

Appendix Table 1: Read codes and ICD-10 codes used to identify AD and other dementia types

Disease	Code	Description
Read codes		
Alzheimer's disease	Eu00.00	[X]Dementia in Alzheimer's
	Eu00000	Dementia in Alzheimer's disease with early onset
	Eu00011	[X]Presenile dement,Alzheimer
	Eu00012	Primary degen dementia, Alzheimer's type, presenile onset
	Eu00013	[X]Alzheimer's disease type 2
	Eu00100	[X]Late onset Alzheim dementia
	Eu00111	[X]Alzheimer's disease type 1
	Eu00112	[X]Senile dementia, Alzheimer
	Eu00113	Primary degen dementia of Alzheimer's type, senile onset
	Eu00200	[X]Atypical/mixed Alzheimer's
	Eu00z00	[X]Alzheimer's disease unspec
	Eu00z11	[X]Alzheimer's dementia unspec
	F110.00	Alzheimer's disease
	F110000	Alzheimer dis wth early onset
	F110100	Alzheimer's dis wth late onset
	Fyu3000	[X]Other Alzheimer's disease
Vascular dementia	E004.00	Arteriosclerotic dementia
	E004.11	Multi infarct dementia
	E004000	Arterioscl.dementia-uncomplic.
	E004100	Arterioscl.dementia+delirium
	E004200	Arterioscl.dementia+paranoia
	E004300	Arterioscl.dementia+depression
	E004z00	Arteriosclerotic dementia NOS
	Eu01.00	[X]Vascular dementia
	Eu01.11	[X]Arteriosclerotic dementia
	Eu01000	[X]Vascular dementia of acute onset
	Eu01100	[X]Multi-infarct dementia
	Eu01111	[X]Predom cortical dementia
	Eu01200	[X]Subcortical vascular dement
	Eu01300	[X]Mix cort/subcor vasc dement
	Eu01y00	[X]Other vascular dementia
	Eu01z00	[X]Vascular dementia unspecif
Dementia with Lewy bodies	Eu02500	[X]Lewy body dementia
	F116.00	Lewy body disease
Frontotemporal dementia	Eu02000	[X]Dementia in Pick's disease
	F111.00	Pick's disease
	F118.00	Frontotemporal degeneration

Disease	Code	Description
Normal-Pressure Hydrocephalus	F113000	Normal pressure hydrocephalus
Parkinson's dementia	Eu02300	[X]Dementia in Parkinson's
	F11x900	Cerebral degen Parkinson dis
ICD-10 codes		
Alzheimer's disease	G30.x	Alzheimer disease
	F00.x	Dementia in Alzheimer disease
Vascular dementia	F01.x	Vascular dementia
Dementia with Lewy bodies	G31.8	Other specified degenerative diseases of nervous system (Grey-matter degeneration, Lewy body disease, subacute necrotizing encephalopathy)
Frontotemporal dementia	G31.0	Circumscribed brain atrophy (frontotemporal dementia, Pick disease, progressive isolated aphasia)
	F02.0	Dementia in Pick disease
Normal-Pressure Hydrocephalus	G91.2	Normal pressure hydrocephalus
Parkinson's dementia	F02.3	Dementia in Parkinson disease

Appendix Table 2: Terms from text-data that are most frequently associated with the earliest dates of cognitive symptoms, cognitive assessment, and AD diagnosis

Category	Key Phrases		
Symptom	memory	disturbance	xalzheimers
	dementia	senile	decline
	mental	presenile	dconfusion
	alzheimers	dysfunction	impaired
	30	27	symptoms
	loss	neurology	29
	symptom	mmts	senility
	mmse	difficulties	24
	cognitive	deterioration	confused
	confused	22	forgetfulness
	poor	26	worsening
	problems	deteriorated	losing
	forgetful	difficulty	15
	impairment	disorder	20
	xdementia	deteriorate	23
	confusion	memoy	28
cognition	problem	psychoses	
Cognitive assessment	memory	mmts	review
	dementia	psychiatry	psychology
	mental	examination	psychogeriatrics
	alzheimers	team	psych
	30	referral	exam
	mmse	psychiatrist	psychological
	cognitive	psychogeriatrician	test
	xdementia	screening	screen
	cognition	assessment	psychological
neurology			
Diagnosis	alzheimers	xalzheimers	

Appendix Table 3: Final code-based algorithm to identify early indications of cognitive symptoms, cognitive assessment, and AD diagnosis

