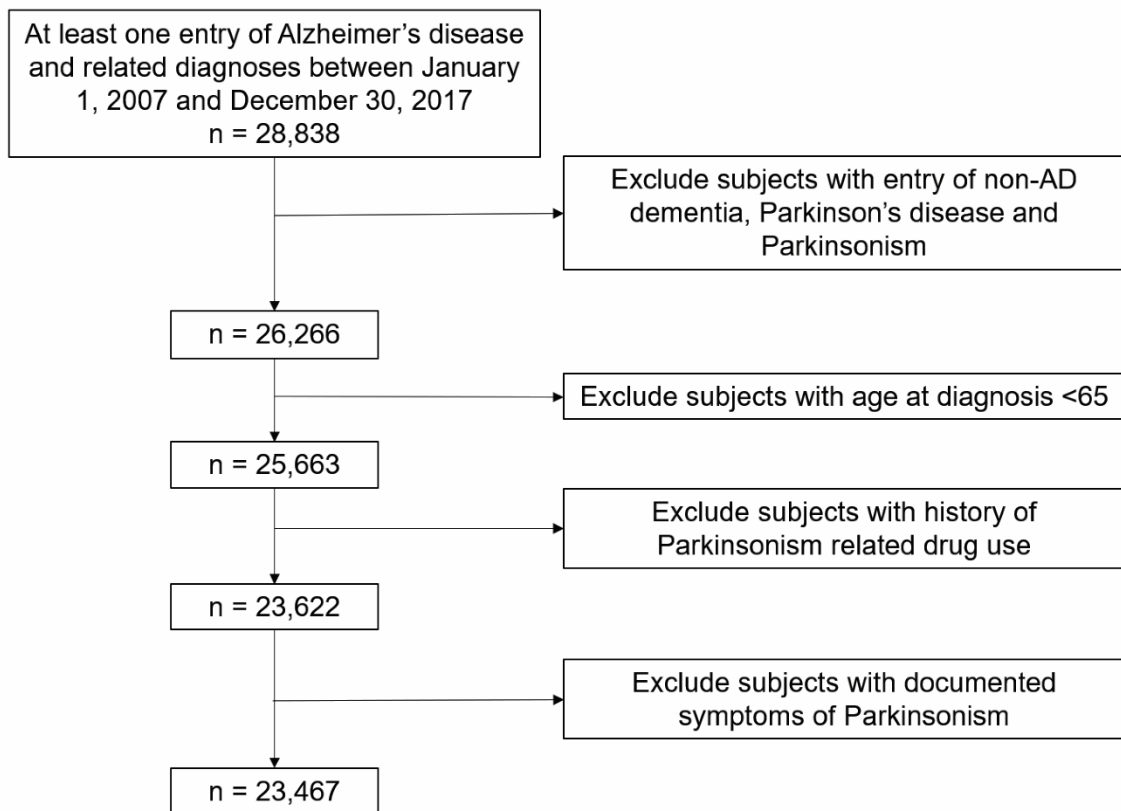


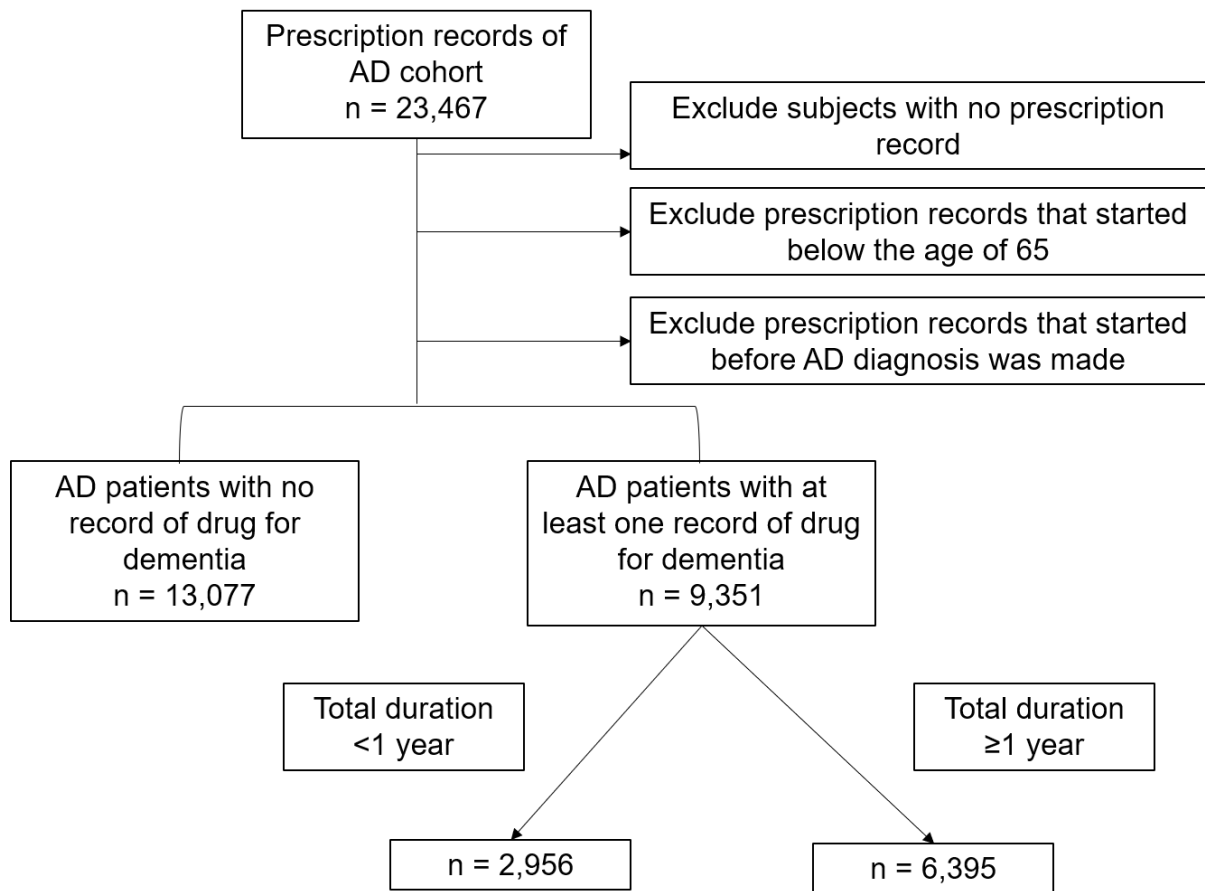
# Supplementary Material

## Demographics and Medication Use of Patients with Late-Onset Alzheimer's disease in Hong Kong

**Supplementary Figure 1.** Selection algorithm for patients with Alzheimer's disease (AD).



**Supplementary Figure 2.** Selection algorithm of patients with Alzheimer’s disease (AD) with a history of medication use for dementia.



**Supplementary Table 1.** Alzheimer's disease-related diagnoses used for subject selection.

AD-related diagnoses
Alzheimer's disease
Alzheimer's disease with early onset
Alzheimer's disease with late onset
Dementia in Alzheimer's disease atypical or mixed type

**Supplementary Table 2.** Neurodegenerative disorders other than Alzheimer's disease used for subject selection.

Non-AD dementia, Parkinson's disease and Parkinsonism
Dementia due to Creutzfeldt-Jacob disease
Arteriosclerotic dementia
Arteriosclerotic dementia with delirium
Post infarct dementia
Arteriosclerotic dementia with delusional feature
Arteriosclerotic dementia with depressive feature
Mixed cortical and subcortical vascular dementia
Mixed cortical and subcortical vascular dementia, without additional symptoms
Mixed cortical and subcortical vascular dementia, with predominant delusional symptom
Mixed cortical and subcortical vascular dementia, with predominantly hallucinatory symptom
Mixed cortical and subcortical vascular dementia, with predominantly depressive symptom
Mixed cortical and subcortical vascular dementia, with mixed symptoms
