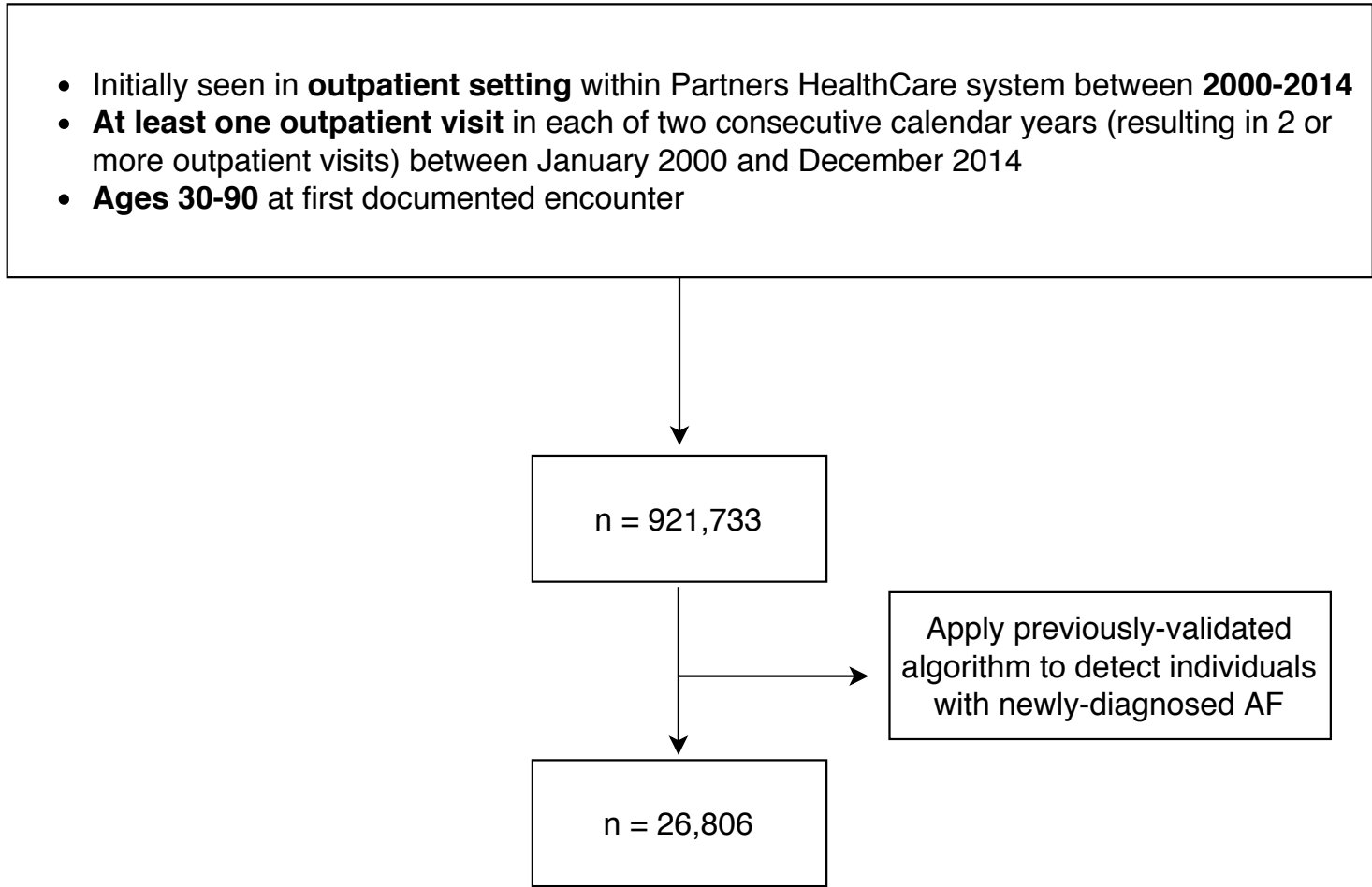
<sup>‡</sup>Association between recurrence and outcome in individuals with and without precipitants. Derived by comparing the log hazard ratios

(β) between the two groups using a z-test as follows: 
$$Z = \frac{\beta_1 - \beta_2}{\sqrt{(SE\beta_1)^2 + (SE\beta_2)^2}}$$

