

**Supplementary Appendix 1. Coding definitions (ICD-10) for conditions included in Charlson and Tonelli measures**

**Charlson conditions (Quan 2005)**

<b>Condition</b>	<b>ICD-10 codes</b>	<b>Description</b>	<b>Prevalence (%)</b>
Chronic pulmonary disease (includes asthma)	I27.8	Other specified pulmonary heart diseases	11.3
	I27.9	Pulmonary heart disease, unspecified	
	J40	Bronchitis, not specified as acute or chronic	
	J41	Simple and mucopurulent chronic bronchitis	
	J42	Unspecified chronic bronchitis	
	J43	Emphysema	
	J44	Other chronic obstructive pulmonary disease	
	J45	Asthma	
	J46	Status asthmaticus	
	J47	Bronchiectasis	
	J60	Coalworker pneumoconiosis	
	J61	Pneumoconiosis due to asbestos and other mineral fibres	
	J62	Pneumoconiosis due to dust containing silica	
	J63	Pneumoconiosis due to other inorganic dusts	
	J64	Unspecified pneumoconiosis	
	J65	Pneumoconiosis associated with tuberculosis	
	J66	Airway disease due to specific organic dust	
J67	Hypersensitivity pneumonitis due to organic dust		
J68.4	Chronic respiratory conditions due to chemicals, gases, fumes and vapours		
J70.1	Chronic and other pulmonary manifestations due to radiation		
J70.3	Chronic drug-induced interstitial lung disorders		
Diabetes without chronic complications	E10.0	Insulin-dependent diabetes mellitus-With coma	7.5
	E10.1	Insulin-dependent diabetes mellitus-With ketoacidosis	
	E10.6	Insulin-dependent diabetes mellitus-With other specified complications	
	E10.8	Insulin-dependent diabetes mellitus-With unspecified complications	
	E10.9	Insulin-dependent diabetes mellitus-Without complications	
	E11.0	Non-insulin-dependent diabetes mellitus-With coma	
	E11.1	Non-insulin-dependent diabetes mellitus-With ketoacidosis	
	E11.6	Non-insulin-dependent diabetes mellitus-With other specified complications	
	E11.8	Non-insulin-dependent diabetes mellitus-With unspecified complications	
	E11.9	Non-insulin-dependent diabetes mellitus-Without complications	
	E12.0	Malnutrition-related diabetes mellitus-With coma	
	E12.1	Malnutrition-related diabetes mellitus-With ketoacidosis	
	E12.6	Malnutrition-related diabetes mellitus-With other specified complications	
	E12.8	Malnutrition-related diabetes mellitus-With unspecified complications	

Condition	ICD-10 codes	Description	Prevalence (%)
	E12.9	Malnutrition-related diabetes mellitus-Without complications	
	E13.0	Other specified diabetes mellitus-With coma	
	E13.1	Other specified diabetes mellitus-With ketoacidosis	
	E13.6	Other specified diabetes mellitus-With other specified complications	
	E13.8	Other specified diabetes mellitus-With unspecified complications	
	E13.9	Other specified diabetes mellitus-Without complications	
	E14.0	Unspecified diabetes mellitus-With coma	
	E14.1	Unspecified diabetes mellitus-With ketoacidosis	
	E14.6	Unspecified diabetes mellitus-With other specified complications	
	E14.8	Unspecified diabetes mellitus-With unspecified complications	
	E14.9	Unspecified diabetes mellitus-Without complications	
Any malignancy, including lymphoma and leukemia, except malignant neoplasm of skin	C00– C26 C30 C31 C32 C33 C34 C37 C38 C39 C40 C41 C43 C45– C58 C60– C76 C81 C82 C83 C84 C85 C88 C90 C91	Malignant neoplasms of lip, oral cavity and pharynx Malignant neoplasms of digestive organs Malignant neoplasm of nasal cavity and middle ear Malignant neoplasm of accessory sinuses Malignant neoplasm of larynx Malignant neoplasm of trachea Malignant neoplasm of bronchus and lung Malignant neoplasm of thymus Malignant neoplasm of heart, mediastinum and pleura Malignant neoplasm of other and ill-defined sites in the respiratory system and intrathoracic organs Malignant neoplasm of bone and articular cartilage of limbs Malignant neoplasm of bone and articular cartilage of other and unspecified sites Malignant melanoma of skin Malignant neoplasms of mesothelial and soft tissue Malignant neoplasm of breast Malignant neoplasms of female genital organs Malignant neoplasms of male genital organs Malignant neoplasms of urinary tract Malignant neoplasms of eye, brain and other parts of central nervous system Malignant neoplasms of thyroid and other endocrine glands Malignant neoplasm of other and ill-defined sites Hodgkin lymphoma Follicular lymphoma Non-follicular lymphoma Mature T/NK-cell lymphomas Other and unspecified types of non-Hodgkin lymphoma Malignant immunoproliferative diseases Multiple myeloma and malignant plasma cell neoplasms Lymphoid leukaemia	6.9

