

## Supplementary data

Table 14. ICD-10 codes for the Charlson Co-morbidity Index

Myocardial infarction		Other rheumatoid arthritis	M06.x
Acute myocardial infarction	I21	Giant cell arteritis with polymyalgia rheumatica	M31.5
Subsequent myocardial infarction	I22	Systemic lupus erythematosus	M32.x
Old myocardial infarction	I252	Dermatopolymyositis	M33.x
Congestive cardiac failure		Systemic sclerosis	M34.x
Hypertensive heart disease with (congestive) heart failure	I11.0	Other overlap syndromes	M35.1
Hypertensive heart and renal disease with (congestive) heart failure	I13.0	Polymyalgia rheumatica	M35.3
Hypertensive heart and renal disease with both (congestive) heart failure and renal failure	I13.2	Dermato(poly)myositis in neoplastic disease	M36.0
Ischaemic cardiomyopathy	I25.5	Peptic ulcer disease	
Cardiomyopathy in diseases classified elsewhere	I43	Gastric ulcer	K25.x
Heart failure	I50	Duodenal ulcer	K26.x
Cardiomyopathy	I42	Peptic ulcer, site unspecified	K27.x
Peripheral vascular disease		Gastrojejunal ulcer	K28.x
Aortic aneurysm and dissection	I71.x	Liver disease	
Thromboangiitis obliterans [Buerger]	I73.1	Chronic viral hepatitis	B18.x
Other specified peripheral vascular diseases	I73.8	Alcoholic fatty liver	K70.0
Peripheral vascular disease, unspecified	I73.9	Alcoholic hepatitis	K70.1
Stricture of artery	I77.1	Alcoholic fibrosis and sclerosis of liver	K70.2
Aneurysm of aorta in diseases classified elsewhere	I79.0	Alcoholic cirrhosis of liver	K70.3
Peripheral angiopathy in diseases classified elsewhere	I79.2	Alcoholic liver disease, unspecified	K70.9
Chronic vascular disorders of intestine	K55.1	Toxic liver disease with chronic persistent hepatitis	K71.3
Other vascular disorders of intestine	K55.8	Toxic liver disease with chronic lobular hepatitis	K71.4
Vascular disorder of intestine, unspecified	K55.9	Toxic liver disease with chronic active hepatitis	K71.5
Presence of other cardiac and vascular implants and grafts	Z95.8	Toxic liver disease with fibrosis and cirrhosis of liver	K71.7
Presence of cardiac and vascular implant and graft, unspecified	Z95.9	Chronic hepatitis, not elsewhere classified	K73.x
Cerebrovascular disease		Fibrosis and cirrhosis of liver	K74.x
Transient cerebral ischaemic attacks and related syndromes	G45.x	Fatty (change of) liver, not elsewhere classified	K76.0
Vascular syndromes of brain in cerebrovascular diseases	G46.x	Central haemorrhagic necrosis of liver	K76.2
Transient retinal artery occlusion	H34.0	Infarction of liver	K76.3
Cerebrovascular diseases	I60–I69	Peliosis hepatis	K76.4
Dementia		Other specified diseases of liver	K76.8
Dementia in Alzheimer disease	F00.x	Liver disease, unspecified	K76.9
Vascular dementia	F01.x	Diabetes without chronic complication	
Dementia in other diseases classified elsewhere	F02.x	Type 1 diabetes mellitus with coma	E10.0
Unspecified dementia	F03.x	Type 1 diabetes mellitus with ketoacidosis	E10.1
Delirium superimposed on dementia	F05.1	Type 1 diabetes mellitus without complications	E10.9
Alzheimer disease	G30.x	Type 2 diabetes mellitus with coma	E11.0
Senile degeneration of brain, not elsewhere classified	G31.1	Type 2 diabetes mellitus with ketoacidosis	E11.1
Chronic pulmonary disease		Type 2 diabetes mellitus without complications	E11.9
Other specified pulmonary heart diseases	I27.8	Malnutrition-related diabetes mellitus with coma	E12.0
Chronic lower respiratory disease	J40–J47	Malnutrition-related diabetes mellitus with ketoacidosis	E12.1
Coalworker pneumoconiosis	J60.x	Malnutrition-related diabetes mellitus without complications	E12.9
Pneumoconiosis due to asbestos and other mineral fibres	J61.x	Other specified diabetes mellitus with coma	E13.0
Pneumoconiosis due to dust containing silica	J62.x	Other specified diabetes mellitus with ketoacidosis	E13.1
Pneumoconiosis due to other inorganic dusts	J63.x	Other specified diabetes mellitus without complications	E13.9
Unspecified pneumoconiosis	J64.x	Unspecified diabetes mellitus with coma	E14.0
Pneumoconiosis associated with tuberculosis	J65.x	Unspecified diabetes mellitus with ketoacidosis	E14.1
Airway disease due to specific organic dust	J66.x	Unspecified diabetes mellitus without complications	E14.9
Hypersensitivity pneumonitis due to organic dust	J67.x	Diabetes with end organ damage	
Chronic respiratory conditions due to chemicals, gases, fumes and vapours	J68.4	Type 1 diabetes mellitus with renal complications	E10.2
Chronic and other pulmonary manifestations due to radiation	J70.1	Type 1 diabetes mellitus with ophthalmic complications	E10.3
Chronic drug-induced interstitial lung disorders	J70.3	Type 1 diabetes mellitus with neurological complications	E10.4
Rheumatic disease		Type 1 diabetes mellitus with peripheral circulatory complications	E10.5
Seropositive rheumatoid arthritis	M05.x	Type 1 diabetes mellitus with multiple complications	E10.7
		Type 2 diabetes mellitus with renal complications	E11.2
		Type 2 diabetes mellitus with ophthalmic complications	E11.3
		Type 2 diabetes mellitus with neurological complications	E11.4
		Type 2 diabetes mellitus with peripheral circulatory complications	E11.5
		Type 2 diabetes mellitus with multiple complications	E11.7
		Malnutrition-related diabetes mellitus with renal complications	E12.2

