

Diagnosing dementia with confidence by GPs

Hein PJ van Hout^a, Myrra J Vernooij-Dassen^b and Wim AB Stalman^a

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Background. Earlier reports suggest limited clinical reasoning and substantial uncertainty of GPs in assessing patients suspected of dementia.

Objective. To explore the predictors of GPs to decide on the presence and absence of dementia as well as the predictors of diagnostic confidence of GPs.

Design. An observational study was set up among 107 patients of 64 GPs. The GPs were instructed to use the Dutch national dementia guideline on consecutive patients newly suspected of dementia and to register their assessment on a detailed form. The predictors of the presence and absence of dementia according to the GPs and their diagnostic confidence were explored by logistic regression analyses.

Main outcome measures. Dependent variables: (i) presence and absence of dementia according to GPs and (ii) diagnostic confidence.

Independent variables: clinical (cognitive, behavioural, somatic, functional), applications of recommendations, patient related and GP related.

Results. Dementia was diagnosed in 67% of the suspected patients. The presence of dementia according to the GPs was positively associated with observed impairment of the higher cognitive functions, absence of depression and female gender of patients. The GPs expressed diagnostic confidence in 58% of the cases. This was positively associated with application of recommendations, ADL dependency, longer duration, informant availability, restless behaviour and a patient's female gender. Use of the Mini Mental Status Examination was not associated with confidence.

Conclusions. GPs seem to base the diagnosis of dementia on rational grounds. Application of the dementia guideline's recommendations may contribute to more diagnostic confidence.

Keywords. Clinical diagnosis, decision science, dementia, diagnostic tests, family medicine.

Introduction

As our population ages, the number of elderly patients with dementia grows exponentially.^{1,2} Recognizing dementia in its early phase may provide substantial benefits such as enabling patients and family caregivers to better understand and deal with changed behaviour, permitting patients and caregivers to prepare future care planning and allowing support for the often severely burdened caregivers and starting disease management.^{3,4} Timely diagnosis and disease management can increase patients and caregivers quality of life⁵ and delay institutionalization.^{6,7}

The GP is often the first physician to observe patients with possible dementia and often the only physician involved in making the diagnosis. Earlier reports suggested a limited rationality in clinical reasoning and substantial uncertainty of GPs in assessing patients suspected of dementia.⁸ In addition, several studies reported a limited diagnostic awareness of GPs regarding demented patients across their practice patients as well as limited recognition of dementia in contacting patients.^{8–13} Possible barriers to accurate diagnosis were reported such as a limited knowledge of typical dementia symptoms,^{14,15} low acquaintance with and low use of internationally accepted

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^aDepartment of General Practice, Institute for Research in Extramural Medicine (EMGO), VU University Medical Center Amsterdam, Amsterdam, The Netherlands and ^bCenter for Quality of Care Research (WOK), University Medical Center St Radboud, Nijmegen, The Netherlands. Correspondence to Hein van Hout, Department of General Practice, Institute for Research in Extramural Medicine (EMGO), VU University Medical Center Amsterdam, Van der Boeorchorststraat 7 1081 BS Amsterdam, The Netherlands; Email: hpj.vanhout@vumc.nl

diagnostic criteria^{16–18} and the physician's reluctance to make the diagnosis of dementia.^{19,20} However, these conclusions were mainly based on self-reported surveys among GPs. This led us to further explore possible predictors of a GP's dementia diagnosis.

Clinical practice guidelines might improve the GPs' performance and stimulate a more active approach.^{21,22} Several guidelines and consensus statements have been published with recommendations on the diagnosis and management of dementia in primary care.^{23–25} The Netherlands was the first country to issue a national dementia guideline for GPs in 1991 which was updated in 1997 and 2003.²⁵ The Dutch dementia guideline resembles closely other dementia guidelines for primary care such as of the North of England, US Veterans Affairs and of the US Agency for Health Care Policy and Research.²³ The objectives of this study were to explore the predictors of GPs to decide on the presence and absence of dementia as well as the predictors of diagnostic confidence of GPs.

Our study is one of the very few that acquired detailed information from consecutive GPs' assessments in patients newly suspected of dementia. Insight into the variables that lead GPs to label patients to be demented can provide insight in the level of rationality and give clues for further education. In earlier accounts, we reported that the accuracy of the GPs' diagnosis is strongly associated with their diagnostic certainty.^{26,27} Therefore, insight into the variables that predict diagnostic certainty or uncertainty of GPs may provide a starting point for further education and guideline development as well.