Condition	ICD-10 codes	Description	Prevalence (%)
	C92 C93 C94 C95	Myeloid leukaemia Monocytic leukaemia Other leukaemias of specified cell type Leukaemia of unspecified cell type	
	C96 C97	Other and unspecified malignant neoplasms of lymphoid, haematopoietic and related tissue Malignant neoplasms of independent (primary) multiple sites	
Renal disease	I12.0 I13.1 N03.2 N03.3 N03.4 N03.5 N03.6 N03.7 N05.2 N05.3 N05.4 N05.5 N05.6 N05.7 N18 N19 N25.0 Z49.0 Z49.1 Z49.2 Z94.0 Z99.2	Hypertensive renal disease with renal failure Hypertensive heart and renal disease with renal failure Chronic nephritic syndrome-Diffuse membranous glomerulonephritis Chronic nephritic syndrome-Diffuse mesangial proliferative glomerulonephritis Chronic nephritic syndrome-Diffuse endocapillary proliferative glomerulonephritis Chronic nephritic syndrome-Diffuse mesangiocapillary glomerulonephritis Chronic nephritic syndrome-Dense deposit disease Chronic nephritic syndrome-Diffuse crescentic glomerulonephritis Unspecified nephritic syndrome-Diffuse membranous glomerulonephritis Unspecified nephritic syndrome-Diffuse mesangial proliferative glomerulonephritis Unspecified nephritic syndrome-Diffuse endocapillary proliferative glomerulonephritis Unspecified nephritic syndrome-Diffuse mesangiocapillary glomerulonephritis Unspecified nephritic syndrome-Dense deposit disease Unspecified nephritic syndrome-Diffuse crescentic glomerulonephritis Chronic kidney disease Unspecified kidney failure Renal osteodystrophy Preparatory care for dialysis Extracorporeal dialysis Other dialysis Kidney transplant status Dependence on renal dialysis	6.1
Myocardial infarction	I21 I22 I25.2	Acute myocardial infarction Subsequent myocardial infarction Old myocardial infarction	5.6
Congestive heart failure	I09.9 I11.0 I13.0 I13.2 I25.5	Rheumatic heart disease, unspecified Hypertensive heart disease with (congestive) heart failure Hypertensive heart and renal disease with (congestive) heart failure Hypertensive heart and renal disease with both (congestive) heart failure and renal failure Ischaemic cardiomyopathy	3.8

