RESEARCH ARTICLE

General practitioners' attitude toward early and pre-dementia diagnosis of AD in five European countries—A MOPEAD project survey

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Abstract

Introduction: General practitioners (GPs) play a key role in early identification of dementia, yet diagnosis is often missed or delayed in primary care. As part of the multinational Models of Patient Engagement for Alzheimer's Disease project, we assess GPs'

attitude toward early and pre-dementia diagnosis of AD and explore barriers to early diagnosis.

Methods: Our survey covered general attitude toward early diagnosis, diagnostic procedures, resources, and opinion on present and future treatment options across five European countries.

Results: In total 343 GPs completed the survey; 74% of GPs indicated that an early diagnosis is valuable. There were country-specific differences in GPs' perceptions of reimbursement and time available for the patient. If a drug were available to slow down the progression of AD, 59% of the GPs would change their implementation of early diagnosis.

Discussion: Our findings provide insight into GPs' attitudes by exploring differences in perception and management of early diagnosis.

KEYWORDS

Alzheimer's disease, dementia, early diagnosis, general practitioners, mild cognitive impairment, primary care

1 | BACKGROUND

Early detection of dementia and underlying diseases, such as Alzheimer's disease (AD), is regarded as beneficial for patients and caregivers.[1] Early diagnosis may be associated with economic benefits that can result in long-term cost savings for health-care systems.[2,3] Additionally, shifting diagnosis to an early stage of the disease enables patients to receive access to education and support as well as pharmacological and non-pharmacological treatments.[4,5] A recent survey on family carers across Europe revealed that 47% of carers would have preferred an earlier diagnosis, while only 0.8% thought that the diagnosis had been given too soon.[6]

General practitioners (GPs) are often the first contact person when cognitive changes arise and play a key role in diagnosing dementia. They have been the focus of a wealth of studies, such as the Changing Attitudes toward Dementia in Family Practice (CADIF) project aimed at raising awareness on early recognition of cognitive decline.[7] Dementia management and the role of cognitive screening tests in primary care have been examined by research groups in several countries.[8–12] Previous studies have identified several barriers that contribute to missed or delayed diagnosis of cognitive impairment or dementia in the primary care setting. These barriers include constraints of time and resources,[10,13] lack of adequate training in identifying and diagnosing mild cognitive impairment (MCI) or dementia,[14,15] and fear of stigmatizing the patient with impact on the patient–physician relationship.[15,16] A diagnosis of dementia is often accompanied by avoidance and denial in both patients and clinicians.[17] Some GPs consider early diagnosis unimportant or even harmful, especially for their oldest patients.[9,18]

Over the last decade, dementia research has shifted toward early identification of underlying diseases, including AD, and toward the development of pharmacological and non-pharmacological prevention

strategies. The multinational Models of Patient Engagement for Alzheimer's Disease (MOPEAD) project, an EU-funded public–private study within the Innovative Medicines Initiative (IMI-2) research agenda, was carried out to identify the most effective and cost-efficient screening methods for the detection of prodromal AD and mild AD dementia.[19] Four models of patient engagement in five different countries have been investigated of which one is engaging patients in the primary care setting by implementing a pre-screening in GP offices. A detailed description of the project has been published by Rodríguez-Gómez et al.[19]

Due to the range of different responses that we received when presenting MOPEAD to GPs, we aimed at assessing the current attitude of GPs toward early and pre-dementia diagnosis for AD in a structured manner. There are different opinions regarding a very early diagnosis—while research on the benefits of early detection of AD and potential prevention strategies increases, arguments such as lack of treatment and potential stigma speak against early diagnosis. Therefore, our aim was to provide an up-to-date overview on GPs' opinions on early and pre-dementia diagnosis for AD and gain insight into diagnostic processes. The structure of MOPEAD gave us the unique opportunity to collect data from five different countries and examine country-specific differences. In light of the development of disease-modifying treatments, we also assessed GPs' opinions on currently available treatments and expectations for future drugs or interventions that target AD.

2 | METHODS

We designed a structured questionnaire to measure GPs' attitude toward early and pre-dementia diagnosis of AD at the stage of MCI or very mild dementia. The questions were carefully selected by an expert

group within the MOPEAD consortium and pilot-tested among members of the research group. The survey covered several topics, including attitude toward benefits and risks of early diagnosis, diagnostic procedures, resources, and opinion on treatment options. The questionnaire consisted of 12 multiple-choice questions (Questions 1–4, 6–13) and one multiple-answer question (Question 5). Note that we referred to MCI and very mild dementia as one entity. We chose this approach to describe a particular patient group, which is familiar to the GPs, and to prevent focusing on the distinction between MCI and mild dementia, which is conceptualized differently among individual physicians. When referring to current pharmacological treatment, we exclusively focused on mild dementia, because the currently available drugs are licensed for this condition only and not for MCI. The English version of the questionnaire is provided in the Appendix in supporting information.

We carried out the study at five different European sites: Fundació ACE Barcelona/Spain (FACE); Karolinska Institutet Stockholm/Sweden (KI); University Hospital Cologne/Germany (UKK); University Medical Centre Ljubljana/Slovenia (UMCL); and VUmc Alzheimer Centrum Amsterdam/ the Netherlands (VUmc), all of which are part of the MOPEAD Project.[19] Each site was responsible for translating the questionnaire and distributing it to local GP networks and referrers. No sampling criteria were applied. The number of invitations to the survey was dependent on the size of local GP networks. Distribution methods differed between countries according to communication preferences of local GPs—the survey was either sent out via regular mail (UKK, 500 letters to local GPs) or administered online through eSurveysPro (eSurveysPro.com; FACE, KI, UMCL), or both (VUmc, 261 letters to GPs that refer to the Amsterdam Alzheimercentrum with additional link to the online survey). Participation was anonymous and no personal or structural information about GPs was collected.

