

## Supplemental Appendix I

### Charlson Comorbidity Index: *ICD-9* Update and *ICD-10* Translation

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**Table SI-1. CCI Scoring System**

NOTE: The scoring system depicted in this table was used to compute the CCI scores used in the admissions and mortality models (see Methods and Results section in manuscript). It is a modification of the system designed by Quan et al.

Condition Number	Condition Description	Points
1	Myocardial infarction	1
2	Congestive heart failure	1
3	Peripheral vascular disease	1
4	Cerebrovascular disease	1
5	Dementia	1
6	Chronic pulmonary disease	1
7	Rheumatic disease	1
8	Peptic ulcer disease	1
9	Liver disease, mild	1
10	Diabetes without chronic complications	1
11	Renal disease, mild to moderate*	1
12	Diabetes with chronic complications	2
13	Hemiplegia or paraplegia	2
14	Any malignancy	2
15	Liver disease, moderate to severe	3
16	Renal disease, severe*	3
17	HIV infection, no AIDS	3
18	Metastatic solid tumor	6
19	AIDS	6

AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus

\* Although liver disease in the instrument proposed here was categorized as mild and moderate-severe, renal disease has been categorized as mild-moderate and severe to reflect the dramatic increase in risk when a patient transitions to stage 5 kidney disease.

**Table SI-2. Hierarchy Categories**

Within each hierarchy category, the milder condition should not contribute to the CCI score if the more severe condition applies even though codes for both may appear for an individual patient in a claims dataset.

Category	Hierarchy Rule
1	Hemiplegia/paraplegia (Condition 13) trumps cerebrovascular disease (Condition 4)
2	Liver disease, moderate-severe (Condition 5) trumps liver disease, mild (Condition 9)
3	Diabetes with complications (Condition 12) trumps Diabetes, uncomplicated (Condition 10)
4	Renal disease, severe (Condition 16) trumps Renal disease, mild-moderate (Condition 11)
5	Metastatic solid tumor (Condition 18) trumps malignancy (Condition 14)
6	AIDS (Condition 19) trumps HIV (Condition 14)

AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus

**Tables SI-3a Through SII-3s**

The following tables correspond to the 19 conditions of Table SII-1.

*Table SI-3a. Deyo and CDMF CCI Coding Schemes: Myocardial Infarction*

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	410.x Acute Myocardial Infarction 412.x Old Myocardial Infarction	410.x Acute Myocardial Infarction 412.x Old Myocardial Infarction	I21.x STEMI and NSTEMI I22.x Subsequent STEMI and NSTEMI I25.2 Old Myocardial Infarction

Table SI-3b. Deyo and CDMF CCI Coding Schemes: Congestive Heart Failure

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	428.x Heart Failure	398.91 Rheumatic heart failure (congestive) 402.01 Malignant hypertensive heart disease with heart failure 402.11 Benign hypertensive heart disease with heart failure 402.91 Unspecified hypertensive disease with heart failure 404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.13 Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease 404.91 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or	I11.0 Hypertensive heart disease with heart failure I13.0 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease I13.2 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease I25.5 Ischemic cardiomyopathy I42.0 Cardiomyopathy I42.5 Other restrictive cardiomyopathy I42.6 Alcoholic cardiomyopathy I42.7 Cardiomyopathy due to drug and external agent I42.8 Other cardiomyopathies I42.9 Cardiomyopathy, unspecified I43.x Cardiomyopathy in diseases classified elsewhere I50.x Heart failure P29.0 Neonatal cardiac failure

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
		unspecified 404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease 425.4 Other primary cardiomyopathies 425.5 Alcoholic cardiomyopathy 425.6 Cardiomyopathy in Chagas disease 425.7 Nutritional and metabolic cardiomyopathy 425.8 Cardiomyopathy in other disease classified elsewhere 425.9 Secondary cardiomyopathy, unspecified 428.x unspecified Heart failure	

Table SI-3c. Deyo and CDMF CCI Coding Schemes: Peripheral Vascular Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	443.9	Peripheral vascular disease, unspecified	093.0 Aneurysm of aorta, specified as syphilitic
	444.x	Arterial embolism and thrombosis	437.3 Cerebral aneurysm, non-ruptured
	785.4	Gangrene	440.x Atherosclerosis
	V43.4*	Presence of other vascular implants and grafts	441.x Aortic aneurysm and dissection
	Proc	Resection of vessel with replacement, lower limb arteries	443.1 Thromboangiitis obliterans [Buerger's disease]
	38.48		443.2x Other arterial dissection
			443.8x Other specified peripheral vascular diseases
			443.9 Peripheral vascular disease, unspecified
			447.1 Stricture of artery
			557.1 Chronic vascular insufficiency of intestine
			557.9 Unspecified vascular insufficiency of intestine
			V43.4* Blood vessels replaced by other means
			I70.x Atherosclerosis
			I71.x Aortic aneurysm and dissection
			I73.1 Thromboangiitis obliterans [Buerger's disease]
			I73.8 Other specified peripheral vascular diseases
			I73.9 Peripheral vascular disease, unspecified
		I77.1 Stricture of artery	
		I79.0 Aneurysm of aorta in diseases classified elsewhere	
		I79.1 Aortitis in diseases classified elsewhere	
		I79.8 Other disorders of arteries, arterioles, and capillaries in diseases classified elsewhere	
		K55.1 Chronic vascular disorders of intestine	
		K55.8 Other vascular disorders of intestine	
		K55.9 Vascular disorder of intestine, unspecified	
		Z95.8 Presence of other cardiac and vascular implants and grafts	
		Z95.9 Presence of cardiac and vascular implant and graft, unspecified	