Category	Diagnosis code	Description	
Read codes Symptom	1B1A.12	memory loss symptom	
	F110.00	alzheimer's disease	
	Eu00.00	[x]dementia in alzheimer's disease	
	Eu02z00	[x] unspecified dementia	
	28G..00	forgetful	
	Eu00100	[x]dementia in alzheimer's disease with late onset	
	E2A1000	mild memory disturbance	
	E00z.00	senile or presenile psychoses nos	
	1B1A.13	memory disturbance	
	Z7CF800	poor short-term memory	
	Z7C1.00	impaired cognition	
	R009.00	[d]confusion	
	Eu00z11	[x]alzheimer's dementia unspec	
	Eu05700	[X]Mild cognitive disorder	
	2841.00	Confused	
	2841.11	Confusion	
	1461.00	H/O: dementia	
	168..14	C/O 'Muzzy head'	
	1JA2.00	Suspected dementia	
	28E..00	Cognitive decline	
	28H..00	Mentally vague	
	E00..11	Senile dementia	
	E00..12	Senile/presenile dementia	
	Eu01y00	[X]Other vascular dementia	
	Eu02500	[X]Lewy body dementia	
	F116.00	Lewy body disease	
	R00z011	[D]Memory deficit	
	Z7CEH14	Memory problem	
	Cognitive assessment	9N1T.00	seen in psychiatry clinic
		388m.00	mini-mental state examination
		388V.00	mini mental state score
		6AB..00	dementia annual review
9N1M.00		seen in psychology clinic	
ZL9D.00		seen by psychiatrist	
9Nk1.00		seen in memory clinic	
3AD3.00		six item cognitive impairment test	

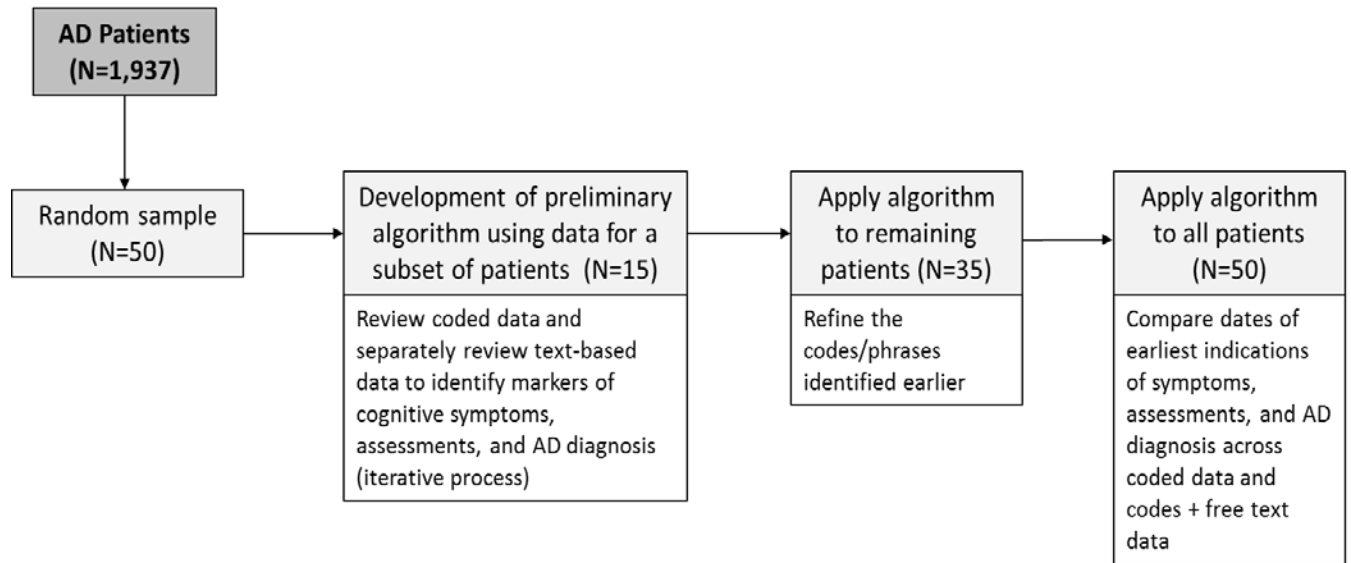
Category	Diagnosis code	Description
	9Nk6.00	seen in mental health clinic
	6A6..00	mental health review
	388m.11	mmse score
	9N1R.00	seen in neurology clinic
	ZRaA.00	mini-mental state examination
	9N2a.11	Seen by CPN
	ZL9D412	Seen by old age psychiatrist
	ZQ3E.00	Mental health assessment
	3A...11	Memory assessment
	8CM2.00	Psychiatry care plan
	ZL9D400	Seen by psychogeriatrician
	38C1000	Assessment for dementia
	38Dv.00	GPCOG - general practitioner assessment of cognition
	3A...12	Dementia assessment
	3AF..00	Addenbrooke's cognitive examination revised
	66h..00	Dementia monitoring
	8A2..00	Psychiatric monitoring
	8CMZ.00	Dementia care plan
	8HLC.00	Psychogeriatric D.V. done
	9N1yA00	Seen in psychogeriatric clinic
	9NN7.00	Under care of mental health team
	ZLA2E00	Seen by psychiatric nurse
	ZLA3111	Seen by CPN
	ZLB5.00	Seen by mental health counsellor
Relevant referral	8H4D.00	Referral to psychogeriatrician
	8H47.00	Geriatric referral
	8HKC.00	Psychogeriatrics D.V. requestd
	8HTY.00	Referral to memory clinic
	8Hc..00	Referral to mental health team
	8H49.00	Psychiatric referral
	8HHo.00	Referral to older age community mental health team
	ZL5B.00	Referral to psychiatrist
Encounter	9N1C.11	Home visit
	9N33.11	Letter encounter
	9N33.00	Letter encounter from patient
	9N35.00	Letter encounter to patient
	9N36.11	Letter from consultant
	9N36.00	Letter from specialist
	8H87.00	Follow-up 1 month
	9NV..00	Follow-up encounter

