

Differentiation between early and severe stages of dementia in claims data based on diagnosis, prescription and utilization patterns

Running title: *Detecting disease severity in claims data*

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Supplementary Table 1: Comorbidities and healthcare utilization - frequencies and group differences between different stages of dementia

	Total Sample		Early-stage dementia MMSE ≥27		Mild dementia MMSE 20 – 26		Moderate to severe dementia MMSE 0 – 19		
	n=737		n=131 (17.8%)		n=320 (43.4%)		n=286 (38.8%)		
		95% CI		95% CI		95% CI		95% CI	p-value
Comorbidities									
Abnormalities of gait, n (%)	81 (10.9)	0.089 – 0.134	13 (9.9)	0.058 – 0.163	35 (10.9)	0.079 – 0.148	33 (11.5)	0.083 – 0.157	0.886 ^b
Tremor, n (%)	13 (1.7)	0.010 – 0.030	2 (1.5)	0.003 – 0.059	8 (2.5)	0.012 – 0.049	3 (1.0)	0.003 – 0.032	0.389 ^b
Extremity injury, n (%)	22 (2.9)	0.019 – 0.044	4 (3.0)	0.011 – 0.078	8 (2.5)	0.012 – 0.049	10 (3.5)	0.018 – 0.063	0.771 ^b
Anxiety, n (%)	13 (1.7)	0.010 – 0.030	1 (0.7)	0.001 – 0.052	6 (1.8)	0.008 – 0.041	6 (2.1)	0.009 – 0.045	0.618 ^b
Cognitive impairment, n (%)	10 (1.3)	0.007 – 0.025	0 (0)	–	4 (1.2)	0.004 – 0.032	6 (2.1)	0.009 – 0.045	0.223 ^b
Depression, n (%)	123 (16.6)	0.141 – 0.195	13 (9.9)	0.058 – 0.163	69 (21.5)	0.173 – 0.264	41 (14.3)	0.107 – 0.189	0.004 ^b
Memory impairment, n (%)	47 (6.3)	0.048 – 0.083	10 (7.6)	0.041 – 0.136	24 (7.5)	0.050 – 0.109	13 (4.5)	0.026 – 0.076	0.269 ^b
Visual impairment, n (%)	24 (3.2)	0.021 – 0.048	6 (4.5)	0.02 – 0.098	10 (3.1)	0.016 – 0.057	8 (2.8)	0.014 – 0.054	0.626 ^b
Hearing impairment, n (%)	79 (10.7)	0.086 – 0.131	17 (12.9)	0.082 – 0.198	38 (11.8)	0.087 – 0.159	24 (8.3)	0.056 – 0.122	0.251 ^b
Insomnia, n (%)	13 (1.7)	0.010 – 0.030	3 (2.2)	0.007 – 0.068	3 (0.9)	0.003 – 0.028	7 (2.4)	0.011 – 0.050	0.326 ^b
Other sleeping disorder, n (%)	15 (2.0)	0.012 – 0.033	3 (2.2)	0.007 – 0.068	7 (2.1)	0.010 – 0.045	5 (1.7)	0.007 – 0.041	0.906 ^b
Sleep apnea, n (%)	14 (1.9)	0.011 – 0.031	3 (2.2)	0.007 – 0.068	6 (1.8)	0.008 – 0.041	5 (1.7)	0.007 – 0.041	0.931 ^b
Constipation, n (%)	14 (1.9)	0.011 – 0.031	4 (3.0)	0.011 – 0.078	6 (1.8)	0.008 – 0.041	4 (1.4)	0.005 – 0.036	0.516 ^b
Dizziness, n (%)	61 (8.2)	0.064 – 0.105	15 (11.4)	0.070 – 0.181	26 (8.1)	0.055 – 0.116	20 (6.9)	0.045 – 0.105	0.306 ^b
Obesity, n (%)	73 (9.9)	0.079 – 0.122	10 (7.6)	0.041 – 0.136	38 (11.8)	0.087 – 0.159	25 (8.7)	0.059 – 0.126	0.275 ^b
Alcohol abuse, n (%)	14 (1.9)	0.011 – 0.031	3 (2.2)	0.007 – 0.068	8 (2.5)	0.012 – 0.049	3 (1.0)	0.003 – 0.032	0.399 ^b
Nicotine abuse, n (%)	11 (1.4)	0.008 – 0.026	3 (2.2)	0.007 – 0.068	4 (1.2)	0.004 – 0.032	4 (1.4)	0.005 – 0.036	0.700 ^b
Atrial fibrillation, n (%)	146 (19.8)	0.170 – 0.228	32 (24.4)	0.178 – 0.325	63 (19.6)	0.156 – 0.244	51 (17.8)	0.138 – 0.227	0.291 ^b
Carotid artery stenosis, n (%)	30 (4.0)	0.028 – 0.057	2 (1.5)	0.003 – 0.059	20 (6.2)	0.040 – 0.094	8 (2.8)	0.014 – 0.054	0.027 ^b
Cerebrovascular disease, n (%)	149 (20.2)	0.174 – 0.232	25 (19.0)	0.132 – 0.267	68 (21.2)	0.171 – 0.260	56 (19.5)	0.153 – 0.245	0.824 ^b