Table SI-3d. Deyo and CDMF CCI Coding Schemes: Cerebrovascular Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	430.x Subarachnoid hemorrhage	362.34 Transient retinal arterial occlusion	G45.x Transient cerebral ischemic attacks and related syndromes
	431.x Intracerebral hemorrhage	430.x Subarachnoid hemorrhage	G46.x Vascular syndromes of brain in cerebrovascular diseases
	432.x Other and unspecified intracranial hemorrhage	431.x Intracerebral hemorrhage	H34.0x Transient retinal artery occlusion
	433.x Occlusion and stenosis of precerebral arteries	432.x Other and unspecified intracranial hemorrhage	H34.1x Central retinal artery occlusion
	434.x Occlusion of cerebral arteries	433.x Occlusion and stenosis of precerebral arteries	H34.2x Other retinal artery occlusions
	435.x Transient cerebral ischemia	434.x Occlusion of cerebral arteries	I60.x Non-traumatic subarachnoid hemorrhage
	436.x Acute, but ill-defined, cerebrovascular disease	435.x Transient cerebral ischemia	I61.x Non-traumatic intracerebral hemorrhage
	437.x Other and ill-defined cerebrovascular disease	436.x Acute, but ill-defined, cerebrovascular disease	I62.x Other and unspecified non-traumatic intracranial hemorrhage
	438.x Late effects of cerebrovascular disease	437.x Other and ill-defined cerebrovascular disease	I63.x Cerebral infarction
		438.x Late effects of cerebrovascular disease	I64.x Stroke, not specified as hemorrhage or infarction
		I65.x Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction	
		I66.x Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction	
		I67.x Other cerebrovascular diseases	
		I68.x Cerebrovascular disorders in diseases classified elsewhere	

Table SI-3e. Deyo and CDMF CCI Coding Schemes: Dementia

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	290.x Dementias	290.0 Senile dementia, uncomplicated 290.1x Presenile dementia 290.2x Senile dementia with delusional or depressive features 290.3 Senile dementia with delirium 290.4x Vascular dementia 294.0 Amnestic disorder in conditions classified elsewhere 294.1x Dementia in conditions classified elsewhere 294.2x Dementia, unspecified 294.8 Other persistent mental disorders due to conditions classified elsewhere 331.0 Alzheimer's disease 331.1x Frontotemporal dementia 331.2 Senile degeneration of brain 331.7 Cerebral degeneration in diseases classified elsewhere 797 Senility without mention of psychosis	F01.x Vascular dementia F02.x Dementia in other diseases classified elsewhere F03.x Unspecified dementia F04 Amnestic disorder due to known physiological condition F05 Delirium due to known physiological condition F06.1 Catatonic disorder due to known physiological condition F06.8 Other specified mental disorders due to known physiological condition G13.2 Systemic atrophy primarily affecting the central nervous system in myxedema G13.8 Systemic atrophy primarily affecting central nervous system in other diseases classified elsewhere G30.x Alzheimer's disease G31.0x Frontotemporal dementia G31.1 Senile degeneration of brain, not elsewhere classified G31.2 Degeneration of nervous system due to alcohol G91.4 Hydrocephalus in diseases classified elsewhere G94 Other disorders of brain in diseases classified elsewhere R41.81 Age-related cognitive decline R54 Age-related physical debility

Table SI-3f. Deyo and CDMF CCI Coding Schemes: Chronic Pulmonary Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	490.x Bronchitis, not specified as acute or chronic	490.x Bronchitis, not specified as acute or chronic	J40.x Bronchitis, not specified as acute or chronic
	491.x Chronic bronchitis	491.x Chronic bronchitis	J41.x Simple and mucopurulent chronic bronchitis
	492.x Emphysema	492.x Emphysema	J42.x Unspecified chronic bronchitis
	493.x Asthma	493.x Asthma	J43.x Emphysema
	494.x Bronchiectasis	494.x Bronchiectasis	J44.x Other chronic obstructive pulmonary disease
	495.x Extrinsic allergic alveolitis	495.x Extrinsic allergic alveolitis	J45.x Asthma
	496.x Chronic airway obstruction, not elsewhere classified	496.x Chronic airway obstruction, not elsewhere classified	J46.x Status asthmaticus
	500.x Coal workers' pneumoconiosis	500.x Coal workers' pneumoconiosis	J47.x Bronchiectasis
	501.x Asbestosis	501.x Asbestosis	J60.x Coal worker's pneumoconiosis
	502.x Pneumoconiosis due to other silica or silicates	502.x Pneumoconiosis due to other silica or silicates	J61.x Pneumoconiosis due to asbestos and other mineral fibers
	503.x Pneumoconiosis due to other inorganic dust	503.x Pneumoconiosis due to other inorganic dust	J62.x Pneumoconiosis due to dust containing silica
	504.x Pneumonopathy due to inhalation of other dust	504.x Pneumonopathy due to inhalation of other dust	J63.x Pneumoconiosis due to other inorganic dusts
	505.x Pneumoconiosis, unspecified	505.x Pneumoconiosis, unspecified	J64.x Unspecified pneumoconiosis
		506.4 Chronic respiratory conditions due to fumes and vapors	J65.x Pneumoconiosis associated with tuberculosis
		508.1 Chronic and other pulmonary manifestations due to radiation	J66.x Airway disease due to specific organic dust
		508.8 Respiratory conditions due to other specified external agents	J67.x Hypersensitivity pneumonitis due to organic dust
			J68.4 Chronic respiratory conditions due to chemicals, gases, fumes and vapors
		J70.1 Chronic and other pulmonary manifestations due to radiation	
		J70.3 Chronic drug-induced interstitial lung disorders	