2.1 | Statistical analysis

Results of the GP survey are reported as frequency and percentage. We carried out chi-square tests of homogeneity to assess differences in responses across sites. To further explore the relationship between individual variables, chi-square tests of independence were used. Post hoc tests were carried out using the adjusted standardized residual method.[20,21] Bonferroni-corrected P-values are reported to adjust for multiple comparisons. All statistical analyses were performed with IBM SPSS Statistics 26.0 (IBM Corp., Armonk, New York, USA) for Windows.

3 | RESULTS

Between February and September 2019, $N = 343$ GPs from five European countries completed the survey. The distribution of responders across all sites is shown in Table 1. The response rate was 18.6% for Germany and 38.7% for the Netherlands. Due to the distribution methods at the other sites using different channels such as e-mail or online messenger, it was not possible to collect precise information about the number of GPs that received the link to the survey. In Spain, the survey

Research in Context

Systematic review: Previous research has identified barriers to delayed or missed diagnosis of dementia, such as resource constraints or fear to stigmatize the patient. Many studies concentrated on general practitioners (GPs) from a single country or used small sample sizes. We reviewed the literature using conventional sources (eg, PubMed).

Interpretation: Our findings provide insight into the attitudes of 343 GPs in five European countries by exploring differences in perception and management of early diagnosis of mild cognitive impairment and early dementia. Early diagnosis is predominantly considered to be of value. We identify barriers to early diagnosis including insufficient time for the patient and a lack of confidence in diagnostic procedures. Available pharmacological treatments are mostly regarded as having low benefit.

Future directions: Strategies to overcome modifiable challenges for early diagnosis like resource deficits need further investigation to improve access to already available benefits for patients and prepare health systems for future availability of a disease-modifying treatment.

was provided in Catalan ($n = 70$) and Spanish ($n = 27$). The response pattern did not differ between these two languages and therefore, we pooled the data.

In the online survey, it was impossible to select more than one answer in the multiple-choice questions. However, it was not possible to avoid multiple answers on the paper-based questionnaire. Therefore, we decided to exclude questions with multiple answers from the analysis. Additionally, some questionnaires were returned incomplete. Unanswered questions were treated as missing data in statistical analyses. In 12.24% of all surveys, at least one question was either missing or excluded.

The distribution of responses per question for all sites combined is shown in Figures 1–4. Table 2 lists the distribution of responses per site.

3.1 | General attitude

The first question inquired whether GPs considered a diagnosis of AD at the very early dementia stage or before dementia at the stage of MCI of value. In total 74% of GPs in our sample indicated that an early diagnosis was of value, whereas 11% were not sure and 15% did not see a value. Regarding patients, 58% of responders were of the opinion that the benefit of early diagnosis outweighs the risk,

TABLE 1 Distribution of responders to the survey across sites

	FACE (ES)	KI (SE)	UKK (DE)	UMCL (SI)	VUmc (NL)	Total
Number of responders	97	27	93	25	101	343
Mail / online (%)	0/100	0/100	100/0	0/100	97/3	55.7/44.3

Abbreviations: DE, Germany; ES, Spain; FACE, Fundació ACE; KI, Karolinska Institutet; NL, the Netherlands; SE, Sweden; SI, Slovenia; UKK, University Hospital Cologne; UMCL, University Medical Centre Ljubljana; VUmc, VUmc Alzheimer Centrum Amsterdam.

30% indicated that benefit equals the risk, and 12% thought that the benefit is lower than the risk. For relatives, the majority thought that benefit outweighs (71%) or at least equals the risk (18%), and only 11% were of the opinion that the risk is higher than the benefits. There were country-specific differences in the distribution of answers regarding patients ($X^2[8] = 31.25$, $P < .001$). Post hoc testing indicated that in Slovenia, the percentage of GPs who thought that benefit outweighs the risk for patients was significantly higher (88%, $P < .05$) compared to the other sites, while a higher percentage of GPs who thought that the risk outweighs the benefit (29.63%, $p = .05$) was found in Sweden.

3.2 | Diagnostic procedures

The next topic covered diagnostic procedures for very early dementia or MCI. In total 34% of the responders did not feel confident in the diagnostic procedures and 22% were undecided; 44% confirmed that they felt confident. There was a significant difference between countries ($X^2[8] = 43.99$, $P < .001$) with a larger proportion of Dutch GPs feeling confident in diagnostic procedures (61.39%, $P < .001$) compared to all other countries. In contrast, the percentage of GPs who did not feel confident was significantly increased in Germany (48.39%, $P < .05$) compared to the other sites. In Swedish GPs, 59.26% indicated that they did not feel confident; however, the effect missed significance level after Bonferroni correction ($P = .07$).

A multiple-answer question gave insight into the procedures that are used in the diagnostic process on a regular basis (Q5). Detailed results are displayed in Figure 2. Medical history with the patient and caregivers, short cognitive tests like the Mini-Mental State Examination (MMSE)[22] and blood tests were reported most frequently. With regard to brain imaging, 38% ordered or performed computed tomography (CT), while 10% ordered or performed magnetic resonance imaging (MRI).