Multi-infarct dementia
Multi-infarct dementia, without additional symptoms
Multi-infarct dementia, with predominant delusional symptom
Multi-infarct dementia, with predominantly hallucinatory symptom
Multi-infarct dementia, with predominant depressive symptom
Multi-infarct dementia, with mixed symptoms
Subcortical vascular dementia
Subcortical vascular dementia, without additional symptoms
Subcortical vascular dementia, with predominant delusional symptom
Subcortical vascular dementia, with predominantly hallucinatory symptom
Subcortical vascular dementia, with predominant depressive symptom
Subcortical vascular dementia, with mixed symptoms
Vascular dementia
Vascular dementia, acute onset
Vascular dementia of acute onset, without additional symptoms
Vascular dementia of acute onset, with predominant delusional symptom
Vascular dementia of acute onset, with predominantly hallucinatory symptom
Vascular dementia of acute onset, with predominant depressive symptom
Vascular dementia of acute onset, with mixed symptoms
Vascular dementia, without additional symptoms
Vascular dementia with behavioral disturbance
Vascular dementia, uncomplicated
Vascular dementia with hallucination
Vascular dementia with mixed symptoms
Vascular dementia with delirium
Vascular dementia with delirium, with behavioral disturbance
Vascular dementia with delusion, with behavioral disturbance
Vascular dementia with predominantly delusional
Vascular dementia with depressed mood, with behavioral disturbance
Vascular dementia with predominantly depressive