Condition	ICD-10 codes	Description	Prevalence (%)
	I42.0 I42.5 I42.6 I42.7	Dilated cardiomyopathy Other restrictive cardiomyopathy Alcoholic cardiomyopathy Cardiomyopathy due to drugs and other external agents	
	I42.8 I42.9 I43 I50 P29.0	Other cardiomyopathies Cardiomyopathy, unspecified Cardiomyopathy in diseases classified elsewhere Heart failure Neonatal cardiac failure	
Peripheral vascular disease	I70 I71 I73.1 I73.8 I73.9 I77.1 I79.0 I79.2 K55.1 K55.8 K55.9 Z95.8 Z95.9	Atherosclerosis Aortic aneurysm and dissection Thromboangiitis obliterans [Buerger] Other specified peripheral vascular diseases Peripheral vascular disease, unspecified Stricture of artery Aneurysm of aorta in diseases classified elsewhere Peripheral angiopathy in diseases classified elsewhere Chronic vascular disorders of intestine Other vascular disorders of intestine Vascular disorder of intestine, unspecified Presence of other cardiac and vascular implants and grafts Presence of cardiac and vascular implant and graft, unspecified	3.3
Cerebrovascular disease	G45 G46 H34.0 I60 I61 I62 I63 I64 I65 I66 I67 I68 I69	Transient cerebral ischaemic attacks and related syndromes Vascular syndromes of brain in cerebrovascular diseases Transient retinal artery occlusion Subarachnoid haemorrhage Intracerebral haemorrhage Other nontraumatic intracranial haemorrhage Cerebral infarction Stroke, not specified as haemorrhage or infarction Occlusion and stenosis of precerebral arteries, not resulting in cerebral infarction Occlusion and stenosis of cerebral arteries, not resulting in cerebral infarction Other cerebrovascular diseases Cerebrovascular disorders in diseases classified elsewhere Sequelae of cerebrovascular disease	3.2
Metastatic solid tumour	C77 C78 C79 C80	Secondary and unspecified malignant neoplasm of lymph nodes Secondary malignant neoplasm of respiratory and digestive organs Secondary malignant neoplasm of other and unspecified sites Malignant neoplasm, without specification of site	1.8
Dementia	F00 F01	Dementia in Alzheimer disease Vascular dementia	1.7

Condition	ICD-10 codes	Description	Prevalence (%)
	F02 F03 F05.1 G30 G31.1	Dementia in other diseases classified elsewhere Unspecified dementia Delirium superimposed on dementia Alzheimer disease Senile degeneration of brain, not elsewhere classified	
Rheumatic disease	M05 M06 M31.5 M32 M33 M34 M35.1 M35.3 M36.0	Seropositive rheumatoid arthritis Other rheumatoid arthritis Giant cell arteritis with polymyalgia rheumatica Systemic lupus erythematosus Dermatopolymyositis Systemic sclerosis Other overlap syndromes Polymyalgia rheumatica Dermao(poly)myositis in neoplastic disease	1.7
Mild liver disease	B18 K70.0 K70.1 K70.2 K70.3 K70.9 K71.3 K71.4 K71.5 K71.7 K73 K74 K76.0 K76.2 K76.3 K76.4 K76.8 K76.9 Z94.4	Chronic viral hepatitis Alcoholic fatty liver Alcoholic hepatitis Alcoholic fibrosis and sclerosis of liver Alcoholic cirrhosis of liver Alcoholic liver disease, unspecified Toxic liver disease with chronic persistent hepatitis Toxic liver disease with chronic lobular hepatitis Toxic liver disease with chronic active hepatitis Toxic liver disease with fibrosis and cirrhosis of liver Chronic hepatitis, not elsewhere classified Fibrosis and cirrhosis of liver Fatty (change of) liver, not elsewhere classified Central haemorrhagic necrosis of liver Infarction of liver Peliosis hepatis Other specified diseases of liver Liver disease, unspecified Liver transplant status	1.4
Peptic ulcer disease	K25 K26 K27 K28	Gastric ulcer Duodenal ulcer Peptic ulcer, site unspecified Gastrojejunal ulcer	0.9
Diabetes with chronic complications	E10.2 E10.3 E10.4 E10.5 E10.7 E11.2 E11.3	Insulin-dependent diabetes mellitus-With renal complications Insulin-dependent diabetes mellitus-With ophthalmic complications Insulin-dependent diabetes mellitus-With neurological complications Insulin-dependent diabetes mellitus-With peripheral circulatory complications Insulin-dependent diabetes mellitus-With multiple complications Non-insulin-dependent diabetes mellitus-With renal complications Non-insulin-dependent diabetes mellitus-With ophthalmic complications	0.9