Table SI-3g. Deyo and CDMF CCI Coding Schemes: Rheumatic Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	710.0 Systemic lupus erythematosus	446.5 Polyarteritis nodosa and allied conditions	M05.x Rheumatoid arthritis with rheumatoid factor
	710.1 Systemic sclerosis	710.0 Systemic lupus erythematosus	M06.x Other rheumatoid arthritis
	710.4 Polymyositis	710.1 Systemic sclerosis	M31.5 Giant cell arteritis with polymyalgia rheumatica
	714.0 Rheumatoid arthritis and other inflammatory polyarthropathies	710.2 Sicca syndrome	M32.x Systemic lupus erythematosus (SLE)
	714.1 Rheumatoid arthritis	710.3 Dermatomyositis	M33.x Dermatopolymyositis
	714.2 Other rheumatoid arthritis with visceral or systemic involvement	710.4 Polymyositis	M34.x Systemic sclerosis [scleroderma]
	714.81 Rheumatoid lung	714.0 Rheumatoid arthritis	M35.1 Other overlap syndromes
	725.x Polymyalgia rheumatica	714.1 Felty's syndrome	M35.3 Polymyalgia rheumatica
		714.2 Other rheumatoid arthritis with visceral or systemic involvement	M36.0 Dermato(poly)myositis in neoplastic disease
		714.8x Other specified inflammatory polyarthropathies	
		725.x Polymyalgia rheumatica	

Table SI-3h. CCI Coding Scheme: Peptic Ulcer Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	531.x Gastric ulcer	531.x Gastric ulcer	K25.x Gastric ulcer
	532.x Duodenal ulcer	532.x Duodenal ulcer	K26.x Duodenal ulcer
	533.x Peptic ulcer site unspecified	533.x Peptic ulcer site unspecified	K27.x Peptic ulcer, site unspecified
	534.x Gastrojejunal ulcer	534.x Gastrojejunal ulcer	K28.x Gastrojejunal ulcer

Table SI-3i. Deyo and CDMF CCI Coding Schemes: Mild Liver Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	571.2	Alcoholic cirrhosis of liver	070.22 Chronic viral hepatitis B with hepatic coma without hepatitis delta
	571.4	Chronic hepatitis	070.23 Chronic viral hepatitis B with hepatic coma with hepatitis delta
	571.5	Cirrhosis of liver without mention of alcohol	070.32 Chronic viral hepatitis B without mention of hepatic coma without mention of hepatitis delta
	571.6	Biliary cirrhosis	070.33 Chronic viral hepatitis B without mention of hepatic coma with hepatitis delta
			070.44 Chronic hepatitis C with hepatic coma
			070.54 Chronic hepatitis C without mention of hepatic coma
			070.6 Unspecified viral hepatitis with hepatic coma
			070.9 Unspecified viral hepatitis without mention of hepatic coma
			570.x Acute and subacute necrosis of liver
			571.x Chronic liver disease and cirrhosis
			573.3 Hepatitis, unspecified
			573.4 Hepatic infarction
			573.8 Other specified disorders of liver
			573.9 Unspecified disorder of liver
			V42.7* Liver replaced by transplant
			B18.x Chronic viral hepatitis
			K70.0 Alcoholic fatty liver
		K70.1 Alcoholic hepatitis	
		K70.2 Alcoholic fibrosis and sclerosis of liver	
		K70.3 Alcoholic cirrhosis of liver	
		K70.9 Alcoholic liver disease, unspecified	
		K71.3 Toxic liver disease with chronic persistent hepatitis	
		K71.4 Toxic liver disease with chronic lobular hepatitis	
		K71.5 Toxic liver disease with chronic active hepatitis	
		K71.7 Toxic liver disease with fibrosis and cirrhosis of liver	
		K73.x Chronic hepatitis, not elsewhere classified	
		K74.x Fibrosis and cirrhosis of liver	
		K76.0 Fatty (change of) liver, not elsewhere classified	
		K76.2 Central hemorrhagic necrosis of liver	
		K76.3 Infarction of liver	
		K76.4 Peliosis hepatis	
		K76.8 Other specified diseases of liver	
		K76.9 Liver disease, unspecified	
		Z94.4 Liver transplant status	

Table SI-3j. Deyo and CDMF CCI Coding Schemes: Diabetes without chronic complication

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	250.0x Diabetes mellitus without mention of complication	250.8x Diabetes with other specified manifestations	<u>Main Codes</u> E08 Diabetes mellitus due to underlying condition E09 Drug or chemical induced diabetes mellitus E10 Type 1 diabetes mellitus E11 Type 2 diabetes mellitus E13 Other specified diabetes mellitus  <u>Relevant Subcodes</u> E**.0x With hyperosmolarity E**.1x With ketoacidosis E**.6x With other specified complications E**.8x With unspecified complications E**.9x Without complications
	250.1x Diabetes with ketoacidosis	250.9x Diabetes with unspecified complication	
	250.2x Diabetes with hyperosmolarity	249.0x Secondary diabetes mellitus without mention of complication	
	250.3x Diabetes with other coma	249.1x Secondary diabetes mellitus with ketoacidosis	
	250.7x Diabetes with peripheral circulatory disorders, type II or unspecified type, not stated as uncontrolled	249.2x Secondary diabetes mellitus with hyperosmolarity	
		249.3x Secondary diabetes mellitus with other coma	
		249.9x Secondary diabetes mellitus with unspecified complication, no stated an uncontrolled, or unspecified	

Table SI-3k. Deyo and CDMF CCI Coding Schemes: Renal (Mild or Moderate)