Malnutrition-related diabetes mellitus with ophthalmic complications	E12.3	Malignant neoplasms of male genital organs	C60–C63
Malnutrition-related diabetes mellitus with neurological complications	E12.4	Malignant neoplasms of urinary tract	C64–C68
Malnutrition-related diabetes mellitus with peripheral circulatory complications	E12.5	Malignant neoplasms of eye, brain and other parts of the central nervous system	C69–C72
Malnutrition-related diabetes mellitus with multiple complications	E12.7	Malignant neoplasm of thyroid and other endocrine glands	C73–C75
Other specified diabetes mellitus with renal complications	E13.2	Malignant neoplasm of other and ill-defined sites	C76.x
Other specified diabetes mellitus with ophthalmic complications	E13.3	Lymphoma	
Other specified diabetes mellitus with neurological complications	E13.4	Hodgkin lymphoma	C81.x
Other specified diabetes mellitus with peripheral circulatory complications	E13.5	Follicular lymphoma	C82.x
Other specified diabetes mellitus with multiple complications	E13.7	Non-follicular lymphoma	C83.x
Unspecified diabetes mellitus with renal complications	E14.2	Mature T/NK-cell lymphomas	C84.x
Unspecified diabetes mellitus with ophthalmic complications	E14.3	Other and unspecified types of non-Hodgkin lymphoma	C85.x
Unspecified diabetes mellitus with neurological complications	E14.4	Malignant immunoproliferative diseases	C88.x
Unspecified diabetes mellitus with peripheral circulatory complications	E14.5	Multiple myeloma and malignant plasma cell neoplasms	C90.x
Unspecified diabetes mellitus with multiple complications	E14.7	Leukaemia	
Hemiplegia		Lymphoid leukaemia	C91.x
Hereditary spastic paraplegia	G11.4	Myeloid leukaemia	C92.x
Spastic diplegic cerebral palsy	G80.1	Monocytic leukaemia	C93.x
Spastic hemiplegic cerebral palsy	G80.2	Other leukaemias of specified cell type	C94.x
Hemiplegia	G81.x	Leukaemia of unspecified cell type	C95.x
Paraplegia and tetraplegia	G82.x	Other and unspecified malignant neoplasms of lymphoid, haematopoietic and related tissue	C96.x
Diplegia of upper limbs	G83.0	Malignant neoplasms of independent (primary) multiple sites	C97.x
Moderate or severe renal disease		Moderate or severe liver disease	
Hypertensive renal disease with renal failure	I12.0	Oesophageal varices with bleeding	I85.0
Hypertensive heart and renal disease with renal failure	I13.1	Oesophageal varices without bleeding	I85.9
Chronic nephritic syndrome	N03	Gastric varices	I86.4
Unspecified nephritic syndrome: diffuse membranous glomerulonephritis	N05.2	Oesophageal varices without bleeding in diseases classified elsewhere	I98.2
Unspecified nephritic syndrome: diffuse mesangial proliferative glomerulonephritis	N05.3	Alcoholic hepatic failure	K70.4
Unspecified nephritic syndrome: diffuse endocapillary proliferative glomerulonephritis	N05.4	Toxic liver disease with hepatic necrosis	K71.1
Unspecified nephritic syndrome: diffuse mesangiocapillary glomerulonephritis	N05.5	Chronic hepatic failure	K72.1
Unspecified nephritic syndrome: dense deposit disease	N05.6	Hepatic failure, unspecified	K72.9
Unspecified nephritic syndrome: diffuse crescentic glomerulonephritis	N05.7	Hepatic veno-occlusive disease	K76.5
Chronic kidney disease stage 3	N183	Portal hypertension	K76.6
Chronic kidney disease stage 4	N184	Hepatorenal syndrome	K76.7
Chronic kidney disease stage 5	N185	Metastatic solid tumor	
Unspecified kidney failure	N19.x	Secondary and unspecified malignant neoplasm of lymph nodes	C77.x
Renal osteodystrophy	N25.0	Secondary malignant neoplasm of respiratory and digestive organs	C78.x
Preparatory care for dialysis	Z49.0	Secondary malignant neoplasm of other and unspecified sites	C79.x
Extracorporeal dialysis	Z49.1	Malignant neoplasm, without specification of site	C80.x
Other dialysis	Z49.2	AIDS/HIV	
Dependence on renal dialysis	Z99.2	Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases	B20.x
Any malignancy, including lymphoma and leukemia, except malignant neoplasm of skin		Human immunodeficiency virus [HIV] disease resulting in malignant neoplasms	B21.x
Malignant neoplasms of lip, oral cavity and pharynx	C00–C14	Human immunodeficiency virus [HIV] disease resulting in other specified diseases	B22.x
Malignant neoplasms of digestive organs	C15–C26	Human immunodeficiency virus [HIV] disease resulting in other conditions	B23.x
Malignant neoplasms of respiratory and intrathoracic organs	C30–C39	Unspecified human immunodeficiency virus [HIV] disease	B24.x
Malignant neoplasms of bone and articular cartilage	C40–C41		
Malignant neoplasms of mesothelial and soft tissue	C45–C49		
Malignant neoplasm of breast	C50.x		
Malignant neoplasms of female genital organs	C51–C58		