Category	Diagnosis code	Description
	9N32.00	Third party encounter
	6A...00	Patient reviewed
	9N3D.00	Letter received
	2....11	Examination of patient
	9H...00	Mental health administration
	ZL9AL00	Seen by care of the elderly physician
	68Q..00	Geriatric screening
	69D1.00	Geriatric health exam.
	9N1U.00	Seen in elderly assessment clinic
	9Nk5.00	Seen in elderly care clinic
	3876.00	Multidisciplinary assessment
	3891.00	Initial patient assessment
	3Z...00	Diagnostic procedure NOS
	67...11	Counselling
	671C.00	Discussed with doctor
	68P..00	Adult screening
	68Q3.00	Geriatric 75 year screen
	9N02.00	Seen in geriatric clinic
	9N0c.00	Seen in private clinic
	9N11.00	Seen in GP's surgery
	9N1C.00	Seen in own home
	9N22.00	Seen by practice nurse
	9N2G.00	Seen by consultant
	9N2N.00	Seen by Rota Doctor
	9N2R.00	Seen by co-operative doctor
	9N2o.00	Seen by health support worker
	9N7..11	Follow-up consultation
	9NFA.00	District nurse visit
	9NY..00	Appointment
	9Na..00	Consultation
	ZL23300	Under care of district nurse
	ZV67.00	[V]Follow-up examination
Other referral	8HR1.00	Refer for ECG recording
	8H7Y.00	Refer to acupuncture
	8H77.00	Refer to physiotherapist
	8H...00	Referral for further care
	8H68.00	Referral to haematologist
	8HTb.00	Referral to male urology clinic
	8H7..12	Referral to nurse
	8H4J.00	Referred to anaesthetist
	8H4K.00	Referred to endocrinologist

Category	Diagnosis code	Description
	8H52.00	Ophthalmological referral
	8H53.00	ENT referral
	8H54.00	Orthopaedic referral
	8H43.00	Dermatological referral
	8H7R.00	Refer to chiropodist
	8H48.00	Gastroenterological referral
	8H4L.00	Referred to nephrologist
	8H58.00	Gynaecological referral
	8H59.00	Referred to plastic surgeon
	8H5B.00	Referred to urologist
	8H5D.00	Referred to vascular surgeon
	8H5J.00	Referral to colorectal surgeon
	8H72.00	Refer to district nurse
	8H7G.00	Refer to speech therapist
	8H7Q.00	Refer to surgical fitter
	8H7V.00	Refer to audiologist
	8H7X.00	Refer to podiatry
	8HBJ.00	Stroke / transient ischaemic attack referral
	8HD..00	Refer to hospital OPD
	8HH5.00	Refer to domiciliary physiotherapy
	8HHk.00	Referral to hospital phlebotomist
	8HHl.00	Referral to practice phlebotomist
	8HQ..00	Refer for imaging
	8HQ2.00	Refer for ultrasound investign
	8HQ8.00	Referral for dual energy X-ray photon absorptiometry scan
	8HR8.00	Referral for 24 hour blood pressure recording
	8HTX.00	Referral to incontinence clinic
	8HVQ.00	Private referral to rheumatologist
	8He..00	Referral to intermediate care
	8He0.00	Referral to intermediate care - hospital at home
	8Hj0.00	Referral to diabetes structured education programme
	ZL85111	Referral to community physiotherapist
Diagnosis	F110.00	alzheimer's disease
	Eu00.00	[x]dementia in alzheimer's disease
	Eu00100	[x]dementia in alzheimer's disease with late onset
	Eu00z11	[x]alzheimer's dementia unspec
ICD-10 codes		
Symptom	F03	unspecified dementia
	R418	other and unspecified symptoms and signs involving cognitive functions and awareness
	R54	senility
	G309	Alzheimer's disease, unspecified