Score	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
1	403.00 Hypertensive chronic kidney disease, malignant, with chronic kidney disease stage I through stage IV, or unspecified	I12.9 Hypertensive chronic kidney disease with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
	403.10 Hypertensive chronic kidney disease, benign, with chronic kidney disease stage I through stage IV, or unspecified	I13.0 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
	403.90 Hypertensive chronic kidney disease, unspecified, with chronic kidney disease stage I through stage IV, or unspecified	I13.10 Hypertensive heart and CKD without heart failure with stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
	404.00 Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	N03.x Chronic nephritic syndrome
	404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	N05.x Unspecified nephritic syndrome
	404.10 Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	N18.1 Chronic kidney disease, Stage 1
	404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	N18.2 Chronic kidney disease, Stage 2 (mild)
	404.90 Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage I through stage IV, or unspecified	N18.3 Chronic kidney disease, Stage 3 (moderate)
	404.91 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified	N18.4 Chronic kidney disease, Stage 4 (severe)
	582.x Chronic glomerulonephritis	N18.9 Chronic kidney disease, unspecified
	583.x Nephritis/nephropathy	Z94.0 Kidney transplant status
	585.1 Chronic kidney disease, Stage I	
	585.2 Chronic kidney disease, Stage II (mild)	
	585.3 Chronic kidney disease, Stage III (moderate)	
	585.4 Chronic kidney disease, Stage IV (severe)	
	585.9 Chronic kidney disease, unspecified	
	V42.0 Kidney replaced by transplant	

NOTE: Deyo et al. (1992) used one set of codes without differentiation by severity: 582.x, 583.0, 583.1, 583.2, 583.3, 583.4, 583.5, 583.6, 583.7, 585.x, 586.x, and 588.x.

Table SI-3I. Deyo and CDMF CCI Coding Schemes: Diabetes with Chronic Complications

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
2	250.4 Diabetes with renal manifestations	250.4 Diabetes with renal manifestations	<u>Main Codes</u> E08 Diabetes mellitus due to underlying condition E09 Drug or chemical induced diabetes mellitus E10 Type 1 diabetes mellitus E11 Type 2 diabetes mellitus E13 Other specified diabetes mellitus  <u>Relevant Subcodes</u> E**.2 Diabetes mellitus due to underlying condition with kidney complications E**.3 Diabetes mellitus due to underlying condition with ophthalmic complications E**.4 Diabetes mellitus due to underlying condition with neurological complications E**.5 Diabetes mellitus due to underlying condition with circulatory complications
	250.4 Diabetes with ophthalmic manifestations	250.5 Diabetes with ophthalmic complications	
	250.6 Diabetes with neurological manifestations	250.6 Diabetes with neurological manifestations  250.7 Diabetes with peripheral circulatory disorders	

Table SI-3m. Deyo and CDMF CCI Coding Schemes: Hemiplegia or Paraplegia

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
2	334.1 Hereditary spastic paraplegia	334.1 Hereditary spastic paraplegia	G04.1 Tropical spastic paraplegia
	342.x Hemiplegia and hemiparesis	342.x Hemiplegia and hemiparesis 343.x Infantile cerebral palsy 344.x Other paralytic syndromes	G11.4 Hereditary spastic paraplegia G80.0 Spastic quadriplegic cerebral palsy G80.1 Spastic diplegic cerebral palsy G80.2 Spastic hemiplegic cerebral palsy G81.x Hemiplegia and hemiparesis G82.x Paraplegia (paraparesis) and quadriplegia (quadriparesis) G83.x Other paralytic syndromes

Table SI-3n. Deyo and CDMF CCI Coding Schemes: Any malignancy, including lymphoma and leukemia, except malignant nonmelanoma neoplasm of skin

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
2	14x.x Malignant neoplasm of lip, oral cavity, and pharynx	14x.x Malignant neoplasm of lip, oral cavity, and pharynx	C0x.x Malignant neoplasms of lip, oral cavity and pharynx
	15x.x Malignant neoplasm of digestive organs and peritoneum	15x.x Malignant neoplasm of digestive organs and peritoneum	C1x.x Malignant neoplasms of lip, oral cavity and pharynx, esophagus, stomach, small intestine, colon
	16x.x Malignant neoplasm of respiratory and intrathoracic organs	16x.x Malignant neoplasm of respiratory and intrathoracic organs	C2x.x Malignant neoplasms of rectum, anus, anal canal, liver and intrahepatic bile ducts, gallbladder, other and unspecified part of biliary tract, pancreas, other and ill-defined digestive organs
	170.x Malignant neoplasm of bone and articular cartilage	170.x Malignant neoplasm of bone and articular cartilage	C30.x Malignant neoplasm of nasal cavity and middle ear
	171.x Malignant neoplasm of connective and other soft tissue	171.x Malignant neoplasm of connective and other soft tissue	C31.x Malignant neoplasm of accessory sinuses
	172.x Malignant melanoma of skin	172.x Malignant melanoma of skin	C32.x Malignant neoplasm of larynx
	174.x Malignant neoplasm of female breast	174.x Malignant neoplasm of female breast	
	175.x Malignant neoplasm of male breast	175.x Malignant neoplasm of male breast	
	176.x Kaposi's sarcoma	176.x Kaposi's sarcoma	
	179.x Malignant neoplasm of	179.x Malignant neoplasm of	