Continued Supplementary Table 1: Comorbidities and healthcare

	Total Sample		Early-stage dementia		Mild dementia		Moderate to severe dementia		p-value
	n=737	95% CI	n=131 (17.8%)	95% CI	n=320 (43.4%)	95% CI	n=286 (38.8%)	95% CI	
Type 2 Diabetes mellitus, n (%)	334 (45.3)	0.417 – 0.489	62 (47.3)	0.389 – 0.558	165 (51.5)	0.460 – 0.570	107 (37.4)	0.319 – 0.431	0.002 ^b
Hypercholesterolaemia, n (%)	64 (8.6)	0.068 – 0.109	13 (9.9)	0.058 – 0.163	31 (9.6)	0.068 – 0.134	20 (6.9)	0.045 – 0.105	0.429 ^b
Hypertension, n (%)	545 (73.9)	0.706 – 0.769	101 (77.1)	0.691 – 0.835	245 (76.5)	0.715 – 0.808	199 (69.5)	0.639 – 0.746	0.098 ^b
Ischemic heart disease, n (%)	231 (31.3)	0.280 – 0.347	46 (35.1)	0.274 – 0.436	101 (31.5)	0.266 – 0.368	84 (29.3)	0.243 – 0.349	0.499 ^b
Gastritis, n (%)	62 (8.4)	0.066 – 0.106	11 (8.4)	0.047 – 0.145	28 (8.7)	0.061 – 0.123	23 (8.0)	0.053 – 0.118	0.952 ^b
Reflux disease, n (%)	71 (9.6)	0.077 – 0.119	16 (12.2)	0.076 – 0.190	33 (10.3)	0.074 – 0.141	22 (7.6)	0.051 – 0.114	0.300 ^b
Stomach ulcer, n (%)	10 (1.3)	0.007 – 0.025	1 (0.7)	0.001 – 0.052	6 (1.8)	0.008 – 0.041	3 (1.0)	0.003 – 0.032	0.552 ^b
Epilepsy, n (%)	15 (2.0)	0.012 – 0.033	1 (0.7)	0.001 – 0.052	6 (1.8)	0.008 – 0.041	8 (2.8)	0.014 – 0.054	0.380 ^b
Parkinsons disease, n (%)	36 (4.8)	0.035 – 0.067	6 (4.5)	0.020 – 0.098	15 (4.6)	0.028 – 0.076	15 (5.2)	0.031 – 0.085	0.936 ^b
Cancer, n (%)	109 (14.7)	0.124 – 0.175	17 (12.9)	0.082 – 0.198	45 (14.0)	0.106 – 0.183	47 (16.4)	0.125 – 0.211	0.580 ^b
Osteoarthritis, n (%)	226 (30.6)	0.274 – 0.340	44 (33.5)	0.260 – 0.421	112 (35.0)	0.299 – 0.403	70 (24.4)	0.198 – 0.298	0.014 ^b
Other rheumatoid arthritis, n (%)	19 (2.5)	0.016 – 0.040	6 (4.5)	0.020 – 0.098	7 (2.1)	0.010 – 0.045	6 (2.1)	0.009 – 0.045	0.280 ^b
Senility, n (%)	56 (7.6)	0.058 – 0.097	8 (6.1)	0.030 – 0.117	21 (6.5)	0.043 – 0.098	27 (9.4)	0.065 – 0.134	0.319 ^b