Paralysis agitans  
Parkinsonian syndrome  
Neuroleptic-induced Parkinsonism  
Secondary Parkinsonism  
Secondary Parkinsonism  
Drug-induced Parkinsonism  
Secondary Parkinsonism due to non-drug agents  
Postencephalitic Parkinsonism  
Dementia in Pick's disease  
Frontotemporal dementia

**Supplementary Table 3.** List of diagnoses for determining comorbidities of patients with Alzheimer’s disease.

Comorbidities	Disease full description
Hypertension and related diagnoses	Benign essential hypertension Essential hypertension Hypertension Hypertensive encephalopathy Hypertensive heart and renal disease Hypertensive heart and renal disease, malignant Hypertensive heart and renal disease, malignant, with congestive heart failure Hypertensive heart and renal disease, with congestive heart failure Hypertensive heart and renal disease, with congestive heart failure and renal failure Hypertensive heart and renal disease, with renal failure Hypertensive heart disease Hypertensive heart disease with congestive heart failure Hypertensive renal disease Hypertensive renal disease with renal failure Hypertensive renal disease, malignant Hypertensive renal disease, malignant, with renal failure Malignant hypertension Malignant hypertensive heart disease with congestive heart failure Renovascular hypertension
Diabetes Mellitus	Diabetes mellitus Diabetes mellitus with autonomic neuropathy Diabetes mellitus with background retinopathy Diabetes mellitus with drug induced hypoglycemia Diabetes mellitus with hyperglycemia Diabetes mellitus with hyperosmolarity Diabetes mellitus with hypoglycemia Diabetes mellitus with maculopathy Diabetes mellitus with mononeuropathy Diabetes mellitus with overt nephropathy (macroalbuminuria) Diabetes mellitus with peripheral angiopathy Diabetes mellitus with proliferative retinopathy Diabetes mellitus, uncontrolled with gangrene foot Diabetes mellitus, uncontrolled with hyperglycemia Diabetes mellitus, uncontrolled with hyperosmolar coma Diabetes mellitus, uncontrolled with hyperosmolarity Diabetes mellitus, uncontrolled with ketoacidosis Diabetic ketoacidosis Diabetic retinopathy NIDDM with neurological manifestations, uncontrolled NIDDM with ophthalmic manifestations, uncontrolled