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
	uterus, part unspecified	uterus, part unspecified	C33.x Malignant neoplasm of trachea
	18x.x Malignant neoplasm of genitourinary organs	18x.x Malignant neoplasm of genitourinary organs	C34.x Malignant neoplasm of bronchus and lung
	190.x Malignant neoplasm of eye	190.x Malignant neoplasm of eye	C37.x Malignant neoplasm of thymus
	191.x Malignant neoplasm of brain	191.x Malignant neoplasm of brain	C38.x Malignant neoplasm of heart, mediastinum and pleura
	192.x Malignant neoplasm of other and unspecified parts of nervous system	192.x Malignant neoplasm of other and unspecified parts of nervous system	C39.x Malignant neoplasm of other and ill-defined sites in the respiratory system and intrathoracic organs
	193.x Malignant neoplasm of thyroid gland	193.x Malignant neoplasm of thyroid gland	C40.x Malignant neoplasm of bone and articular cartilage of limbs
	194.x Malignant neoplasm of other endocrine glands and related structures	194.x Malignant neoplasm of other endocrine glands and related structures	C41.x Malignant neoplasm of bone and articular cartilage of other and unspecified sites
	195.x Malignant neoplasm of other and ill-defined sites	195.x Malignant neoplasm of other and ill-defined sites	C43.x Malignant melanoma of skin
	200.x Lymphosarcoma and reticulosarcoma and other specified malignant tumors of lymphatic tissue	199.1 Other malignant neoplasm without specification of site	C45.x Mesothelioma
	201.x Hodgkin's disease	200.x Lymphosarcoma and reticulosarcoma and other specified malignant tumors of lymphatic tissue	C46.x Kaposi's sarcoma
	202.x Other malignant neoplasms of lymphoid and histiocytic tissue	201.x Hodgkin's disease	C47.x Malignant neoplasm of peripheral nerves and autonomic nervous system
	203.x Multiple myeloma and immunoproliferative neoplasms	202.x Other malignant neoplasms of lymphoid and histiocytic tissue	C48.x Malignant neoplasm of retroperitoneum and peritoneum
	204.x Lymphoid leukemia	203.x Multiple myeloma and immunoproliferative neoplasms	C49.x Malignant neoplasm of other connective and soft tissue
	205.x Myeloid leukemia	204.x Lymphoid leukemia	C50 Malignant neoplasm of breast
	206.x Monocytic leukemia	205.x Myeloid leukemia	C51- Malignant neoplasms of female genital organs
	207.x Other specified leukemia	206.x Monocytic leukemia	C58.x Malignant neoplasm of male genital organs
	208.x Leukemia of unspecified cell type	207.x Other specified leukemia	C60- Malignant neoplasm of other and ill-defined sites
		208.x Leukemia of unspecified cell type	C76.x Malignant neoplasm of other and ill-defined sites
		238.6 Neoplasm of uncertain behavior of plasma cells	C80.1 Malignant (primary) neoplasm, unspecified
			C81.x Hodgkin lymphoma
			C82.x Follicular lymphoma
			C83.x Non-follicular lymphoma
			C84.x Mature T/NK-cell

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
			lymphomas C85.x Other specified and unspecified types of non-Hodgkin lymphoma C88.x Malignant immunoproliferative diseases and certain other B-cell lymphomas C9x.x Multiple myeloma and malignant plasma cell neoplasms, lymphoid leukemia, monocytic leukemia, other leukemias of specified cell type, leukemia of unspecified cell type, other and unspecified malignant neoplasms of lymphoid, hematopoietic and related tissue

Table SI-30. CCI Coding Scheme: Moderate or Severe Liver Disease

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
3	456.0 Esophageal varices with bleeding 456.1 Esophageal varices without mention of bleeding 456.2x Esophageal varices in diseases classified elsewhere 572.2 Hepatic encephalopathy 572.3 Portal hypertension 572.4 Hepatorenal syndrome 572.8 Other sequelae of chronic liver disease	456.0 Esophageal varices with bleeding 456.1 Esophageal varices without mention of bleeding 456.2x Esophageal varices in diseases classified elsewhere 572.2 Hepatic encephalopathy 572.3 Portal hypertension 572.4 Hepatorenal syndrome 572.8 Other sequelae of chronic liver disease	I85.0x Esophageal varices I86.4 Gastric varices K70.4x Alcoholic hepatic failure K71.1x Toxic liver disease with hepatic necrosis K72.1x Chronic hepatic failure K72.9x Hepatic failure, unspecified K76.5 Hepatic veno-occlusive disease K76.6 Portal hypertension K76.7 Hepatorenal syndrome

Table SI-3p. Deyo and CDMF CCI Coding Schemes: Renal (Severe)

Score	ICD-9 Diagnosis Code (CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
3	403.01 Hypertensive chronic kidney disease, malignant, with chronic kidney disease stage V or end stage renal disease	I12.0 Hypertensive chronic kidney disease with stage 5 chronic kidney disease or end stage renal disease
	403.11 Hypertensive chronic kidney disease, benign, with chronic kidney disease stage V or end stage renal disease	I13.11 Hypertensive heart and CKD without heart failure with stage 5 chronic kidney disease, or end stage renal disease
	403.91 Hypertensive chronic kidney disease, unspecified, with chronic kidney disease stage V or end stage renal disease	I13.2 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease
	404.02 Hypertensive heart and chronic kidney disease, malignant, without heart failure and with chronic kidney disease stage V or end stage renal disease	N18.5 Chronic kidney disease, Stage 5
	404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease	N18.6 End stage renal disease
	404.12 Hypertensive heart and chronic kidney disease, benign, without heart failure and with chronic kidney disease stage V or end stage renal disease	N19.x Unspecified kidney failure
	404.13 Hypertensive heart and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease	N25.0 Renal osteodystrophy
	404.92 Hypertensive heart and chronic kidney disease, unspecified, without heart failure and with chronic kidney disease stage V or end stage renal disease	Z49.x Encounter for care involving renal dialysis
	404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease	Z99.2 Dependence on renal dialysis
	585.5 Chronic kidney disease, Stage V	
	585.6 End stage renal disease	
	586.x Renal failure NOS	
	588.0 Renal osteodystrophy	
	V45.11 Renal dialysis status	
	V45.12 Noncompliance with renal dialysis	
	V56.0 Encounter for extracorporeal dialysis	
	V56.1 Fitting and adjustment of extracorporeal dialysis catheter	
	V56.2 Fitting and adjustment of peritoneal dialysis catheter	
	V56.31 Encounter for adequacy testing for hemodialysis	
	V56.32 Encounter for adequacy testing for peritoneal dialysis	
	V56.8 Encounter for other dialysis	

NOTE: Deyo et al. (1992) used one set of codes without differentiation by severity: 582.x, 583.0, 583.1, 583.2, 583.3, 583.4, 583.5, 583.6, 583.7, 585.x, 586.x, and 588.x.