Unspecific pain, n (%)	80 (10.8)	0.088 – 0.133	17 (12.9)	0.082 – 0.198	32 (10.0)	0.071 – 0.138	31 (10.8)	0.077 – 0.150	0.653 ^b
Healthcare utilization									
PIM, n (%)	127 (17.2)	0.146 – 0.201	29 (22.1)	0.158 – 0.300	69 (21.5)	0.173 – 0.264	29 (10.1)	0.071 – 0.142	≤0.001^b
Antipsychotics, n (%)	82 (11.1)	0.090 – 0.136	5 (3.8)	0.015 – 0.088	26 (8.1)	0.055 – 0.116	51 (17.8)	0.138 – 0.227	≤0.001^b
Sedative and hypnotics, n (%)	29 (3.9)	0.027 – 0.056	7 (5.3)	0.025 – 0.107	12 (3.7)	0.021 – 0.064	10 (3.5)	0.018 – 0.063	0.650 ^b
Antidepressants, n (%)	117 (15.8)	0.134 – 0.186	13 (9.9)	0.058 – 0.163	65 (20.3)	0.162 – 0.250	39 (13.6)	0.101 – 0.181	0.010 ^b
Antidementia drug treatment, n (%)	190 (25.7)	0.227 – 0.290	20 (15.2)	0.100 – 0.224	72 (22.5)	0.182 – 0.274	98 (34.2)	0.289 – 0.399	≤0.001^b
Number GP contacts, mean (SD)	7.3 (6.1)	6.8 – 7.7	7.9 (6.3)	6.8 – 9.0	7.1 (5.8)	6.5 – 7.8	7.1 (6.3)	6.4 – 7.8	0.440 ^a
Specialist contacts, n (%)	220 (29.8)	0.266 – 0.332	37 (28.2)	0.211 – 0.365	96 (30.0)	0.252 – 0.352	87 (30.4)	0.253 – 0.360	0.901 ^b
Number hospital contacts, mean (SD)	4.0 (9.8)	3.3 – 4.7	4.8 (11.3)	2.8 – 6.7	4.3 (10.2)	3.2 – 5.4	3.2 (8.6)	2.2 – 4.3	0.245 ^a
Therapies contacts, n (%)	382 (51.8)	0.482 – 0.554	83 (63.3)	0.547 – 0.711	179 (55.9)	0.504 – 0.612	120 (41.9)	0.363 – 0.477	≤0.001^b
Nursing contacts, n (%)	248 (33.6)	0.303 – 0.371	34 (25.9)	0.191 – 0.341	99 (30.9)	0.261 – 0.362	115 (40.2)	0.346 – 0.460	0.007 ^b

p-Values in bold indicate $p \leq 0.001$. Abbreviations: CI confidence interval; GP general practitioner; MMSE Mini-Mental State Examination, range 0–30, higher score indicates better cognitive function; PIM Potentially Inappropriate Medication; SD standard deviation. ^a Differences in means: One-way ANOVA ^b Differences in proportions: Chi-square tests