Non-insulin dependent diabetes mellitus with neuropathy  
Polyneuropathy in diabetes  
Proliferative diabetic retinopathy  
Type I diabetes mellitus  
Type I diabetes mellitus with background retinopathy  
Type I diabetes mellitus with drug induced hypoglycemia  
Type I diabetes mellitus with hyperglycemia  
Type I diabetes mellitus with hypoglycemia  
Type I diabetes mellitus with leg ulcer  
Type I diabetes mellitus with maculopathy  
Type I diabetes mellitus with neurological manifestations  
Type I diabetes mellitus with overt nephropathy (macroalbuminuria)  
Type I diabetes mellitus with peripheral neuropathy  
Type I diabetes mellitus with pre-proliferative retinopathy  
Type I diabetes mellitus with proliferative retinopathy  
Type I diabetes mellitus with retinopathy  
Type I diabetes mellitus with triopathy  
Type I diabetes mellitus, uncontrolled with hyperglycemia  
Type I diabetes mellitus, uncontrolled with hyperosmolarity  
Type II diabetes mellitus  
Type II diabetes mellitus uncontrolled with autonomic neuropathy  
Type II diabetes mellitus uncontrolled with nephrotic syndrome  
Type II diabetes mellitus uncontrolled with peripheral neuropathy  
Type II diabetes mellitus with amyotrophy  
Type II diabetes mellitus with arthropathy  
Type II diabetes mellitus with autonomic neuropathy  
Type II diabetes mellitus with background retinopathy  
Type II diabetes mellitus with complication  
Type II diabetes mellitus with foot ulcer  
Type II diabetes mellitus with gangrene foot  
Type II diabetes mellitus with hyperosmolarity  
Type II diabetes mellitus with hypoglycemia  
Type II diabetes mellitus with hypoglycemia, drug induced  
Type II diabetes mellitus with hypoglycemic coma  
Type II diabetes mellitus with incipient nephropathy  
Type II diabetes mellitus with ischemic heart disease  
Type II diabetes mellitus with ketoacidosis  
Type II diabetes mellitus with ketoacidotic coma  
Type II diabetes mellitus with leg ulcer  
Type II diabetes mellitus with maculopathy  
Type II diabetes mellitus with mononeuropathy  
Type II diabetes mellitus with nephrotic syndrome  
Type II diabetes mellitus with overt nephropathy (macroalbuminuria)  
Type II diabetes mellitus with peripheral neuropathy  
Type II diabetes mellitus with peripheral vascular disease

	<p>Type II diabetes mellitus with polyneuropathy</p> <p>Type II diabetes mellitus with pre-proliferative retinopathy</p> <p>Type II diabetes mellitus with proliferative retinopathy</p> <p>Type II diabetes mellitus with triopathy</p> <p>Type II diabetes mellitus, uncontrolled with amyotrophy</p> <p>Type II diabetes mellitus, uncontrolled with background retinopathy</p> <p>Type II diabetes mellitus, uncontrolled with complication</p> <p>Type II diabetes mellitus, uncontrolled with drug induced hypoglycemia</p> <p>Type II diabetes mellitus, uncontrolled with foot ulcer</p> <p>Type II diabetes mellitus, uncontrolled with gangrene foot</p> <p>Type II diabetes mellitus, uncontrolled with hyperglycemia</p> <p>Type II diabetes mellitus, uncontrolled with hyperosmolar coma</p> <p>Type II diabetes mellitus, uncontrolled with hyperosmolarity</p> <p>Type II diabetes mellitus, uncontrolled with hypoglycemia</p> <p>Type II diabetes mellitus, uncontrolled with incipient nephropathy</p> <p>Type II diabetes mellitus, uncontrolled with ischemic heart disease</p> <p>Type II diabetes mellitus, uncontrolled with ketoacidosis</p> <p>Type II diabetes mellitus, uncontrolled with ketoacidotic coma</p> <p>Type II diabetes mellitus, uncontrolled with leg ulcer</p> <p>Type II diabetes mellitus, uncontrolled with maculopathy</p> <p>Type II diabetes mellitus, uncontrolled with mononeuropathy</p> <p>Type II diabetes mellitus, uncontrolled with overt nephropathy (macroalbuminuria)</p> <p>Type II diabetes mellitus, uncontrolled with peripheral vascular disease</p> <p>Type II diabetes mellitus, uncontrolled with polyneuropathy</p> <p>Type II diabetes mellitus, uncontrolled with pre-proliferative retinopathy</p> <p>Type II diabetes mellitus, uncontrolled with proliferative retinopathy</p> <p>Type II diabetes mellitus, uncontrolled with triopathy</p> <p>Type II DM with hyperglycemia</p> <p>Type II DM with hyperosmolar coma</p>
Hyperlipidemia	<p>Familial hyperlipidemia</p> <p>Hypercholesterolemia</p> <p>Hyperlipidemia</p> <p>Mixed hyperlipidemia</p> <p>Pure hypercholesterolemia</p> <p>Pure hyperglyceridemia</p>
Cerebrovascular accident	<p>Acute cerebrovascular disease</p> <p>Basilar artery syndrome</p> <p>Cerebral artery occlusion with cerebral infarction</p> <p>Cerebral embolism with infarction</p> <p>Cerebrovascular disease</p> <p>Chronic cerebral ischemia</p> <p>Generalized ischemic cerebrovascular disease</p> <p>Hemorrhagic conversion of cerebral infarction</p> <p>Occlusion and stenosis of carotid artery</p>