Table SI-3q. Deyo and CDMF CCI Coding Schemes: HIV Infection

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code ( CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
3	042.x Human immunodeficiency virus [HIV] disease	042.x Human immunodeficiency virus [HIV] disease	B20.x Human immunodeficiency virus [HIV] disease

NOTE: The Deyo version of the ICD-9 coding system includes codes 043.x and 044.x, which are no longer in use. Corresponding ICD-10 codes B21.x, B22.x, and B24.x also no longer exist.

Table SI-3r. Deyo and CDMF CCI Coding Schemes: Metastatic Solid Tumor

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code ( CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
6	196.x Secondary and unspecified malignant neoplasm of lymph nodes	196.x Secondary and unspecified malignant neoplasm of lymph nodes	C77.x Secondary and unspecified malignant neoplasm of lymph nodes
	197.x Secondary malignant neoplasm of respiratory and digestive systems	197.x Secondary malignant neoplasm of respiratory and digestive systems	C78.x Secondary malignant neoplasm of respiratory and digestive organs
	198.x Secondary malignant neoplasm of other specified sites	198.x Secondary malignant neoplasm of other specified sites	C79.x Secondary malignant neoplasm of other and unspecified sites
	199.0 Disseminated malignant neoplasm without specification of site	199.0 Disseminated malignant neoplasm without specification of site	C80.0 Disseminated malignant neoplasm, unspecified C80.2 Malignant neoplasm associated with transplanted organ

Table SI-3s. Deyo and CDMF CCI Coding Schemes: AIDS (HIV Infection + opportunistic infection)

Score	ICD-9 Diagnosis Code (Deyo et al., 1992)	ICD-9 Diagnosis Code ( CDMF CCI)	ICD-10 Diagnosis Code (CDMF CCI)
6	-- --	112.x Candidiasis of bronchi, trachea, esophagus, or lungs 180.x Invasive cervical cancer 114.x Coccidioidomycosis 117.5 Cryptococcosis 007.4 Cryptosporidiosis, chronic intestinal (greater than 1 month's duration) 078.5 Cytomegalovirus disease (particularly CMV retinitis) 348.3x Encephalopathy, HIV-related 054.x Herpes simplex: chronic ulcer(s) (greater than 1 month's duration); or bronchitis, pneumonitis, or esophagitis 115.x Histoplasmosis 007.2 Isosporiasis, chronic intestinal (greater than 1 month's duration) 176.x Kaposi's sarcoma 200-209 Lymphoma, multiple forms 031.x Mycobacterium avium comp 010-018 Tuberculosis 136.3 Pneumocystis carinii pneumonia V12.61 Pneumonia, recurrent (exact) 046.3 Progressive multifocal leukoencephalopathy 003.1 Salmonella septicemia, recurrent 130.x Toxoplasmosis of brain 799.4 Wasting syndrome due to HIV	B37.x Candidiasis of bronchi, trachea, esophagus, or lungs C53.x Invasive cervical cancer B38.x Coccidioidomycosis B45.x Cryptococcosis A07.2 Cryptosporidiosis, chronic intestinal (greater than 1 month's duration) B25.x Cytomegalovirus disease (particularly CMV retinitis) G93.4x Encephalopathy, HIV-related B00 Herpes simplex: chronic ulcer(s) (greater than 1 month's duration); or bronchitis, pneumonitis, or esophagitis B39.x Histoplasmosis A07.3 Isosporiasis, chronic intestinal (greater than 1 month's duration) C46.x Kaposi's sarcoma C81-C96 Lymphoma, multiple forms A31.x Mycobacterium avium comp A15-A19 Tuberculosis B59 Pneumocystis carinii pneumonia Z87.01 Pneumonia, recurrent A81.2 Progressive multifocal leukoencephalopathy A02.1 Salmonella septicemia, recurrent B58.x Toxoplasmosis of brain R64 Wasting syndrome due to HIV

See Bibliography, next page

## **Bibliography, Supplemental Appendix I**

Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *J. Clin. Epidemiol.* 1992;45(6):613-619.

Quan H, Sundararajan V, Halfon P, et al. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med. Care.* 2005;43(11):1130-1139.