Condition	ICD-10 codes	Description	Prevalence (%)
	E11.4 E11.5 E11.7	Non-insulin-dependent diabetes mellitus-With neurological complications Non-insulin-dependent diabetes mellitus-With peripheral circulatory complications Non-insulin-dependent diabetes mellitus-With multiple complications	
	E12.2 E12.3 E12.4 E12.5 E12.7 E13.2 E13.3 E13.4 E13.5 E13.7 E14.2 E14.3 E14.4 E14.5 E14.7	Malnutrition-related diabetes mellitus-With renal complications Malnutrition-related diabetes mellitus-With ophthalmic complications Malnutrition-related diabetes mellitus-With neurological complications Malnutrition-related diabetes mellitus-With peripheral circulatory complications Malnutrition-related diabetes mellitus-With multiple complications Other specified diabetes mellitus-With renal complications Other specified diabetes mellitus-With ophthalmic complications Other specified diabetes mellitus-With neurological complications Other specified diabetes mellitus-With peripheral circulatory complications Other specified diabetes mellitus-With multiple complications Unspecified diabetes mellitus-With renal complications Unspecified diabetes mellitus-With ophthalmic complications Unspecified diabetes mellitus-With neurological complications Unspecified diabetes mellitus-With peripheral circulatory complications Unspecified diabetes mellitus-With multiple complications	
Hemiplegia or paraplegia	G04.1 G11.4 G80.1 G80.2 G81 G82 G83.0 G83.1 G83.2 G83.3 G83.4 G83.9	Tropical spastic paraplegia Hereditary spastic paraplegia Spastic diplegic cerebral palsy Spastic hemiplegic cerebral palsy Hemiplegia Paraplegia and tetraplegia Diplegia of upper limbs Monoplegia of lower limb Monoplegia of upper limb Monoplegia, unspecified Cauda equina syndrome Paralytic syndrome, unspecified	0.7
Moderate/severe liver disease	I85.0 I85.9 I86.4	Oesophageal varices with bleeding Oesophageal varices without bleeding Gastric varices	0.6

Condition	ICD-10 codes	Description	Prevalence (%)
	I98.2 K70.4 K71.1 K72.1 K72.9 K76.5 K76.6 K76.7	Oesophageal varices without bleeding in diseases classified elsewhere Alcoholic hepatic failure Toxic liver disease with hepatic necrosis Chronic hepatic failure Hepatic failure, unspecified Hepatic veno-occlusive disease Portal hypertension Hepatorenal syndrome	
AIDS/HIV	B20 B21 B22 B24	Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases Human immunodeficiency virus [HIV] disease resulting in malignant neoplasms Human immunodeficiency virus [HIV] disease resulting in other specified diseases Unspecified human immunodeficiency virus [HIV] disease	0.0

**Tonelli conditions (Tonelli 2015)**

<b>Morbidity</b>	<b>ICD-10 codes</b>	<b>Description</b>	<b>Prevalence (%)</b>
Hypertension	I10 I11 I12 I13 I15	Essential (primary) hypertension Hypertensive heart disease Hypertensive renal disease Hypertensive heart and renal disease Secondary hypertension	19.0
Diabetes	E10 E11 E12 E13 E14	Insulin-dependent diabetes mellitus Non-insulin-dependent diabetes mellitus Malnutrition-related diabetes mellitus Other specified diabetes mellitus Unspecified diabetes mellitus	8.4
Chronic kidney disease	N00-N23	Glomerular diseases (N00-N08) Renal tubulo-interstitial diseases (N10-N16) Renal failure (N17-N19) Urolithiasis (N20-N23)	8.2
Asthma	J45	Asthma	6.7
Atrial fibrillation and flutter	I48	Atrial fibrillation and flutter	6.1
Chronic pain	F45.4 M08.1 M25.5 M43.2 M43.3 M43.4 M43.5 M43.6 M45 M46.1 M46.3 M46.4 M46.9 M47 M48.0 M48.1 M48.8 M48.9 M50.8 M50.9 M51 M53.1 M53.2 M53.3 M53.8 M53.9 M54 M60.8 M60.9 M63.3 M79.0 M79.1 M79.2	Persistent somatoform pain disorder Juvenile ankylosing spondylitis Pain in joint Other fusion of spine Recurrent atlantoaxial subluxation with myelopathy Other recurrent atlantoaxial subluxation Other recurrent vertebral subluxation Torticollis Ankylosing spondylitis Sacroiliitis, not elsewhere classified Infection of intervertebral disc (pyogenic) Discitis, unspecified Inflammatory spondylopathy, unspecified Spondylosis Spinal stenosis Ankylosing hyperostosis [Forestier] Other specified spondylopathies Spondylopathy, unspecified Other cervical disc disorders Cervical disc disorder, unspecified Other intervertebral disc disorders Cervicobrachial syndrome Spinal instabilities Sacrococcygeal disorders, not elsewhere classified Other specified dorsopathies Dorsopathy, unspecified Dorsalgia Other myositis Myositis, unspecified Myositis in sarcoidosis Rheumatism, unspecified Myalgia Neuralgia and neuritis, unspecified	6.1