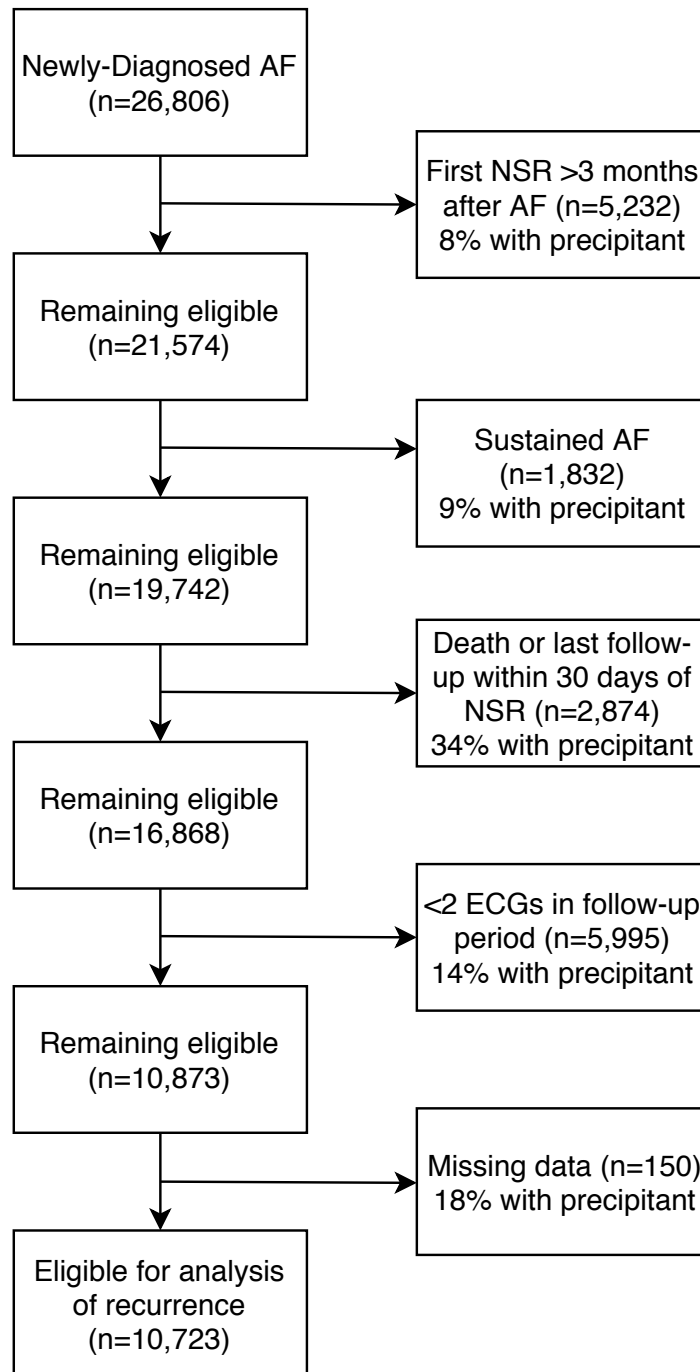
Covariates ascertained at the date of newly-diagnosed AF; Models are adjusted for the presence of a precipitant at the date of newly-diagnosed AF, age, sex, race, hypertension, diabetes mellitus, myocardial infarction, heart failure, valvular disease, stroke/transient ischemic attack, peripheral artery disease, chronic lung disease, malignancy, tobacco use, alcohol use, and stratified by admission status at newly-diagnosed AF.