When pursuing a diagnosis in very early dementia or MCI, 27% chose to refer to a specialist; 10.4% pursued the diagnosis by themselves. The majority did both (62.9%). The distribution of results was comparable across sites.

3.3 | Resources

We addressed time and economic obstacles that GPs might experience in the diagnostic process. In total 49% of the responders thought that the procedures that they used for very early dementia or MCI diagnosis are sufficiently reimbursed; 51% indicated that this is not the case. However, there were major differences between countries

($X^2[4] = 117.26$, $P < .001$). In Germany, only 1% of GPs considered the procedures to be sufficiently reimbursed ($P < .001$). In contrast, adequate reimbursement was reported significantly more often in the Netherlands (74.19%, $P < .001$) and Sweden (81.48%, $P < .01$) compared to Spain and Slovenia. Additionally, 76% of GPs pointed out that they do not have enough time to manage a patient with very early dementia or MCI. The proportion was different in Sweden, with 48.15% of GPs feeling they have enough time ($P < .05$), compared to the other sites.

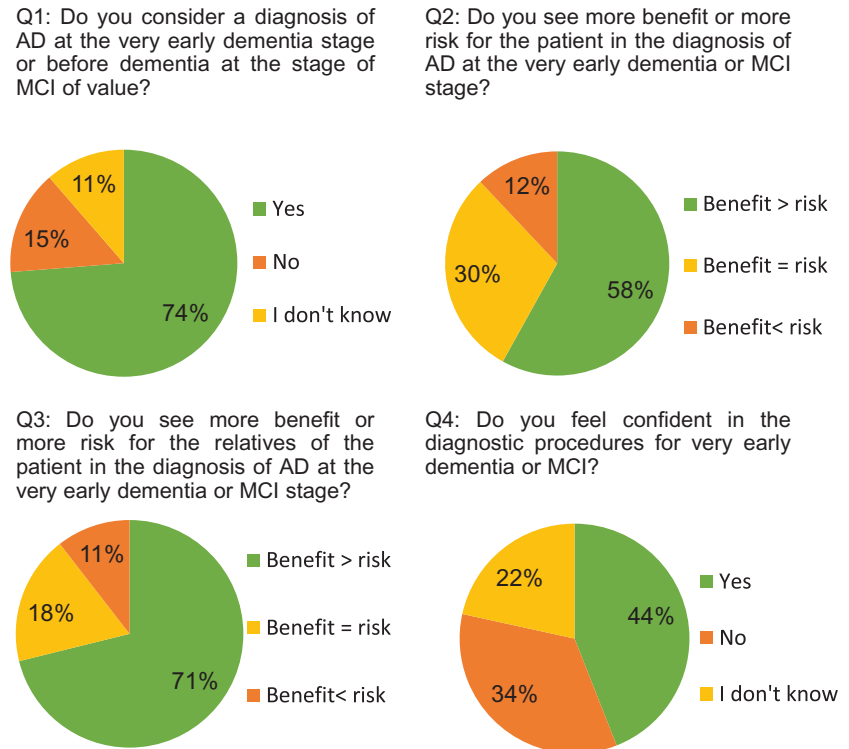## 3.4 | Opinion on current treatment options

We inquired about the perceived risk and benefit of currently available drug treatment options for early dementia. The majority of GPs responded to see low (52%) or no benefit (28%). Medium benefit was indicated by 19%, high benefit by 1% of GPs. Regarding risk evaluation, most GPs were of the opinion that available drugs had low (55%) or medium risk (38%), compared to having no (3%) or high risk (4%).

Regarding currently available non-pharmacological treatment options for early dementia, 85% of the responders thought that they are beneficial. However, more than two thirds indicated that they are not sufficiently available. Another 7% thought that they are not beneficial but widely available; whereas 8% pointed out that they are neither beneficial nor sufficiently available. The distribution among sites did not differ.

3.5 | Opinion on future treatment

We asked GPs whether they would change their implementation of early diagnosis of dementia or MCI if a drug to slow down the progression of AD were available. While 59% of GPs would change their implementation, 29% answered "maybe" and 12% would not change their implementation. We further explored their expectations on the effect of a generally safe drug or intervention over 2 years that they would require to change their handling. In summary, the combined majority of 66% would require a slowing of disease progression by 30% to 50%. The proportion of GPs that required full stability of the disease was significantly higher in Spain (22.68%, $P < .001$) than in Sweden, Germany, Slovenia, and the Netherlands. The number of GPs that asked for reversal of cognitive impairment to change their handling of diagnosis was higher in Slovenia (32%, $P < .001$) compared to the other sites. A significantly higher number of GPs selecting a slowing of disease progression by 10% compared to the other sites was found in Sweden (29.63%, $P < .05$).

FIGURE 1 Distribution of responses per question for all sites combined (Questions 1–4). Abbreviations: AD, Alzheimer's disease; MCI, mild cognitive impairment

Q1: Do you consider a diagnosis of AD at the very early dementia stage or before dementia at the stage of MCI of value?

Q2: Do you see more benefit or more risk for the patient in the diagnosis of AD at the very early dementia or MCI stage?

Q3: Do you see more benefit or more risk for the relatives of the patient in the diagnosis of AD at the very early dementia or MCI stage?

Q4: Do you feel confident in the diagnostic procedures for very early dementia or MCI?