Morbidity	ICD-10 codes	Description	Prevalence (%)
	M79.6 M79.7 M96.1	Pain in limb Fibromyalgia Postlaminectomy syndrome, not elsewhere classified	
Chronic pulmonary disease (excludes asthma)	I27.8 I27.9 J40 J41 J42 J43 J44 J46 J47 J60 J61 J62 J63 J64 J65 J66 J67 J68.4 J70.1 J70.3	Other specified pulmonary heart diseases Pulmonary heart disease, unspecified Bronchitis, not specified as acute or chronic Simple and mucopurulent chronic bronchitis Unspecified chronic bronchitis Emphysema Other chronic obstructive pulmonary disease Status asthmaticus Bronchiectasis Coalworker pneumoconiosis Pneumoconiosis due to asbestos and other mineral fibres Pneumoconiosis due to dust containing silica Pneumoconiosis due to other inorganic dusts Unspecified pneumoconiosis Pneumoconiosis associated with tuberculosis Airway disease due to specific organic dust Hypersensitivity pneumonitis due to organic dust Chronic respiratory conditions due to chemicals, gases, fumes and vapours Chronic and other pulmonary manifestations due to radiation Chronic drug-induced interstitial lung disorders	5.9
Hypothyroidism	E00 E01 E02 E03 E89.0	Congenital iodine-deficiency syndrome Iodine-deficiency-related thyroid disorders and allied conditions Subclinical iodine-deficiency hypothyroidism Other hypothyroidism Postprocedural hypothyroidism	4.5
Cancer, non-metastatic (breast, cervical, colorectal, lung, prostate)	C18 C19 C20 C21 C33 C34 C38.4 C45.0 C46.7 C50 C53 C61 D01.0 D01.1 D01.2 D01.3 D02.2 D05	Malignant neoplasm of colon Malignant neoplasm of rectosigmoid junction Malignant neoplasm of rectum Malignant neoplasm of anus and anal canal Malignant neoplasm of trachea Malignant neoplasm of bronchus and lung Pleura Mesothelioma of pleura Kaposi sarcoma of other sites Malignant neoplasm of breast Malignant neoplasm of cervix uteri Malignant neoplasm of prostate Carcinoma in situ of Colon Carcinoma in situ of Rectosigmoid junction Carcinoma in situ of Rectum Carcinoma in situ of Anus and anal canal Carcinoma in situ of Bronchus and lung Carcinoma in situ of breast	4.2