Methods

Subjects and design

A group of GPs from the eastern part of The Netherlands was recruited to participate in an observational study. The GPs diagnosed suspected patients who¹ were 55 years or older and² showed signs of cognitive impairment. The GPs were asked to use the Dutch dementia guideline.

Clinical practice guideline on dementia

The dementia guideline was established as part of a guideline-setting program of the Dutch College of General Practitioners.^{25,28} The dementia guideline uses the diagnostic criteria of the Diagnostic Statistical Manual of Mental Disorders (DSM) and comprises recommendations for assessment of a patient's cognitive functions, physical condition, behaviour and care situation. The DSM criteria comprise four criteria: impairment of long- or short-term memory; impairment in at least one of the higher cognitive functions (aphasia, agnosia, apraxia, abstraction and judgement); observed impairment has a negative influence on social

functioning and impairment is observed in patients with normal consciousness.²⁹ A cognitive screening test such as the Mini Mental State Examination (MMSE) was optional.

Measurements

For every diagnosed patient, the GPs completed a self-registration form on which they indicated their actions, assessment findings and final diagnosis. The GPs indicated their diagnostic confidence on a four-point Likert scale ranging from (very) confident to (very) uncertain.

Analysis

To explore the diagnostic predictors, uni- and multivariate logistic regression (LR) analyses were used with 'dementia yes or no' as the dependent variable. A predictive model was made by entering all univariately tested variables with $P < 0.25$ in a multivariate LR model with backward exclusion of the least predictive variables. Continuous and ordinal variables were checked for non-linearity and cut-off values were determined when appropriate. The predictive value was expressed in odds ratio with 95% confidence intervals and P -values and explained variance was expressed in Nagelkerke R^2 and Log likelihood ratio.

To be able to integrate all the relevant diagnostic information while maintaining the stability of the LR analyses,³⁰ the number of variables was reduced by computing five sum scores: two cognitive, a behavioural, a blood abnormality score and one on the number of recommendations applied. We computed two sum scores of the cognitive variables in such a way that these corresponded with the first (long- and short-term memory, orientation in time, place and person) (Cronbach's $\alpha = 0.55$) and the second (higher cognitive functioning: aphasia, apraxia, agnosia, abstraction, judgement and personality changes) (Cronbach's $\alpha = 0.55$) DSM criteria. A sum score was made of the number of applied recommendations made from a list of 31 possible recommendations (Cronbach's $\alpha = 0.76$). Because of low Cronbach's α , we refrained from using sum scores for behavioural changes (Cronbach's $\alpha = 0.35$) aggression, apathy, restless, denial, depression and incontinence, and for comorbidity (Cronbach's $\alpha = 0.15$) internal (medical) dysfunction, neurological dysfunction, sensory impairment, adverse effects and drug intoxication. In addition, we entered the application of the MMSE, age and gender of both patients and GPs, informant availability, the number of contacts, duration of the GP-patient relation and how well GPs knew a patient.

Diagnostic confidence. For every diagnosis, the GPs indicated their level of confidence on a four-point Likert scale ranging from (very) certain to (very) uncertain. The predictors of diagnostic confidence were

explored with a multivariate LR analysis with confidence as a dichotomized dependent variable (certain/uncertain). We entered the same covariates as in the analysis above.

Results

GPs and patients

Sixty-four recruited GPs registered 107 patients with cognitive impairment, a mean of 1.7 patients per GP during the average participation time of 16 months. This is slightly lower than the expected annual number of 2.0 per GP.²³ Most patients (87%) lived independently and 61% were (still) married. In 69 cases, dementia was diagnosed, in 29 cases no dementia and 9 cases possible dementia.

The GPs were comparable to the Dutch GP population regarding age [mean 45 years, range 34–64, standard deviation (SD) 8], practice experience (mean 15 years, range 2–35, SD 7), practice size (mean 2114 patients, range 940–3500, SD 404) and gender (21% females). There were fewer single-handed practicers involved (32% versus 49% nation wide).³¹

The GPs used on average 3.6 (SD 3.3, median 3) contacts to diagnose a suspected patient, 79% of the patients were (very) well known to the GPs and 68% were known for over 5 years. The GPs applied the recommendations to a large extent: of the 30 key recommendations on average 26 (SD 3.3) were applied. Nevertheless, the MMSE was applied in 18% of the patients only with a mean score of 21 (SD 8).