FIGURE 2 Distribution of responses per question for all sites combined (Questions 5–7). Abbreviations: CT, computed tomography scan; FDG, fluorodeoxyglucose; MCI, mild cognitive impairment; MMSE, Mini-Mental State Examination; MRI, magnetic resonance imaging; PET, positron emission tomography

Q5: Which procedures do you use on a regular basis and not only in few specific patients in the diagnostic process of very early dementia or MCI?

Q6: Are the procedures of very early dementia or MCI diagnosis you use sufficiently reimbursed?

Q7: Do you have sufficient time to manage a patient with very early dementia or MCI?
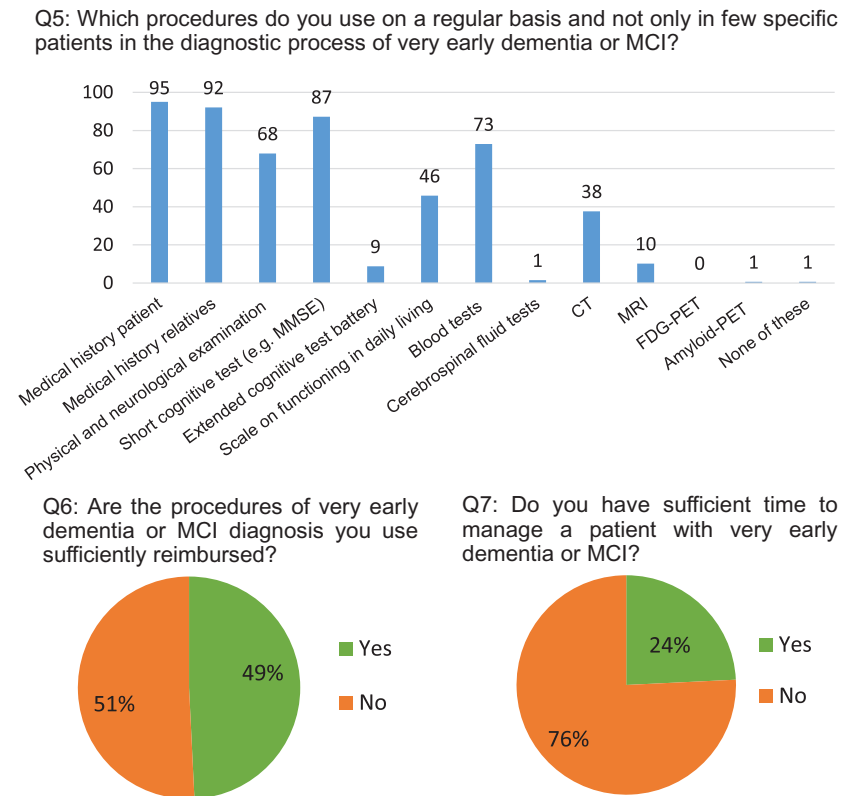
3.6 | Associations between responses

Exploratory chi-square analyses of independence were carried out to further investigate associations among certain variables. We found a significant association between the general opinion on the value of very early diagnosis of AD and the view on benefits of currently available pharmacological treatment options ($X^2[6] = 53.18$, $P < .001$). Post hoc analysis indicated that the proportion of GPs who saw no ben-

FIGURE 3 Distribution of responses per question for all sites combined (Questions 8–11). Abbreviations: MCI, mild cognitive impairment

Q8: If you want to pursue diagnosis in very early dementia or MCI in a patient, do you do it yourself or do refer to a specialist?
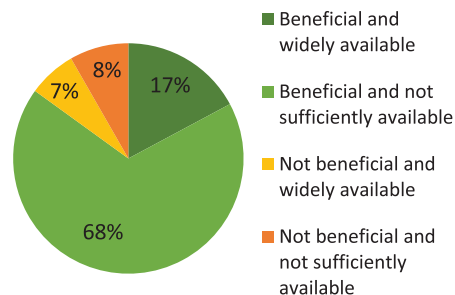

- Myself — 10%
- Refer to specialist — 27%
- Both — 63%
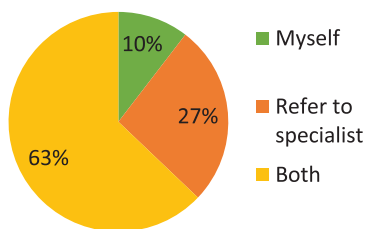
Q9: What do you think about benefits of current pharmacological treatment options for very early dementia?

- No benefit — 28%
- Low benefit — 52%
- Medium benefit — 19%
- High benefit — 1%
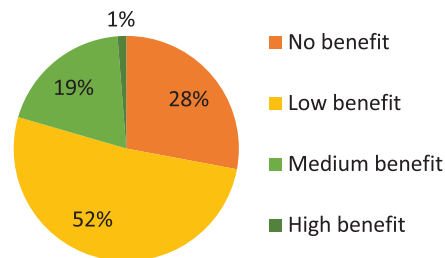
Q10: What do you think about risk of current pharmacological treatment options for very early dementia?

- No risk — 3%
- Low risk — 55%
- Medium risk — 38%
- High risk — 4%
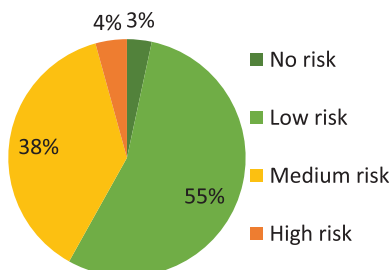
Q11: What do you think about the current non-pharmacological treatment options for very early dementia?