	<p>Occlusion and stenosis of carotid artery with cerebral infarction</p> <p>Occlusion and stenosis of multiple arteries with cerebral infarct</p> <p>Occlusion and stenosis of precerebral artery with cerebral infarction</p> <p>Occlusion and stenosis of vertebral artery</p> <p>Transient cerebral ischemia</p> <p>Transient ischemic attack</p> <p>Vertebral artery syndrome</p> <p>Cerebral hemorrhage</p> <p>Intracerebral hemorrhage - intra-ventricular, non-traumatic</p> <p>Intracerebral hemorrhage, non-traumatic</p> <p>Intracranial hemorrhage, non-traumatic</p>
Coronary heart disease	<p>Acute ischemic heart disease</p> <p>Chronic ischemic heart disease</p> <p>Free wall rupture - post-myocardial infarction</p> <p>Ischemic heart disease</p> <p>Sequelae of myocardial infarction</p> <p>Subacute ischemic heart disease</p>
Cancers	<p>Acute leukemia</p> <p>Acute myeloid leukemia</p> <p>Acute myeloid leukemia in complete remission</p> <p>Anorectal adenocarcinoma</p> <p>B-cell lymphoma</p> <p>Cancer of ampulla of Vater</p> <p>Cancer of anal canal</p> <p>Cancer of anterior mediastinum</p> <p>Cancer of anus</p> <p>Cancer of appendix vermiformis</p> <p>Cancer of ascending colon</p> <p>Cancer of biliary tract</p> <p>Cancer of body of uterus</p> <p>Cancer of brain - parietal lobe</p> <p>Cancer of brain - temporal lobe</p> <p>Cancer of bronchus and lung</p> <p>Cancer of caecum</p> <p>Cancer of cervix</p> <p>Cancer of cervix uteri</p> <p>Cancer of cheek mucosa</p> <p>Cancer of colon</p> <p>Cancer of connective and soft tissue</p> <p>Cancer of connective and soft tissue of head, face, and neck</p> <p>Cancer of connective and soft tissue of lower limb, including hip</p> <p>Cancer of connective and soft tissue of thorax</p> <p>Cancer of connective and soft tissue of upper limb, including shoulder</p> <p>Cancer of corpus uteri, not involve isthmus</p> <p>Cancer of descending colon</p>

Cancer of digestive organs and peritoneum  
Cancer of digestive system and intra-abdominal organs  
Cancer of duodenum  
Cancer of exocervix  
Cancer of extrahepatic bile ducts  
Cancer of female breast  
Cancer of female breast - central  
Cancer of female breast - lower-inner quadrant  
Cancer of female breast - lower-outer quadrant  
Cancer of female breast - upper-inner quadrant  
Cancer of female breast - upper-outer quadrant  
Cancer of female breast, other site  
Cancer of floor of mouth  
Cancer of gallbladder  
Cancer of hard palate  
Cancer of hepatic flexure of colon  
Cancer of hypopharynx, other site  
Cancer of kidney and ureter  
Cancer of kidney, bilateral  
Cancer of kidney, left  
Cancer of kidney, right  
Cancer of labia majora  
Cancer of labia minora  
Cancer of larynx - glottis  
Cancer of larynx - subglottis  
Cancer of larynx - supraglottis  
Cancer of liver - intrahepatic bile duct  
Cancer of liver, primary  
Cancer of lower gum  
Cancer of lower lip, vermilion border  
Cancer of lower lobe, bronchus or lung  
Cancer of main bronchus  
Cancer of male breast  
Cancer of male breast, left  
Cancer of mediastinum  
Cancer of middle lobe, bronchus or lung  
Cancer of mouth  
Cancer of nasal cavity  
Cancer of nasopharynx  
Cancer of esophagus  
Cancer of esophagus - abdominal  
Cancer of esophagus - cervical  
Cancer of esophagus - thoracic  
Cancer of oropharynx  
Cancer of ovary