Predictors dementia diagnosis

The GPs diagnosed dementia in 69 suspected patients (67%). In an earlier account, we reported about the GPs accuracy compared to a memory clinic. The presence and absence of dementia in these suspected patients was accurately diagnosed by the GPs.²⁶ Table 1 shows the uni- and multivariate associations between the GPs' dementia diagnosis (yes/no) and the predictors. Impairment of memory, higher cognitive functions and ADL dependency were strongly correlated and may 'wash' each other out in multivariate analyses. In multivariate analysis, impairment of the higher cognitive functions, absence of depression and female gender of the patient positively predicted the GPs' diagnosis of dementia. Together these three variables explained 24% of the diagnostic variance (Nagelkerke R^2).

Predictors diagnostic confidence

The GPs indicated that they were diagnostically confident in 58% of all cases, in 69% of the persons they considered demented and 30% of the not demented cases. Table 1 shows both uni- and multivariate associations of the predictors with diagnostic confidence.

Again, impairment of memory, higher cognitive functions, ADL dependency as well as denial behaviour were strongly correlated and may wash each other out multivariately. Multivariate predictors were ADL dependency, informant availability, number of recommendations applied, duration of the symptoms, presence of medication or alcohol intoxication and restless behaviour. These six variables together explained 51% of the variance (Nagelkerke R^2). The use of the MMSE was not associated with diagnostic confidence. In contrast, it tended to be associated with less confidence univariately.

Conclusions

Among a group of newly suspected patients, impairment of the higher cognitive functions was the strongest predictor for GPs to decide on the presence of dementia. Also, absence of depression and female gender of patients predicted a diagnosis of dementia by GPs. The GPs expressed diagnostic confidence in just over half of the cases. This was positively associated with higher application of the Dutch dementia guideline's diagnostic recommendations, ADL dependency, longer duration of patients' symptoms, informant availability, restless behaviour and a patient's female gender. Use of the MMSE was not associated with higher confidence.

GPs seem to base the presence of dementia on rational reasoning. Our study did not support the hypothesis of Bowers et al.³² that memory loss, as the core symptom of dementia, is the main predictor of a GPs' dementia diagnosis. In contrast, the higher cognitive functions emerged as the most important diagnostic predictor. This makes sense as memory impairment alone is not sufficient to decide on the presence of dementia. Presence of depression led GPs to be more reluctant in diagnosing dementia. This also makes sense as it can be difficult to disentangle the clinical picture of mixed depression and dementia.

Especially, ADL dependency was strongly related to diagnostic confidence. Diagnostic confidence was to be further boosted by the application of the dementia guideline's recommendations as well as informant availability. The latter two were mentioned earlier to be important in diagnosing dementia by GPs.^{33,34} Diagnostic confidence was reduced in patients with medication intoxication.

This study had several strengths and limitations. Among the strengths were the detailed information gathered on the GPs' diagnostic considerations, which is unique in the field. In addition, consecutive newly suspected patients were included which reflects best the patients on whom GPs start diagnostic assessments. A limitation may be that the high application rate of this guideline is likely to be higher compared

TABLE 1 Predictors of the GPs' dementia diagnosis and diagnostic confidence, uni- and multivariate odds ratios (N = 107)