- Beneficial and widely available — 17%
- Beneficial and not sufficiently available — 68%
- Not beneficial and widely available — 7%
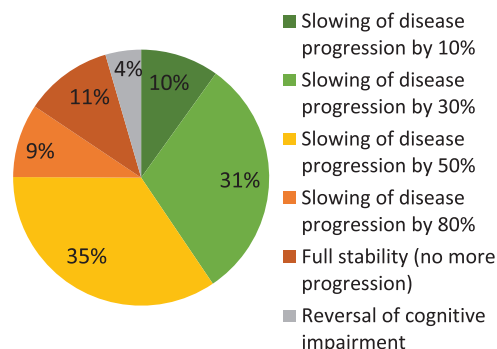- Not beneficial and not sufficiently available — 8%

FIGURE 4 Distribution of responses per question for all sites combined (Questions 12–13). Abbreviations: AD, Alzheimer's disease; MCI, mild cognitive impairment

Q12: If a drug was available that could slow down the progression of AD, would you change your implementation of early diagnosis of dementia or MCI?

- Yes — 59%
- Maybe — 29%
- No — 12%
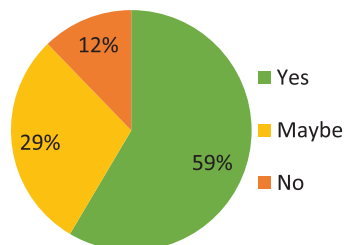
Q13: What would need to be the effect of a generally safe drug or another type of intervention over two years to change your handling of the early diagnosis of early dementia or MCI?

- Slowing of disease progression by 10% — 10%
- Slowing of disease progression by 30% — 31%
- Slowing of disease progression by 50% — 35%
- Slowing of disease progression by 80% — 9%
- Full stability (no more progression) — 11%
- Reversal of cognitive impairment — 4%

efit in pharmacological treatment options was higher in those who did not see a value in early diagnosis (64.58%, $P < .001$) compared to those who saw a value (18.07%) or were unsure (44.44%). In comparison, we found a higher percentage of GPs who indicated medium benefit of pharmacological treatments in those who thought that an early diagnosis was of value (24.37%, $P < .01$). We found no association between the attitude toward early AD diagnosis and opinion on non-pharmacological treatment options ($X^2[6] = 7.18, P = .304$).

Question 12 inquired about the GPs' willingness to change their implementation of early diagnosis of MCI or dementia in case a drug were available that could slow down disease progression. When looking at the association with general attitude on early diagnosis, we found that the distribution of responses to question 12 was different in those who thought that an early diagnosis was of value ($X^2[4] = 12.17$, $P < .05$). There was a significantly lower percentage of GPs that would change their implementation of early diagnosis in those who considered an early diagnosis of value (53.8%, $P < .05$) compared to those who did not or were unsure about its value.

4 | DISCUSSION

Our findings show that the majority of GPs in our survey acknowledge the value of early diagnosis, with more GPs agreeing on the benefits for relatives compared to patients. We identified several

TABLE 2 Distribution of responses (%) per question for each site

	FACE (ES)	KI (SE)	UKK (DE)	UMCL (SI)	VUmc (NL)	X̌š value
Q1 Consider diagnosis at the early stage of value						
Yes	75	52	71	88	77	
No	18	22	18	4	10	
I don't know	7	26	11	8	13	
						15.53, $P = .05$
Q2 More benefit or risk for the patient						
Benefit > risk	63	33	52	88	59	
Benefit = risk	26	37	30	8	37	
Benefit < risk	11	30	18	4	4	
						31.24, $P < .001$
Q3 More benefit or risk for the relatives						
Benefit > risk	74	56	66	76	76	
Benefit = risk	12	33	20	20	18	
Benefit < risk	13	11	14	4	6	
						12.23, $P = .14$
Q4 Confidence in diagnostic procedures						
Yes	41	33	35	28	61	
No	36	59	48	44	11	
I don't know	23	7	16	28	28	
						43.99, $P < .001$
Q5 Regularly used procedures in the diagnostic process						
Medical history - patient	95	100	98	100	100	7.71, $P = .10$
Medical history - relatives	97	100	87	88	100	21.52, $P < .001$
Physical and neurological examination	78	89	69	80	55	19.25, $P < .001$
Short cognitive test (eg, MMSE)	92	96	78	84	97	20.27, $P < .001$
Extended cognitive test battery	19	7	4	4	6	15.74, $P < .01$
Scale on functioning in daily living	54	22	41	12	61	30.24, $P < .001$
Blood tests	87	89	58	76	74	22.87, $P < .001$
Cerebrospinal fluid tests	0	19	0	0	0	57.53, $P < .001$
CT	81	78	20	32	4	155.49, $P < .001$
MRI	4	15	23	16	4	23.67, $P < .001$
FDG-PET	0	0	0	0	0	n.a.
Amyloid-PET	1	0	1	0	0	n.a.
None of these	0	n.a.	2	0	n.a.	n.a.
Q6 Sufficient reimbursement for diagnostic procedures						
Yes	61	81	1	32	74	
No	39	19	99	68	26	
						117.26, $P < .001$
Q7 Sufficient time to manage the patient						
Yes	19	48	23	8	29	
No	81	52	77	92	71	
						14.84, $P < .01$
Q8 Pursue diagnosis yourself or referral to specialist						
Myself	14	22	6	12	6	
Refer to specialist	22	11	35	40	26	

(Continues)

TABLE 2 (Continued)