Supplemental Appendix II

Table SII-1. Population Characteristics by Time Window

Characteristic	Oct. 2013 to Sept. 2014 (ICD-9)	Oct. 2014 to Sept. 2015 (ICD-9)	Oct. 2015 to Sept. 2016 (ICD-10)
<b>TOTAL, n</b>	1,791,171	2,052,698	2,163,082
<b>Male Sex, n</b>	786,287	905,430	964,422
<b>Age (years), mean</b>	75.0	74.9	74.8
<b>Male: Age Subgroups, n (%)</b>			
65-69	200,394 (11.2%)	241,910 (11.8%)	261,998 (12.1%)
70-74	242,347 (13.5%)	271,684 (13.2%)	284,286 (13.1%)
75-79	165,584 (9.2%)	190,637 (9.3%)	207,055 (9.6%)
80-84	102,238 (5.7%)	116,019 (5.7%)	122,346 (5.7%)
85-90	54,029 (3.0%)	60,774 (3.0%)	62,908 (2.9%)
90-94	18,354 (1.0%)	20,522 (1.0%)	21,640 (1.0%)
95++	3,341 (0.19%)	3,854 (0.19%)	4,189 (0.19%)
<b>Female: Age Subgroups, n (%)</b>			
65-69	253,195 (14.1%)	302,972 (14.8%)	322,144 (14.9%)
70-74	289,653 (16.1%)	325,125 (15.8%)	336,264 (15.6%)
75-79	196,344 (11.0%)	225,396 (11.0%)	241,100 (11.1%)
80-84	135,311 (7.6%)	149,839 (7.3%)	154,261 (7.1%)
85-90	84,081 (5.0%)	92,712 (4.5%)	93,178 (4.3%)
90-94	36,616 (2.0%)	40,133 (2.0%)	40,286 (1.9%)
95++	9,684 (0.54%)	11,091 (0.54%)	11,427 (0.53%)
<b>Race, n (%)</b>			
White	1,523,493 (85.2%)	1,722,262 (83.9%)	1,783,800 (82.5%)
Black	194,398 (10.9%)	239,925 (11.7%)	270,619 (12.5%)
Hispanic	23,939 (1.3%)	27,093 (1.3%)	30,318 (1.4%)
Asian	15,010 (0.84%)	18,800 (0.92%)	24,783 (1.1%)
Native American	3,163 (0.18%)	3,779 (0.18%)	4,134 (0.19%)
Other	22,305 (1.2%)	26,766 (1.3%)	32,003 (1.5%)
Unknown	8,863 (0.50%)	14,073 (0.69%)	17,425 (0.81%)
<b>CCI Score, mean</b>	4.910	4.915	4.883
<b>(95% CI)</b>	(4.906-4.913)	(4.912-4.918)	(4.880-4.886)

CCI, Charlson Comorbidity Index; CI, confidence interval; ICD-9(10), International Classification of Diseases, Ninth(Tenth) Edition

**Table SII-2. Prevalence of Each CCI Condition**

Characteristic n(%)	Oct. 2013 to Sept. 2014 (ICD-9)	Oct. 2014 to Sept. 2015 (ICD-9)	Oct. 2015 to Sept. 2016 (ICD-10)
Myocardial Infarction	123,181 (6.9%)	139,216 (6.8%)	138,701 (6.4%)
Congestive heart failure	213,967 (11.9%)	251,514 (12.3%)	272,205 (12.6%)
Peripheral vascular disease	338,626 (18.9%)	394,851 (19.2%)	428,537 (19.8%)
Cardiovascular disease	230,921 (12.9%)	260,189 (12.7%)	237,026 (11.0%)
Dementia	108,968 (6.1%)	121,522 (5.9%)	135,514 (6.3%)
Cephalopelvic disproportion	395,871 (22.1%)	466,482 (22.7%)	479,359 (22.2%)
Cumulative trauma disorder	65,256 (3.6%)	75,333 (3.7%)	76,132 (3.5%)
Ulcer (mild)	24,542 (1.4%)	27,398 (1.3%)	29,191 (1.4%)
Liver (mild)	65,783 (3.7%)	80,318 (3.9%)	85,234 (3.9%)
Diabetes (mild)	336,160 (18.8%)	377,275 (18.4%)	360,986 (16.7%)
Renal (mild-moderate)	293,582 (16.4%)	356,280 (17.4%)	390,455 (18.1%)
Diabetes Complications	237,194 (13.2%)	288,481 (14.1%)	344,240 (15.9%)
Hemiplegia or paraplegia	17,277 (0.97%)	19,738 (0.96%)	24,438 (1.1%)
Malignancy	193,351 (10.8%)	218,080 (10.6%)	194,286 (9.0%)
Liver (moderate-severe)	5,357 (0.30%)	6,798 (0.33%)	7,271 (0.34%)
Renal (severe)	42,898 (2.4%)	45,732 (2.2%)	42,239 (2.0%)
HIV	903 (0.05%)	1,085 (0.05%)	1,338 (0.06%)
Metastatic	20,053 (1.1%)	22,966 (1.1%)	25,874 (1.2%)
AIDS	175 (0.10%)	253 (0.01%)	275 (0.01%)
POPULATION TOTAL	1,791,171 (100%)	2,052,698 (100%)	2,163,082 (100%)

AIDS, acquired immune deficiency syndrome; HIV, human immunodeficiency virus; ICD-9(10), International Classification of Disease, Ninth(Tenth) Edition

**Table SII-3a. Prevalence of Each CCI Score Level, Eliminating Age from Scoring**

CCI Score	Oct. 2013 to Sept. 2014 (ICD-9)	Oct. 2014 to Sept. 2015 (ICD-9)	Oct. 2015 to Sept. 2016 (ICD-10)
0	564,411 (31.5%)	643,459 (31.3%)	685,899 (31.7%)
1	399,386 (22.3%)	451,520 (22.0%)	473,404 (21.9%)
2	296,664 (16.6%)	336,175 (16.4%)	355,615 (16.4%)
3	205,815 (11.5%)	238,677 (11.6%)	252,300 (11.7%)
4	129,813 (7.2%)	152,392 (7.4%)	159,930 (7.4%)
5	79,398 (4.4%)	94,104 (4.6%)	97,511 (4.5%)
6	49,240 (2.7%)	58,618 (2.9%)	59,736 (2.8%)
7	30,147 (1.7%)	35,213 (1.7%)	35,261 (1.6%)
8	16,972 (0.95%)	19,935 (0.97%)	19,958 (0.92%)
9	9,528 (0.53%)	11,125 (0.54%)	11,313 (0.52%)
10	4,983 (0.28%)	5,853 (0.29%)	5,925 (0.27%)
11	2,532 (0.14%)	2,926 (0.14%)	3,273 (0.15%)
12	1,218 (0.07%)	1,434 (0.07%)	1,587 (0.07%)
13	574 (0.03%)	705 (0.03%)	760 (0.04%)
14	287 (0.02%)	308 (0.02%)	339 (0.02%)
15	121 (0.01%)	166 (0.01%)	155 (0.01%)
16	55 (0.003%)	59 (0.003%)	71 (0.003%)
17	20 (0.001%)	16 (0.001%)	29 (0.001%)
18	3 (0.0002%)	12 (0.001%)	10 (0.001%)
19	2 (0.0001%)	1 (0.0001%)	4 (0.0002%)
20	2 (0.0001%)	0	2 (0.0001%)
<b>TOTAL</b>	<b>1,791,171 (100%)</b>	<b>2,052,698 (100%)</b>	<b>2,163,082 (100%)</b>