<b>Morbidity</b>	<b>ICD-10 codes</b>	<b>Description</b>	<b>Prevalence (%)</b>
	D06 D07.5	Carcinoma in situ of cervix uteri Carcinoma in situ of Prostate	
Alcohol misuse	E52 F10 G62.1 I42.6 K29.2 K70.0 K70.3 K70.9 T51 Z50.2 Z71.4 Z72.1	Niacin deficiency Mental and behavioural disorders due to use of alcohol Alcoholic polyneuropathy Alcoholic cardiomyopathy Alcoholic gastritis Alcoholic fatty liver Alcoholic cirrhosis of liver Alcoholic liver disease, unspecified Toxic effect of alcohol Alcohol rehabilitation Alcohol abuse counselling and surveillance Alcohol use	4.1
Chronic heart failure	I09.9 I25.5 I42.0 I42.5 I42.6 I42.7 I42.8 I42.9 I43 I50	Rheumatic heart disease, unspecified Ischaemic cardiomyopathy Dilated cardiomyopathy Other restrictive cardiomyopathy Alcoholic cardiomyopathy Cardiomyopathy due to drugs and other external agents Other cardiomyopathies Cardiomyopathy, unspecified Cardiomyopathy in diseases classified elsewhere Heart failure	3.8
Severe constipation	K55.8 K56.0 K56.4 K56.7 K59.0 K63.1 K63.4 K63.8 K92.8	Other vascular disorders of intestine Paralytic ileus Other impaction of intestine Ileus, unspecified Constipation Perforation of intestine (nontraumatic) Enteroptosis Other specified diseases of intestine Other specified diseases of digestive system	3.3
Myocardial infarction	I21 I22	Acute myocardial infarction Subsequent myocardial infarction	2.3
Depression	F20.4 F31.3 F31.4 F31.5 F32 F33 F34.1 F41.2 F43.2	Post-schizophrenic depression Bipolar affective disorder, current episode mild or moderate depression Bipolar affective disorder, current episode severe depression without psychotic symptoms Bipolar affective disorder, current episode severe depression with psychotic symptoms Depressive episode Recurrent depressive disorder Dysthymia Mixed anxiety and depressive disorder Adjustment disorders	2.3

<b>Morbidity</b>	<b>ICD-10 codes</b>	<b>Description</b>	<b>Prevalence (%)</b>
Stroke or transient ischaemic attack	G45.0 G45.1 G45.2 G45.3 G45.8  G45.9 H34.1 I60 I61 I63 I64	Vertebro-basilar artery syndrome Carotid artery syndrome (hemispheric) Multiple and bilateral precerebral artery syndromes Amaurosis fugax Other transient cerebral ischaemic attacks and related syndromes Transient cerebral ischaemic attack, unspecified Central retinal artery occlusion Subarachnoid haemorrhage Intracerebral haemorrhage Cerebral infarction Stroke, not specified as haemorrhage or infarction	2.0
Cancer, metastatic	C77  C78  C79  C80	Secondary and unspecified malignant neoplasm of lymph nodes  Secondary malignant neoplasm of respiratory and digestive organs  Secondary malignant neoplasm of other and unspecified sites  Malignant neoplasm, without specification of site	1.8
Dementia	F00 F01 F02 F03 F05.1 G30 G31.1	Dementia in Alzheimer disease Vascular dementia Dementia in other diseases classified elsewhere Unspecified dementia Delirium superimposed on dementia Alzheimer disease Senile degeneration of brain, not elsewhere classified	1.7
Rheumatoid arthritis	M05 M06 M31.5 M32 M33 M34 M35.1 M35.3 M36.0	Seropositive rheumatoid arthritis Other rheumatoid arthritis Giant cell arteritis with polymyalgia rheumatica Systemic lupus erythematosus Dermatopolymyositis Systemic sclerosis Other overlap syndromes Polymyalgia rheumatica Dermao(poly)myositis in neoplastic disease	1.7
Epilepsy	G40 G41	Epilepsy Status epilepticus	1.4
Inflammatory bowel disease	K50 K51	Crohn disease [regional enteritis] Ulcerative colitis	1.4
Cirrhosis and hepatic decompensation	K70.3 K74.3 K74.4 K74.5 K74.6 I85.0 I85.9 I98.2  I98.3  K65.0	Alcoholic cirrhosis of liver Primary biliary cirrhosis Secondary biliary cirrhosis Biliary cirrhosis, unspecified Other and unspecified cirrhosis of liver Oesophageal varices with bleeding Oesophageal varices without bleeding Oesophageal varices without bleeding in diseases classified elsewhere  Oesophageal varices with bleeding in diseases classified elsewhere  Acute peritonitis	1.1