	FACE (ES)	KI (SE)	UKK (DE)	UMCL (SI)	VUmc (NL)	$X\check{s}$ value
Both	64	67	59	48	68	
						16.93, $P < .05$
Q9 Benefits of pharmacological treatment options						
No benefit	23	7	31	4	43	
Low benefit	54	44	52	48	52	
Medium benefit	23	48	16	40	4	
High benefit	1	0	1	8	0	
						57.92, $P < .001$
Q10 Risks of pharmacological treatment options						
No risk	3	4	6	0	2	
Low risk	55	70	62	76	36	
Medium risk	42	26	27	24	51	
High risk	0	0	6	0	10	
						35.99, $P < .001$
Q11 Opinion on non-pharmacological treatment options						
Beneficial and widely available	14	11	15	32	20	
Beneficial and not sufficiently available	73	70	66	64	64	
Not beneficial and widely available	6	15	4	4	8	
Not beneficial and not sufficiently available	6	4	14	0	8	
						16.59, $P = .17$
Q12 Change implementation of early diagnosis if a drug was available to slow down AD progression						
Yes	62	81	63	44	47	
Maybe	29	19	20	32	41	
No	9	0	16	24	12	
						21.78, $P < .01$
Q13 What effect of drug/intervention necessary to change handling of early diagnosis						
Slowing of disease progression by 10%	4	30	12	8	9	
Slowing of disease progression by 30%	25	33	31	20	38	
Slowing of disease progression by 50%	31	19	41	32	38	
Slowing of disease progression by 80%	15	0	6	4	10	
Full stability (no more progression)	23	15	7	4	4	
Reversal of cognitive impairment	2	4	3	32	1	
						95.04, $P < .001$

NOTE. The questions are shortened to improve readability. For full questions, see Appendix in supporting information.

Abbreviations: CT, computed tomography; FACE, Fundació ACE Barcelona/Spain; FDG, fluorodeoxyglucose; KI, Karolinska Institutet Stockholm/Sweden; MMSE, Mini-Mental State Examination; MRI, magnetic resonance imaging; PET, positron emission tomography; UKK, University Hospital Cologne/Germany; UMCL, University Medical Centre Ljubljana/Slovenia; VUmc, VUmc Alzheimer Centrum Amsterdam/the Netherlands.

barriers to early diagnosis, including a lack of confidence regarding current diagnostic procedures; lack of time to manage the patient; and, for some countries, insufficient reimbursement. In addition, the attitude toward the usefulness of available pharmacological and non-pharmacological treatment options seems to play a major role.

We found significant differences in the evaluation of resources across countries. The majority of GPs in the Netherlands, Sweden, and Spain, but not in Slovenia or Germany, indicated sufficient reimbursement. Interestingly, data from the Organisation for Economic Co-operation and Development (OECD) on the annual income of general practitioners in 2015 (US$, purchase power parity) indicates the high-

est remuneration for German GPs, followed by the Netherlands, Spain, and Slovenia; however, there are differences in employment structure (eg, salaried vs self-employed) and no current data for Sweden are available.[23] In comparison, health spending per capita was lowest in Slovenia compared to the other countries participating in MOPEAD.[24] It is therefore possible that the perception of sufficient reimbursement can be partially explained by the structure of the health-care system. In Germany, the majority of GPs are self-employed and reimbursement is provided as a fixed amount once per patient and quarter of the year, implying that GPs are not reimbursed for individual visits or procedures during the same quarter, which are usually required throughout the diagnostic process. In most countries, remuneration is based on a capitation fee per registered patient with added fees for service or consultation or GPs are salaried,[25] which might explain the difference in reimbursement perception.

In contrast, the perception of time capacities was comparable across countries in this sample, with GPs' responses indicating that they had sufficient time being highest in Sweden. This is in line with results from a systematic review on primary care physician consultation times.[26] The authors reported the highest consultation time in Sweden with 22.5 minutes per consultation, although the latest available Swedish data were from 1992. Consultation times were 10.2 minutes in the Netherlands and even shorter in Spain (7.8 minutes), Germany (7.6 minutes),[27] and Slovenia (6.9 minutes[28]). In our view, it is well appreciated that such short consultation times are insufficient to adequately discuss diagnostic procedures, results, and consequences of early AD diagnosis.

Our findings imply that if strategies such as the MOPEAD pre-screening procedure are to be implemented in health care, it is necessary that these procedures, including information and informed consent, are rather quick to perform, cost efficient, and easy to apply. The time permitted in the system per GP patient is often too short to perform a proper screening of dementia. A procedure that is easy to apply is especially important when looking at the substantial rate of uncertainty about diagnostic procedures by GPs. Previous studies have identified educational deficits that lead to limited confidence in diagnostic abilities and management of patients with dementia.[29–31] In contrast, results from the IMPACT survey in five European countries (France, Germany, Italy, Spain, and the United Kingdom) showed that only a small percentage of GPs referred their patients to a specialist because they were not comfortable with giving a diagnosis by themselves.[32] However, they also reported that a higher percentage of German GPs felt unconfident, which is mirrored in our results.

Our results show unexpected differences between countries in the procedures that are frequently used in the diagnostic process of very early dementia or MCI. For example, the rate of GPs that carried out physical and neurological exams on a regular basis was only 55% in the Dutch sample, even though this is recommended in standard guidelines by the Dutch College of General Practitioners.[33] Likewise, only 58% of GPs in the German sample regularly carried out blood tests, which is strongly recommended in all diagnostic guidelines, including the German S3-guideline on dementia[34] to screen for reversible causes of memory symptoms.