Table 15. ICD-10 codes for inpatient complications

Pulmonary embolism	
Pulmonary embolism	I26
Myocardial infarction	
Acute myocardial infarction	I21
Subsequent myocardial infarction	I22
Lower respiratory tract infection	
Viral pneumonia, not elsewhere classified	J12
Pneumonia due to <i>Streptococcus pneumoniae</i>	J13
Pneumonia due to <i>Haemophilus influenzae</i>	J14
Bacterial pneumonia, not elsewhere classified	J15
Pneumonia due to other infectious organisms, not elsewhere classified	J16
Pneumonia, organism unspecified	J18
Unspecified acute lower respiratory infection	J22
Pyothorax	J86
Chronic obstructive pulmonary disease with acute lower respiratory infection	J440
Pneumonitis due to food and vomit	J690
Acute kidney injury	
Acute renal failure	N17
Urinary tract infection	
Acute tubulo-interstitial nephritis	N10
Acute cystitis	N300
Other cystitis	N308
Cystitis, unspecified	N309
Urinary tract infection, site not specified	N390
Cerebrovascular event	
Subarachnoid haemorrhage	I60
Intracerebral haemorrhage	I61
Other nontraumatic intracranial haemorrhage	I62
Cerebral infarction	I63
Stroke, not specified as haemorrhage or infarction	I64
Deep vein thrombosis	
Phlebitis and thrombophlebitis of femoral vein	I801
Embolism and thrombosis of other specified veins	I828
Embolism and thrombosis of unspecified vein	I829
Phlebitis and thrombophlebitis of other deep vessels of lower extremities	I802
Phlebitis and thrombophlebitis of lower extremities, unspecified	I803

Table 16. OPCS-4 codes for specific procedures

Subacromial decompression	
Subacromial decompression	O291
Rotator cuff repair	
Plastic repair of rotator cuff of shoulder	T791
Revisional repair of rotator cuff	T793
Plastic repair of multiple tears of rotator cuff of shoulder	T794
Revisional repair of multiple tears of rotator cuff of shoulder	T795