Cancer of pancreas  
Cancer of pancreas - body  
Cancer of pancreas - head  
Cancer of pancreas - tail  
Cancer of pancreatic duct  
Cancer of parotid gland  
Cancer of pelvic bones, sacrum, and coccyx  
Cancer of penis  
Cancer of peritoneum  
Cancer of pharynx  
Cancer of posterior hypopharyngeal wall  
Cancer of prepuce  
Cancer of prostate  
Cancer of pyloric antrum  
Cancer of pyriform sinus  
Cancer of rectosigmoid junction  
Cancer of rectum  
Cancer of rectum or anus  
Cancer of renal pelvis  
Cancer of renal pelvis, left  
Cancer of renal pelvis, right  
Cancer of retroperitoneum  
Cancer of scalp and skin of neck  
Cancer of sigmoid colon  
Cancer of skin  
Cancer of skin - eyelid, including canthus  
Cancer of skin - face  
Cancer of skin - lip  
Cancer of skin - lower limb, hip  
Cancer of skin of ear and external auditory canal  
Cancer of skin of trunk, not involve scrotum  
Cancer of skin of upper limb including shoulder  
Cancer of splenic flexure of colon  
Cancer of stomach  
Cancer of stomach - body  
Cancer of stomach - cardia  
Cancer of stomach - greater curvature  
Cancer of stomach - lesser curvature  
Cancer of stomach - pylorus  
Cancer of the lip, oral cavity and pharynx  
Cancer of thyroid gland  
Cancer of tip and lateral border of tongue  
Cancer of tongue  
Cancer of tongue - base  
Cancer of tongue - dorsal surface

Cancer of trachea  
Cancer of transverse colon  
Cancer of upper lobe, bronchus or lung  
Cancer of ureter, left  
Cancer of ureter, right  
Cancer of ureteric orifice  
Cancer of urinary bladder  
Cancer of urinary bladder - anterior wall  
Cancer of urinary bladder - dome  
Cancer of urinary bladder - lateral wall  
Cancer of urinary bladder - neck  
Cancer of urinary bladder - posterior wall  
Cancer of urinary bladder - trigone  
Cancer of urinary bladder, other site  
Cancer of vagina  
Cancer of vallecule  
Cancer of vulva  
Carcinoma in situ of breast  
Carcinoma in situ of cervix uteri  
Carcinoma in situ of female genital organs  
Carcinoma in situ of rectum  
Carcinoma in situ of scalp and skin of neck  
Carcinoma in situ of skin of face  
Carcinoma in situ of skin of lower limb, including hip  
Carcinoma in situ of stomach  
Carcinoma of kidney  
Carcinoma of penis  
Carcinoma of peritoneum  
Carcinoma of prostate  
Carcinoma of prostate with bony metastasis  
Carcinoma of renal pelvis  
Carcinoma of ureter  
Carcinoma of urinary bladder  
Carcinoma with liver metastasis  
Cholangiocarcinoma  
Chronic lymphocytic leukemia  
Chronic lymphocytic leukemia in remission  
Chronic myeloid leukemia  
Chronic myelomonocytic leukemia  
Invasive transitional cell carcinoma  
Leukemia  
Lymphoma  
Lymphosarcoma  
Lymphosarcoma involving lymph nodes of head, face, and neck  
Lymphosarcoma involving lymph nodes of multiple sites

	<p>Lymphosarcoma involving spleen</p> <p>Malignant ascites</p> <p>Malignant lymphoma involving lymph nodes of inguinal region and lower limb</p> <p>Malignant lymphoma involving lymph nodes of multiple sites</p> <p>Malignant lymphoma, extranodal and solid organ</p> <p>Malignant neoplasm of colon</p> <p>Malignant neoplasm of female breast</p> <p>Malignant neoplasm of nipple and areola of female breast</p> <p>Malignant neoplasm of trachea, bronchus, and lung</p> <p>Malignant pleural effusion</p> <p>Multiple myeloma</p> <p>Multiple myeloma in remission</p> <p>Myeloma</p> <p>Neoplasm of ear</p> <p>Neoplasm of skin</p> <p>Nodular lymphoma</p> <p>Nodular lymphoma involving lymph nodes of multiple sites</p> <p>Plasma cell leukemia</p> <p>Renal cell carcinoma</p> <p>Skin melanoma</p> <p>Skin melanoma - face</p> <p>Skin melanoma - foot</p> <p>Skin melanoma - hip</p> <p>Skin melanoma - lower limb, not involving hip</p> <p>Skin melanoma of trunk, not involving scrotum</p> <p>Skin melanoma of upper limb, not involving shoulder</p> <p>Squamous cell carcinoma</p> <p>Transitional cell carcinoma of urinary bladder</p>
Chronic renal diseases	<p>Bilateral renal impairment</p> <p>Chronic kidney disease</p> <p>Chronic kidney disease, stage 4</p> <p>Chronic kidney disease, stage 5</p> <p>Chronic renal failure</p> <p>Chronic renal impairment</p> <p>Chronic renal parenchymal disease</p> <p>Diabetes mellitus with overt nephropathy (macroalbuminuria)</p> <p>End stage renal failure admitted for hemodialysis</p> <p>End stage renal failure admitted for peritoneal dialysis</p> <p>Hypertensive heart and renal disease</p> <p>Hypertensive heart and renal disease, malignant</p> <p>Hypertensive heart and renal disease, malignant, with congestive heart failure</p> <p>Hypertensive heart and renal disease, with congestive heart failure</p>