As of today, there is no curative treatment for AD and the results of our survey show that currently available pharmacological treatment options are mostly regarded as having low benefit. According to our survey, most GPs would change their handling of early diagnosis if a drug or intervention slowed disease progression by 30% to 50%. GPs who thought that an early diagnosis was of value were less likely to change their implementation of early diagnosis in the case of a drug that could slow down disease progression. Based on the available data, we can hypothesize that GPs in favor of early diagnosis were more likely to have already implemented processes for early diagnosis in their clinical routine independent of the availability of a disease-modifying drug and, therefore, would not need to change their behavior.

In total 76% of GPs in this sample indicated that non-pharmacological treatment options were not sufficiently available, independent of their benefit. In light of the increasing significance of lifestyle interventions to delay disease onset or slow down disease progression, we believe that this gap should be a major field of action for policy makers and health-care systems. Also, the recently introduced World Health Organization (WHO) guidelines on preventing dementia provide recommendations for interventions aimed at lifestyle and medical conditions, many of which are common responsibilities of GPs.[35]

There are limitations to our study. The main limitation relates to the incomplete information about response rates at the different sites. For those sites that distributed the survey online, no reliable information about the number of invitations could be collected. While the response rate in the Netherlands was 38.7%, in Germany only 18.6% of GPs completed the survey, which severely decreases generalizability of our results. It is possible that GPs who did not see a value of early and pre-dementia diagnosis were less likely to participate in a survey on this topic, thus creating bias in our results toward a more favorable view on early diagnosis. While the Dutch sample mainly consisted of GPs that refer to the Alzheimercentrum, who might be sensitized to MCI and dementia and more open to early diagnosis, this was not the case at the other sites.

In addition, the representativeness of our sample is limited by several factors, including small sample sizes, geographic limitations, and unknown characteristics of the sample. All information was collected anonymously and no professional details were collected to align with data protection and increase participation. However, personal and structural details such as age, sex, mean age of patients, etc. would have provided valuable information about the sample and allowed for a more thorough analysis of the response profiles. Furthermore, the MOPEAD sites were mostly located in urban areas, which might have led to an underrepresentation of GPs in rural areas in some of the countries involved.

There were also differences in the sample size between countries and the sample was considerably smaller in Sweden and Slovenia, decreasing statistical power for the comparisons between countries.

In conclusion, our survey provides an up-to-date overview on GPs' attitude toward early and pre-dementia diagnosis at the stage of MCI or very mild dementia in five European countries. Our findings

identify barriers such as the need for improved education to increase confidence in diagnostic procedures and having sufficient time to apply this knowledge and manage a patient with MCI or mild dementia. While the availability of an effective disease-modifying treatment would likely have an impact on the GPs' desire to implement early diagnosis, the above-mentioned barriers relate to logistic challenges in the diagnostic process independent of potential treatment options and should be addressed to enable a shift toward early diagnosis of AD.

CONFLICTS OF INTEREST

Laura Campo is a full-time employee of Eli Lilly Italia S.p.A. and shareholder of Eli Lilly.

Anders Wimo works as a consultant for Biogen and has received a research grant from MSD outside of this study. The other authors report no conflicts of interest regarding the publication of this article.