CCI, Charlson Comorbidity Index; ICD-9(10), International Classification of Disease, Ninth(Tenth) Edition

**Table SII-3b. Prevalence of Each CCI Score Level, Taking Age into Account**

CCI Score	Oct. 2013 to Sept. 2014	Oct. 2014 to Sept. 2015	Oct. 2015 to Sept. 2016
	(ICD-9)	(ICD-9)	(ICD-10)
2	182,155 (10.2%)	216,931 (10.6%)	233,257 (10.8%)
3	391,886 (21.9%)	446,029 (21.7%)	473,993 (21.9%)
4	355,262 (19.8%)	400,801 (19.5%)	422,856 (19.6%)
5	279,579 (15.6%)	316,130 (15.4%)	333,952 (15.4%)
6	204,762 (11.4%)	234,164 (11.4%)	246,482 (11.4%)
7	140,435 (7.8%)	162,471 (7.9%)	170,387 (7.9%)
8	92,981 (5.2%)	107,559 (5.2%)	111,999 (5.2%)
9	59,228 (3.3%)	70,022 (3.4%)	71,370 (3.3%)
10	37,438 (2.1%)	43,476 (2.1%)	43,640 (2.0%)
11	22,045 (1.2%)	25,672 (1.3%)	25,336 (1.2%)
12	12,295 (0.69%)	14,226 (0.69%)	14,166 (0.66%)
13	6,646 (0.37%)	7,691 (0.38%)	7,685 (0.36%)
14	3,345 (0.19%)	3,937 (0.19%)	4,047 (0.19%)
15	1,680 (0.09%)	1,905 (0.09%)	2,075 (0.10%)
16	767 (0.04%)	927 (0.05%)	1,029 (0.05%)
17	375 (0.02%)	416 (0.02%)	456 (0.02%)
18	175 (0.01%)	205 (0.01%)	207 (0.01%)
19	79 (0.004%)	96 (0.005%)	88 (0.004%)
20	25 (0.001%)	24 (0.001%)	36 (0.002%)
21	9 (0.001%)	11 (0.001%)	14 (0.001%)
22	2 (0.0001%)	5 (0.0002%)	5 (0.0002%)
23	2 (0.0001%)	0	2 (0.0001%)
TOTAL	1,791,171 (100.00%)	2,052,698 (100.00%)	2,163,082 (100.00%)

CCI, Charlson Comorbidity Index; ICD-9(10), International Classification of Disease, Ninth(Tenth) Edition

**Table SII-4. Mean Inpatient Admissions Per Thousand Per Year by CCI Score Level**

CCI Score	Oct. 2013 to Sept. 2014 (ICD-9)		Oct. 2014 to Sept. 2015 (ICD-9)		Oct. 2015 to Sept. 2016 (ICD-10)	
	N	Mean Admissions/1000 (95% CI)	N	Mean Admissions/1000 (95% CI)	N	Mean Admissions/1000 (95% CI)
2	182,155	29.9 (29.1-30.8)	216,931	28.9 (28.1-29.7)	233,257	28.0 (27.3-28.8)
3	391,886	46.6 (45.8-47.3)	446,029	46.4 (45.7-47.1)	473,993	45.0 (44.4-45.7)
4	355,262	84.3 (83.2-85.4)	400,801	83.9 (82.9-85.0)	422,856	79.6 (78.6-80.6)
5	279,579	142.4 (140.8-144.0)	316,130	139.8 (138.3-141.4)	333,952	131.5 (130.1-133.0)
6	204,762	222.3 (219.8-224.8)	234,164	215.7 (213.4-217.9)	246,482	202.9 (200.8-205.0)
7	140,435	324.5 (320.8-328.2)	162,471	316.5 (313.1-319.9)	170,387	298.6 (295.4-301.7)
8	92,981	451.3 (445.8-456.8)	107,559	443.4 (438.4-448.4)	111,999	421.2 (416.4-426.0)
9	59,228	618.4 (610.2-626.7)	70,022	595.3 (588.0-602.7)	71,370	580.3 (573.2-587.4)
10	37,438	811.9 (799.7-824.1)	43,476	792.6 (781.6-803.6)	43,640	759.3 (748.7-769.9)
11	22,045	1,015.7 (997.8-1,033.6)	25,672	1,005.6 (989.0-1,022.1)	25,336	984.8 (968.5-1,001.2)
12	12,295	1,252.4 (1,225.5-1,279.3)	14,226	1,481.2 (1,443.5-1,518.9)	14,166	1,215.2 (1,190.9-1,239.4)
13	6,646	1,533.3 (1,492.5-1,574.0)	7,691	1,253.1 (1,228.2-1,278.0)	7,685	1,440.1 (1,404.2-1,475.9)
14	3,345	1,762.0 (1,698.9-1,825.2)	3,937	1,688.9 (1,632.1-1,745.6)	4,047	1,650.4 (1,595.9-1,704.9)
15+	3,114	2,100.8 (2,028.1-2,173.6)	3,589	2,012.8 (1,948.0-2,077.7)	3,912	1,967.5 (1,907.1-2,028.0)

CCI, Charlson Comorbidity Index; CI, confidence interval ICD-9(10), International Classification of Disease, Ninth (Tenth) Edition