	Mean (SD)	Diagnosis dementia				Confidence							
		Univariate		P	Multivariate		P	Univariate		P	Multivariate		P
		OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Impaired memory and orientation (range 0–5)	2.1 (1.3)	1.414	1.023–1.954	0.036*				1.506	1.087–2.086	0.014*			
Impaired higher cognitive functions (range 0–6)	1.6 (1.5)	1.755	1.223–2.518	0.002*	1.52	1.01–2.3	0.046	1.436	1.057–1.951	0.020*			
Impaired social functioning (n/y) %	38/62	1.079	0.479–2.431	0.855				1.221	0.551–2.704	0.623			
Impaired consciousness (n/y) %	35/65	0.634	0.270–1.485	0.294				0.908	0.403–2.045	0.817			
ADL dependency (range 0–3, %) ^a	34/44/9	3.131	1.493–6.565	0.003*				3.448	1.659–7.164	0.001*	12.5	3.0–52.04	0.001
Behavioural changes (range 0–5)	0.9 (1.0)												
Aggression (n/y) %	91/9	2.361	0.475–11.731	0.294				1.696	0.413–6.964	0.463			
Restlessness (n/y) %	86/14	2.456	0.647–9.317	0.187*				3.200	0.845–12.120	0.087*			
Apathy (n/y) %	79/21	0.650	0.254–1.666	0.370				1.396	0.533–3.658	0.497			
Incontinence (n/y) %	92/8	0.523	0.123–2.223	0.380				2.196	0.422–11.439	0.350			
Façade/denial (n/y) %	58/42	1.398	0.621–3.150	0.418				2.462	1.085–5.586	0.031*			
Depression (n/y) %	63/37	0.537	0.235–1.228	0.141*	0.36	0.14–0.95	0.039	0.762	0.334–1.738	0.519			
(Co)morbidity	1.1 (0.9)												
Sensory (n/y) %	65/35	1.310	0.566–3.033	0.529				1.027	0.455–2.319	0.950			
Internal morbidity (n/y) % ^b	58/42	0.605	0.271–1.347	0.218*				0.726	0.330–1.596	0.426			
Neurological (n/y) %	84/16	0.423	0.148–1.208	0.108*				1.186	0.396–3.550	0.761			
Intoxication (n/y) %	92/8	1.111	0.262–4.718	0.887				0.314	0.074–1.331	0.116*	0.065	0.005–0.92	0.043
Adverse effects medication (n/y) %	96/4	1.678	0.169–16.694	0.659				0.683	0.092–5.048	0.709			
Blood abnormality (range 0–5) ^c	0.8 (1.4)	1.234	0.873–1.743	0.234*				0.955	0.721–1.267	0.751			
Number of recommendations applied (0–29)	24.8 (3.6)	0.980	0.872–1.102	0.734				1.070	0.956–1.196	0.239*	1.23	1.01–1.49	0.036
MMSE applied (n/y) %	82/18	0.932	0.333–2.61	0.894				0.489	0.175–1.363	0.171*			
Onset since, months	20.9 (14)	1.02	0.99–1.056	0.258				1.045	1.01–1.09	0.019*	1.1	1.03–1.18	0.004
Age of patient in years	74.4 (7.8)	1.029	0.978–1.083	0.265				1.052	0.996–1.111	0.067*			
Gender of patient (m/f) %	43/57	1.838	0.824–4.096	0.137*	3.4	1.22–9.4	0.019	1.413	0.645–3.095	0.388			
Years of education	9(3)	0.813	0.701–0.943	0.006*				0.924	0.81–1.06	0.25			
Informant availability (n/y) %	25/75	1.385	0.559–3.431	0.482				2.338	0.944–5.790	0.067*	5.5	1.08–28.0	0.040
Number of contacts	3.6 (3.3)	0.981	0.874–1.102	0.747				0.998	0.889–1.120	0.971			
How well the GP knows the patient % ^d	5/16/46/33	0.93	0.570–1.516	0.770				1.080	0.675–1.727	0.748			
How long the GP knows the patient (>5 yr) %	32/68	0.774	0.330–1.814	0.556				0.800	0.347–1.845	0.601			
Age of GP in years	47 (6.6)	0.995	0.935–1.059	0.871				0.979	0.920–1.041	0.493			
Gender of GP (m/f) %	86/14	0.332	0.105–1.050	0.061*				0.623	0.200–1.936	0.413			
				Nagelkerke $R^2 = 0.24$ –2Log likelihood = 113.4				Nagelkerke $R^2 = 0.51$ –2Log likelihood = 70.3					

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OR, odds ratio; CI, confidence interval.

^aActivities of daily living, 0 = no impairment 1 = mild 2 = moderate/severe.

^bSuch as irregular diabetes mellitus, dehydration, cardiovascular or metabolic dysfunction, infections.

^cHaematology (Hgb, Hct, mean corpuscular volume; erythrocyte sedimentation rate), biochemistry (glucose; creatinine; thyroid stimulating hormone).

^dFour-point Likert scale; 1 = very badly; 2 = badly; 3 = fairly well; 4 = very well.

* $P < 0.25$ selected for multivariate analysis.

to its average use by GPs. The GPs in our study were asked and encouraged to work according to this guideline. In comparison with other Dutch guidelines, the average application rate was considerably higher (86% versus 61%).³⁵ The association between guideline use and confidence does not imply directionality. It is equally plausible that having confidence that the patient has dementia contributes to guideline use. Also, we remain uncertain about the rigor to which the recommendations were applied. In addition, because of a limited number of patients per GP, we were not able to estimate the 'variation' of diagnostic assessments within GPs. Next, a number of GPs refused to participate in the study. Although reasons for non-participation were mainly time restraints and no interest in the subject because of a young practice population, it cannot be excluded that the participating GPs were more positive towards the dementia guideline than their non-participating colleagues.

Our findings support the rationality of clinical reasoning of GPs in diagnosing dementia. This may have been induced by high application of the dementia guidelines recommendations. Application of the guideline seemed to boost the GPs' confidence as well. We recommend further implementation of clinical guidelines on dementia in primary care.

Declaration

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Conflicts of interest: There are no conflicts of interest.

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