<b>Morbidity</b>	<b>ICD-10 codes</b>	<b>Description</b>	<b>Prevalence (%)</b>
	K65.8 K65.9 K67.0 K67.1 K67.2 K67.3 K67.8  K76.7 K93.0  R18	Other peritonitis Peritonitis, unspecified Chlamydial peritonitis Gonococcal peritonitis Syphilitic peritonitis Tuberculous peritonitis Other disorders of peritoneum in infectious diseases classified elsewhere  Hepatorenal syndrome Tuberculous disorders of intestines, peritoneum and mesenteric glands  Ascites	
Cancer, lymphoma	C81 C82 C83 C84 C85  C88 C90.0 C90.2 C96	Hodgkin lymphoma Follicular lymphoma Non-follicular lymphoma Mature T/NK-cell lymphomas Other and unspecified types of non-Hodgkin lymphoma  Malignant immunoproliferative diseases Multiple myeloma Extramedullary plasmacytoma Other leukaemias of specified cell type	0.6
Peptic ulcer disease without haemorrhage	K25.7 K25.9  K26.7 K26.9  K27.7 K27.9  K28.7 K28.9	Gastric ulcer-Chronic without haemorrhage or perforation Gastric ulcer-Unspecified as acute or chronic, without haemorrhage or perforation  Duodenal ulcer-Chronic without haemorrhage or perforation Duodenal ulcer-Unspecified as acute or chronic, without haemorrhage or perforation  Peptic ulcer, site unspecified- Chronic without haemorrhage or perforation Peptic ulcer, site unspecified- Unspecified as acute or chronic, without haemorrhage or perforation  Gastrojejunal ulcer- Chronic without haemorrhage or perforation Gastrojejunal ulcer- Unspecified as acute or chronic, without haemorrhage or perforation	0.6
Irritable bowel syndrome	K58	Irritable bowel syndrome	0.5
Multiple sclerosis	G35 G36 G37  H46	Multiple sclerosis Other acute disseminated demyelination Other demyelinating diseases of central nervous system  Optic neuritis	0.5
Parkinson's disease	G20 G21 G22	Parkinson disease Secondary parkinsonism Parkinsonism in diseases classified elsewhere	0.5
Schizophrenia	F20 F21 F23.2 F25	Schizophrenia Schizotypal disorder Acute schizophrenia-like psychotic disorder Schizoaffective disorders	0.3

<b>Morbidity</b>	<b>ICD-10 codes</b>	<b>Description</b>	<b>Prevalence (%)</b>
Psoriasis	L40.0 L40.1 L40.2 L40.3 L40.4 L40.8 L40.9	Psoriasis vulgaris Generalized pustular psoriasis Acrodermatitis continua Pustulosis palmaris et plantaris Guttate psoriasis Other psoriasis Psoriasis, unspecified	0.2
Peripheral vascular disease	I70.2	Atherosclerosis of arteries of extremities	0.1
Chronic viral hepatitis B	B16 B18.0 B18.1	Acute hepatitis B Chronic viral hepatitis B with delta-agent Chronic viral hepatitis B without delta-agent	0.0

Notes: Minor changes to the Tonelli et al. (2015) published algorithms were made. The algorithms developed by Tonelli required a combination of hospitalization, claims and outpatient codes over varying time periods. We modified this to at least one hospitalisation in the five years prior to index for all morbidities. For identifying chronic kidney disease, Tonelli supplemented the algorithm using lab data, however we only used administrative data. The codes for "peptic ulcer disease" referred to "peptic ulcer disease without haemorrhage or perforation", therefore we amended the morbidity description. As specific codes for atrial fibrillation were only implemented in Scotland from April 2016 (ICD-10 version 2016), we included "atrial fibrillation and flutter" (ICD-10 code I48). No entry in ICD-10 was identified for: C46.71 (replaced with C46.7); M25.50, M25.51, M25.55, M25.57 (replaced with M25.5); K63.81 and K63.88 (replaced with K63.8), K92.80 and K92.88 (replaced with K92.8).