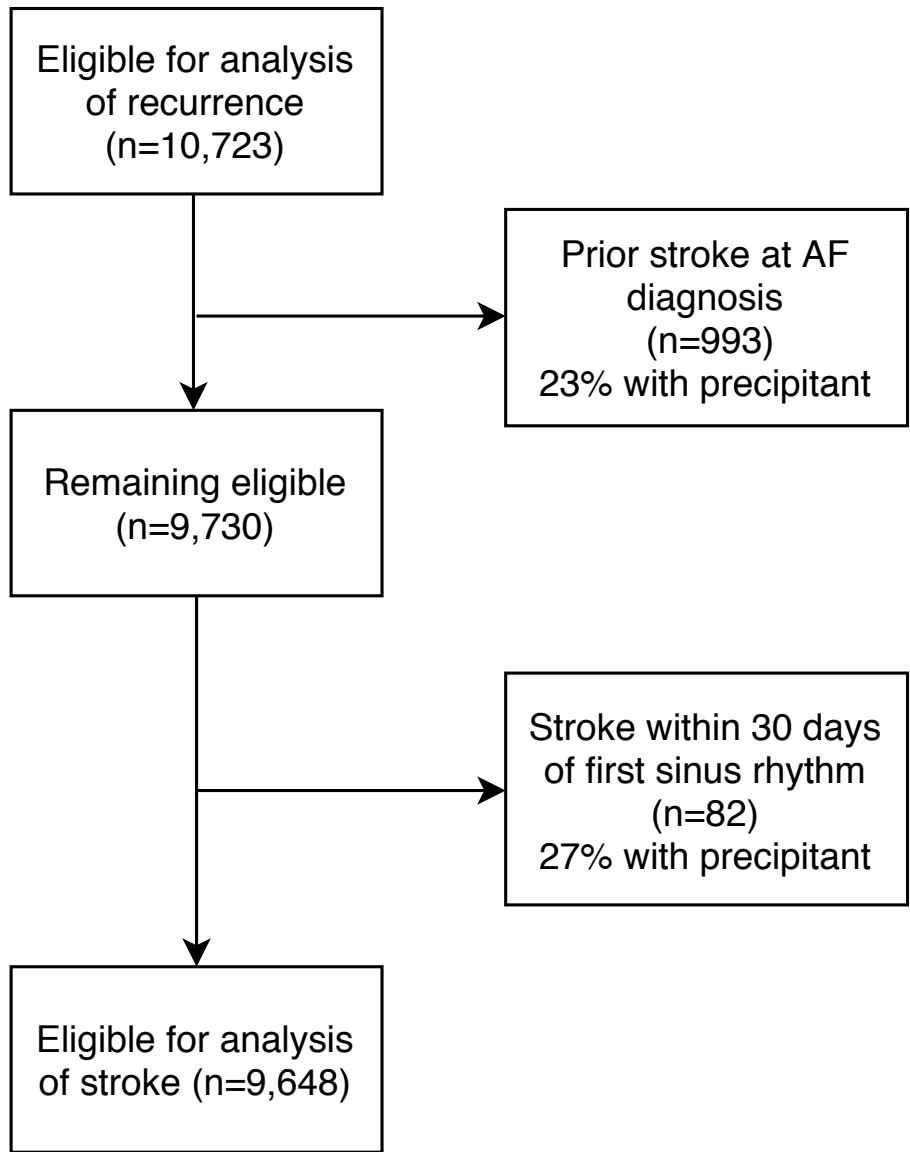
**Supplemental Figure 1. Derivation of cohort of individuals with newly-diagnosed AF**