	<p>Hypertensive heart and renal disease, with congestive heart failure and renal failure</p> <p>Hypertensive heart and renal disease, with renal failure</p> <p>Hypertensive renal disease</p> <p>Hypertensive renal disease with renal failure</p> <p>Hypertensive renal disease, malignant, with renal failure</p> <p>Impaired renal function</p> <p>Renal failure</p> <p>Secondary hypertension due to renal disorder</p> <p>Type I diabetes mellitus with overt nephropathy (macroalbuminuria)</p> <p>Type II diabetes mellitus uncontrolled with nephrotic syndrome</p> <p>Type II diabetes mellitus with incipient nephropathy</p> <p>Type II diabetes mellitus with nephrotic syndrome</p> <p>Type II diabetes mellitus with overt nephropathy (macroalbuminuria)</p> <p>Type II diabetes mellitus, uncontrolled with incipient nephropathy</p> <p>Type II diabetes mellitus, uncontrolled with overt nephropathy (macroalbuminuria)</p> <p>Uremia</p>
<p>Chronic respiratory diseases</p>	<p>Asthma</p> <p>Asthma, with status asthmaticus</p> <p>Bronchiectasis</p> <p>Bronchiolitis obliterans</p> <p>Chronic airway obstruction</p> <p>Chronic bronchitis</p> <p>Chronic obstructive bronchitis</p> <p>Chronic obstructive bronchitis with acute exacerbation</p> <p>Chronic obstructive pulmonary disease</p> <p>Extrinsic asthma</p>
<p>Chronic liver diseases</p>	<p>Acute hepatic failure</p> <p>Alcoholic chronic liver disease</p> <p>Alcoholic cirrhosis of liver</p> <p>“Alcoholic cirrhosis of liver, Child’s A”</p> <p>“Alcoholic cirrhosis of liver, Child’s C”</p> <p>Alcoholic liver damage</p> <p>Alcoholic liver disease</p> <p>Biliary cirrhosis</p> <p>Biliary cirrhosis, primary</p> <p>Chronic hepatic failure</p> <p>Cryptogenic cirrhosis</p> <p>Hepatic coma</p> <p>Hepatic encephalopathy</p> <p>Hepatic fibrosis</p> <p>Impaired liver function</p> <p>Liver cirrhosis</p> <p>“Non-alcoholic cirrhosis of liver - Child’s A”</p>

“Non-alcoholic cirrhosis of liver - Child’s B”

“Non-alcoholic cirrhosis of liver – Child’s C”

“Non-alcoholic cirrhosis of liver - Child’s C”

Esophageal varices due to cirrhosis

**Supplementary Table 4.** List of British National Formulary codes used to identify the different types of medication dispensed to patients with Alzheimer’s disease.

Medication	BNF codes	Medication full description
Drugs for dementia	4.11	Drugs for dementia
Drugs for Parkinsonism	4.9	Drugs used in Parkinsonism and related disorders
Drugs for hypertension	2.4	Beta-adrenoceptor blocking drugs
	2.5	Hypertension and heart failure
	2.6	Calcium-channel blockers
Drugs for diabetes	6.1	Drugs used in diabetes
Lipid-regulating drugs	2.12	Lipid-regulating drugs
Anti-platelets	2.9	Antiplatelet drugs
Anti-psychotics	4.2	Drugs used in psychoses and related disorders
Anti-depressants	4.3	Antidepressant drugs
Hypnotics	4.1	Hypnotics and anxiolytics