Table 17. General re-operation codes

Subacromial decompression	
Total excision of bursa	T621
Excision of bursa	T622
Exploration of bursa	T626
Exploration of bursa	T628
Unspecified	T629
Endoscopic decompression of joint	W844
Rotator cuff repair	
Multiple transfer of tendon to tendon	T641
Transfer of tendon to tendon NEC	T642
Multiple insertion of tendons into bone	T643
Other specified	T648
Unspecified	T649
Primary repair of tendon	T67
Secondary repair of tendon	T68
Relocation	
Primary open reduction of traumatic dislocation of joint and skeletal traction NEC	W652
Other specified	W658
Unspecified	W689
Primary closed reduction of traumatic dislocation of joint and skeletal traction NEC	W662
Other specified	W668
Unspecified	W669
Secondary open reduction of traumatic dislocation of joint and skeletal traction NEC	W672
Secondary open reduction of traumatic dislocation of joint NEC	W674
Other specified	W678
Unspecified	W679
Stabilisation	
Other stabilising operations on joint	O27
Endoscopic repair of intra-articular ligament	W841
Endoscopic reattachment of intra-articular ligament	W842
Repair of capsule of joint for stabilisation of joint	W771
Transposition of muscle for stabilisation of joint	W772
Blocking operations on joint using prosthesis for stabilisation of joint	W773
Blocking operations on joint using bone for stabilisation of joint	W774
Periarticular osteotomy for stabilisation of joint	W775
Transposition of ligament for stabilisation of joint	W777
Other specified	W778
Unspecified	W779
Prosthetic replacement of ligament	W72
Prosthetic reinforcement of ligament	W73
Other reconstruction of ligament	W74
Other open repair of ligament	W75
MUA and capsular release	
Manipulation of joint using traction NEC	W911
Manipulation of prosthetic joint NEC	W913
Other specified	W918
Unspecified	W919
Release of contracture of shoulder joint	W781
Limited release of contracture of capsule of joint	W784
External manipulation of organ NOC	Y421
Other specified	Y428
Unspecified	Y429
Synovectomy	
Total synovectomy	W691
Subtotal synovectomy	W692
Partial synovectomy	W693
Tenosynovectomy	T711
Fracture fixation	
Primary open reduction of fracture of long bone and fixation using rigid nail NEC	W192
Primary open reduction of fracture of long bone and fixation using flexible nail	W193

Primary open reduction of fracture of short bone and fixation using screw	W194
Primary open reduction of fragment of bone and fixation using screw	W195
Primary open reduction of fragment of bone and fixation using wire system	W196
Other specified	W198
Unspecified	W199
Primary open reduction of fracture of bone and extramedullary fixation	W20
Primary open reduction of intra-articular fracture of bone	W21
Other primary open reduction of fracture of bone	W22
Secondary open reduction of fracture of bone	W23
Closed reduction of fracture of long bone and rigid internal fixation NEC	W242
Closed reduction of fracture of long bone and flexible internal fixation HFQ	W243
Closed reduction of fracture of short bone and fixation using screw	W244
Closed reduction of fragment of bone and fixation using screw	W245
Closed reduction of fracture of bone and fixation using nail or screw	W246
Closed reduction of fracture of bone and fixation using plate	W247
Other specified	W248
Unspecified	W249
Closed reduction of fracture of bone and external fixation	W25
Other closed reduction of fracture of bone	W26
Primary open reduction of fracture dislocation of joint and skeletal traction HFQ	W651
Primary open reduction of fracture dislocation of joint NEC	W653
Primary open reduction of fracture dislocation of joint and internal fixation NEC	W654
Primary open reduction of fracture dislocation of joint and combined internal and external fixation	W655
Primary closed reduction of fracture dislocation of joint and skeletal traction HFQ	W661
Primary manipulative closed reduction of fracture dislocation of joint NEC	W663
Primary closed reduction of fracture dislocation of joint and internal fixation	W664
Secondary open reduction of fracture dislocation of joint and skeletal traction HFQ	W671
Secondary open reduction of fracture dislocation of joint NEC	W673
Secondary open reduction of fracture dislocation of joint and internal fixation NEC	W677
Debridement of open fracture of bone	W332
Remanipulation of fracture of long bone and rigid internal fixation NEC	O172
Remanipulation of fracture of long bone and flexible internal fixation HFQ	O173
Remanipulation of fragment of bone and fixation using screw	O175
Other specified	O178
Unspecified	O179

Table 18. Anatomy codes

Standard anatomy options	
Glenohumeral joint	Z813
Shoulder joint	Z814
Shoulder NEC	Z891
Anatomy options - fracture	
Head of humerus	Z691
Tuberosity of humerus	Z692
Neck of humerus	Z693
Glenohumeral joint	Z813
Shoulder joint	Z814
Shoulder NEC	Z891
Anatomy options - ASAD	
Acromioclavicular joint	Z812
Shoulder joint	Z814
Shoulder NEC	Z891