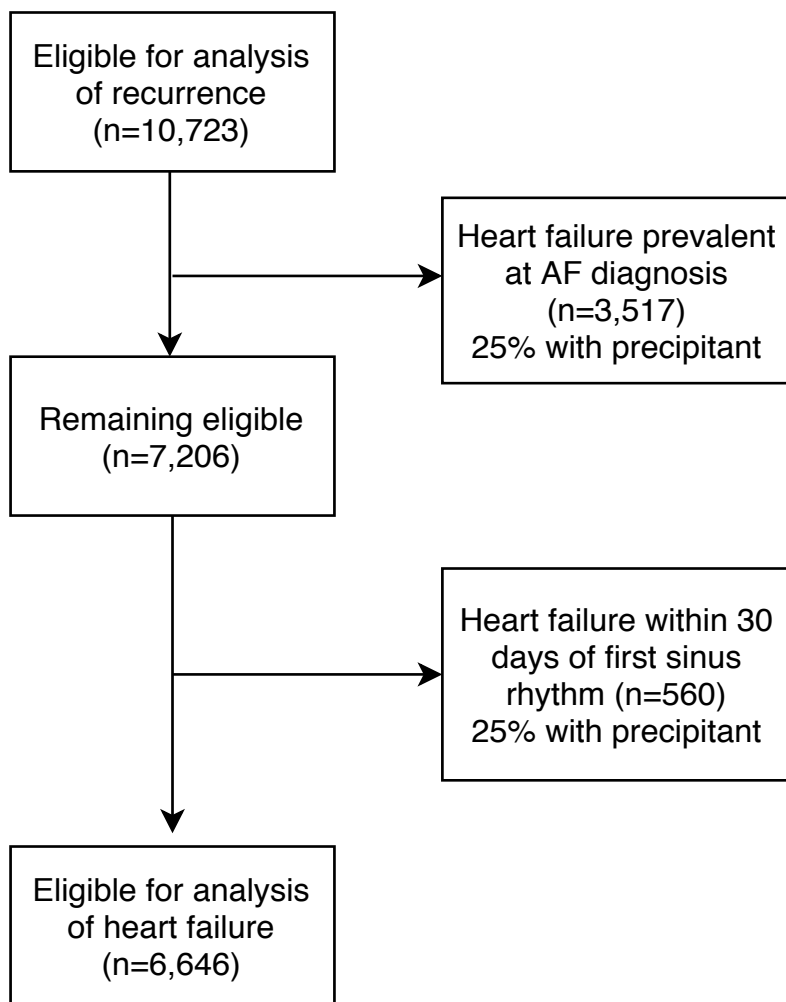
**Supplemental Figure 2. Derivation of risk pool for analyses of AF recurrence.**



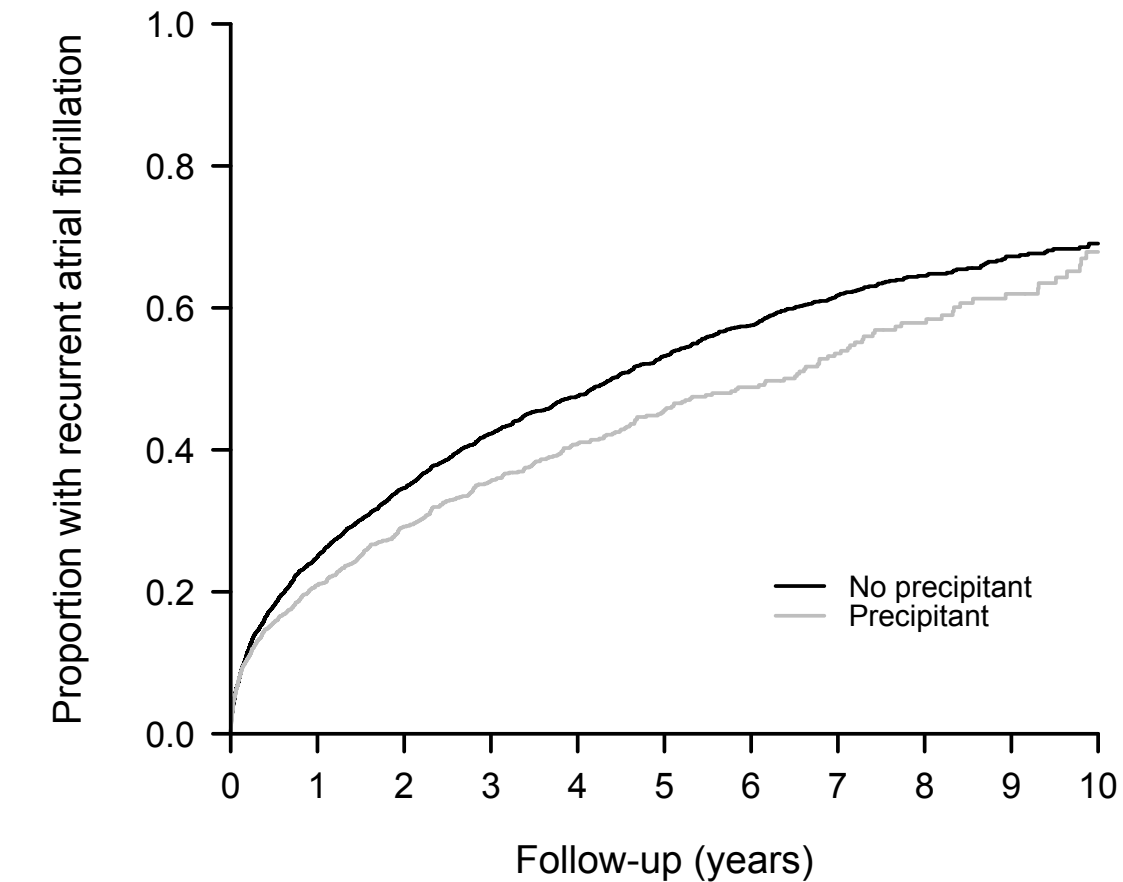
**Supplemental Figure 3. Derivation of risk pool for analysis of stroke.**