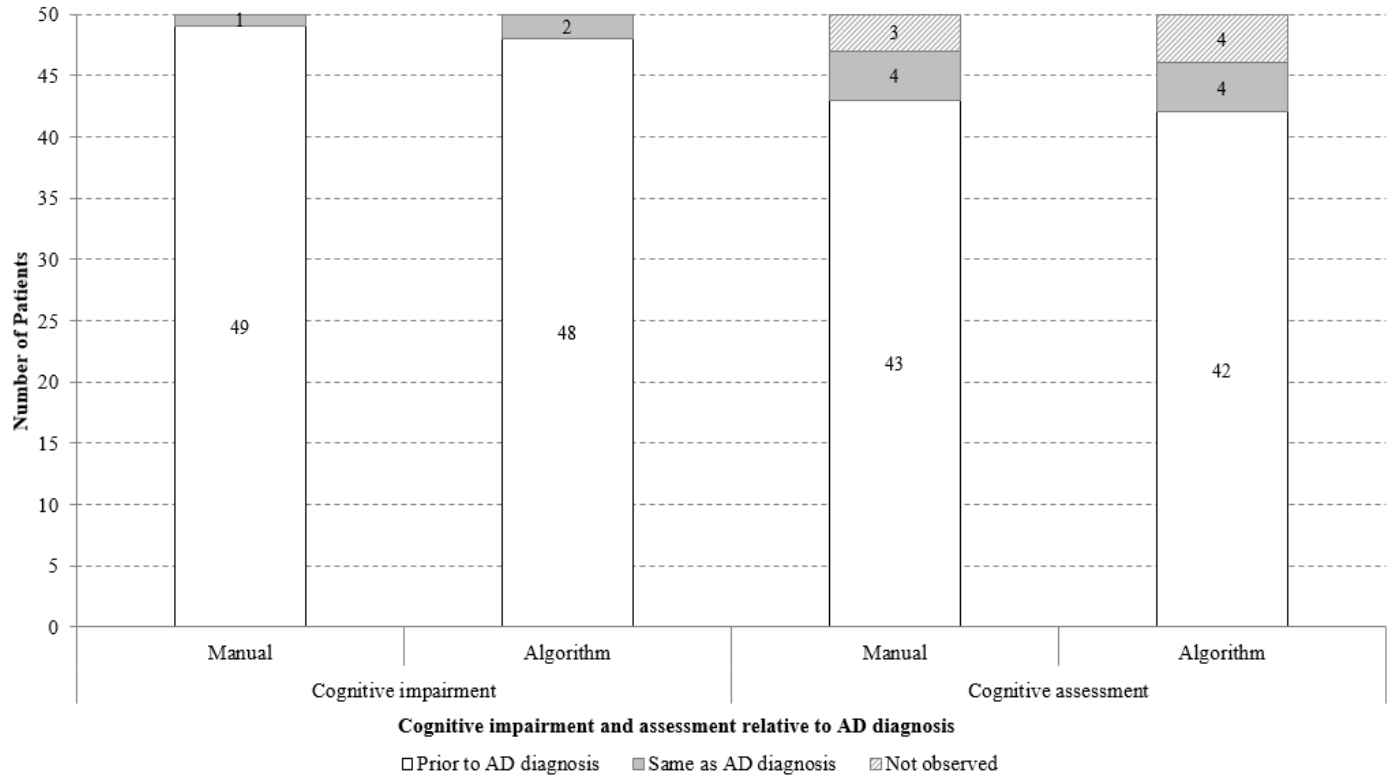
Category	Diagnosis code	Description
	G309D	Alzheimer's disease, unspecified
	R410	Disorientation, unspecified
	F051	Delirium superimposed on dementia
	F028	Dementia in other specified diseases classified elsewhere
	F067	Mild cognitive disorder
	F99	Mental disorder, not otherwise specified
Cognitive assessment - Encounter	Z139	Special screening examination, unspecified
Diagnosis	G309	Alzheimer's disease, unspecified
	G309D	Alzheimer's disease, unspecified

Appendix Figure 1: Study Schematic



Abbreviation: AD = Alzheimer's disease

Appendix Figure 2: Cognitive impairment and cognitive assessment relative to AD diagnosis



Abbreviation: AD = Alzheimer's disease

Note: Manual review included the review of both structured data and text-based data