**Supplemental Figure 4. Derivation of risk pool for analyses of heart failure.**



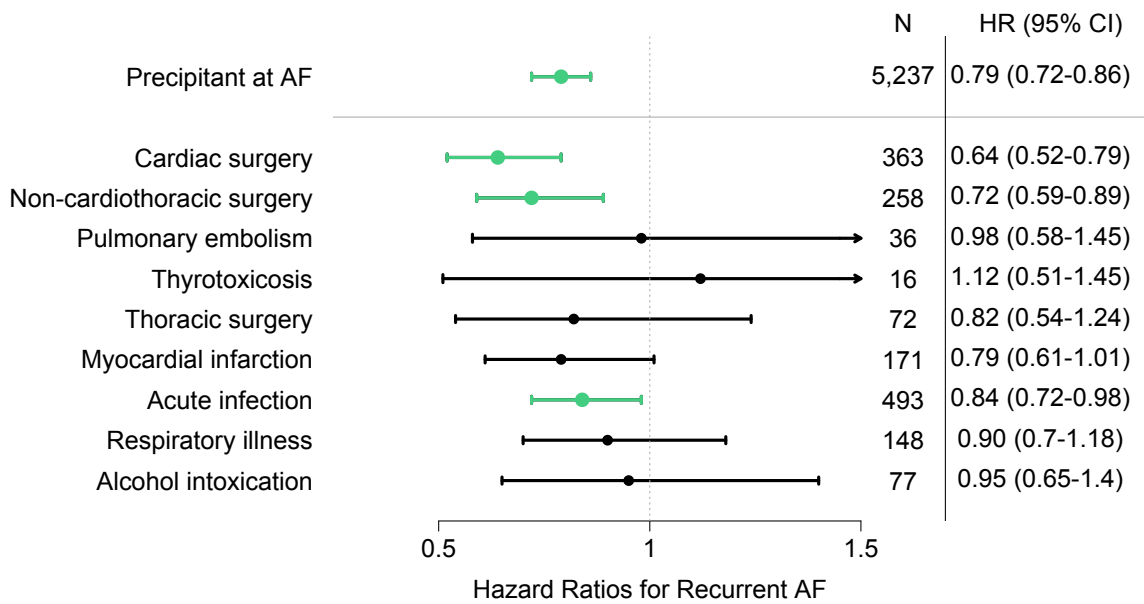
**Supplemental Figure 5. Unadjusted cumulative incidence of AF recurrence in subset of individuals with newly-diagnosed AF in inpatient setting.**



No. at risk												
No precipitant	3603	2263	1673	1236	941	680	505	338	245	169	118	
Precipitant	1634	1047	730	509	355	254	175	123	79	56	35	

Sensitivity analysis of AF recurrence in individuals with newly-diagnosed AF occurring in inpatient setting. Unadjusted cumulative incidence curves displaying the risk of recurrent AF among individuals with and without acute precipitants, generated using Kaplan Meier method.

**Supplemental Figure 6. Multivariable adjusted association between AF precipitants and AF recurrence in subset of individuals with newly-diagnosed AF in inpatient setting.**



Sensitivity analysis of association between AF precipitants and AF recurrence in individuals with newly-diagnosed AF occurring in inpatient setting. Multivariable models taking the competing risk of death into account and adjusted for age, race, hypertension, diabetes mellitus, myocardial infarction, heart failure, valvular disease, stroke/transient ischemic attack, peripheral artery disease, chronic lung disease, cancer, tobacco use, alcohol use, and stratified by admission status at AF.