REFERENCES

1. Dubois B, Padovani A, Scheltens P, Rossi A, Dell'Agnello G. Timely diagnosis for Alzheimer's disease: a literature review on benefits and challenges. *J Alzheimers Dis*. 2016;49:617-631.
2. Getsios D, Blume S, Ishak KJ, Maclaine G, Hernández L. An economic evaluation of early assessment for Alzheimer's disease in the United Kingdom. *Alzheimer's Dement*. 2012;8:22-30.
3. Winblad B, Amouyel P, Andrieu S, Ballard C, Brayne C, Brodaty H, et al. Defeating Alzheimer's disease and other dementias: a priority for European science and society. *Lancet Neurol*. 2016;15:455-532.
4. Alzheimer Europe. The Value of Knowing: findings of Alzheimer Europe's Five Country Survey of Public Perceptions of Alzheimer's Disease and Views on the Value of Diagnosis. *Alzheimer Eur Luxemb*. 2011.
5. Prince M, Bryce R, Ferri C. Alzheimer's Disease International World Alzheimer Report 2011. *Benefits Early Diagnosis Interv Alzheimer's Dis Int*. 2011.
6. Woods B, Arosio F, Diaz A, Gove D, Holmerová I, Kinnaird L, et al. Timely diagnosis of dementia? Family carers' experiences in 5 European countries. *Int J Geriatr Psychiatry*. 2019;34(1):114-121.
7. Pentzek M, Vollmar HC, Wilm S, Leve V. Frühwahrnehmung von Demenzen in der Hausarztpraxis: der CADIF-Ansatz. *Z Gerontol Geriatr*. 2017;50:44-47.
8. Janssen J, Koekkoek PS, Moll Van Charante EP, Jaap Kappelle L, Biessels GJ, Rutten GEHM. How to choose the most appropriate cognitive test to evaluate cognitive complaints in primary care. *BMC Fam Pract*. 2017;18:1-8.
9. Prins A, Hemke F, Pols J, Moll van Charante EP. Diagnosing dementia in Dutch general practice: a qualitative study of GPs' practices and views. *Br J Gen Pract*. 2016;66:e416-22.
10. Petrazzuoli F, Vinker S, Koskela TH, et al. Exploring dementia management attitudes in primary care: a key informant survey to primary care physicians in 25 European countries. *Int Psychogeriatrics*. 2017;29:1413-1423.
11. Wilcock J, Iliffe S, Griffin M, Jain P, Thuné-Boyle I, Lefford F, et al. Tailored educational intervention for primary care to improve the management of dementia: the EVIDEM-ED cluster randomized controlled trial. *Trials*. 2013;14:1-10.
12. Yokomizo JE, Simon SS, Bottino CMDC. Cognitive screening for dementia in primary care: a systematic review. *Int Psychogeriatrics*. 2014;26:
13. Hinton L, Franz CE, Reddy G, Flores Y, Kravitz RL, Barker JC. Practice constraints, behavioral problems, and dementia care: primary care physicians' perspectives. *J Gen Intern Med*. 2007;22:1487-1492.
14. Cahill S, Clark M, O'Connell H, Lawlor B, Coen RF, Walsh C. The attitudes and practices of general practitioners regarding dementia diagnosis in Ireland. *Int J Geriatr Psychiatry*. 2008;23:663-669.
15. Iliffe S, De Lepeleire J, van Hout H, et al. Understanding obstacles to the recognition of and response to dementia in different European countries: a modified focus group approach using multinational, multidisciplinary expert groups. *Aging Ment Health*. 2005;9:1-6.
16. Koch T, Iliffe S. EVIDEM-ED project. Rapid appraisal of barriers to the diagnosis and management of patients with dementia in primary care: a systematic review. *BMC Fam Pract*. 2010;11:52.
17. Milby E, Murphy G, Winthrop A. Diagnosis disclosure in dementia: understanding the experiences of clinicians and patients who have recently given or received a diagnosis. *Dementia*. 2017;16:611-628.
18. Hansen EC, Hughes C, Routley G, Robinson AL. General practitioners' experiences and understandings of diagnosing dementia: factors impacting on early diagnosis. *Soc Sci Med*. 2008;67:1776-1783.
19. Rodríguez-Gómez O, Rodrigo A, Iradier F, et al. The MOPEAD project: advancing patient engagement for the detection of "hidden" undiagnosed cases of Alzheimer's disease in the community. *Alzheimer's Dement*. 2019;15:828-839.
20. Beasley TM, Schumacker RE. Multiple regression approach to analyzing contingency tables: post hoc and planned comparison procedures. *J Exp Educ*. 1995;64:79-93.
21. García-Pérez MA, Núñez-Antón V. Cellwise residual analysis in two-way contingency tables. *Educ Psychol Meas*. 2003;63:825-839.
22. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*. 1975;12(3):189-198.
23. OECD. Health care resources 2016. https://doi.org/10.1787/data-00541-en.
24. OECD. Health at a Glance 2017. 2017. https://doi.org/10.1787/health_glance-2017-en.
25. Kringos D, Boerma W, Hutchinson A, Saltman RB. Building primary care in a changing Europe. 2015.
26. Irving G, Neves AL, Dambha-Miller H, et al. International variations in primary care physician consultation time: a systematic review of 67 countries. *BMJ Open*. 2017;7:e017902.
27. Deveugele M, Derese A, van den Brink-Muinen A, Bensing J, De Maeseneer J. Consultation length in general practice: cross sectional study in six European countries. *BMJ*. 2002;325:472-472.
28. Petek Šter M, Švab I, Živčec Kalan G. Factors related to consultation time: experience in Slovenia. *Scand J Prim Health Care*. 2008;26:29-34.
29. Bradford A, Kunik ME, Schulz P, Williams SP, Singh H. Missed and delayed diagnosis of dementia in primary care: prevalence and contributing factors. *Alzheimer Dis Assoc Disord*. 2009;23:306.
30. Turner S, Iliffe S, Downs M, et al. General practitioners' knowledge, confidence and attitudes in the diagnosis and management of dementia. *Age Ageing*. 2004;33:461-467.
31. Veneziani F, Panza F, Solfrizzi V, Capozzo R, Barulli MR, Leo A, et al. Examination of level of knowledge in Italian general practitioners attending an education session on diagnosis and management of the early stage of Alzheimer's disease: pass or fail?. *Int Psychogeriatrics*. 2016;28:1111-1124.
32. Robinson L, Vellas B, Knox S, Lins K. Clinical practice patterns of generalists and specialists in Alzheimer's disease: what are the differences,

and what difference do they make?. *J Nutr Health Aging*. 2010;14:545-552.

33. de Vaate MDB, van der Weele G, Schep-Akkerman A. Herziene NHG-Standaard Dementie. *Huisarts Wet*. 2020;63:55.

34. Maier W, Jessen F, Schneider F, Deuschl G, Spottke A, Reichmann H. *S3-Leitlinie »Demenzen" « Langversion (B). Diagnose- und Behandlungsleitlin*. In: Deutsche Gesellschaft für Psychiatrie, Psychotherapie und Nervenheilkunde (DGPPN), Deutsche Gesellschaft für Neurologie (DGN) (eds) Diagnose- und Behandlungsleitlinie Demenz. Interdisziplinäre S3 Praxisleitlinien, vol 0. Demenz: Springer Berlin Heidelberg; 2010:9-72.

35. World Health Organization. *Risk Reduction of Cognitive Decline and Dementia: WHO Guidelines*. World Health Organization; 2019.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Sannemann L, Müller T, Waterink L, et al. General practitioners' attitude toward early and pre-dementia diagnosis of AD in five European countries—A MOPEAD project survey. *Alzheimer's Dement*. 2021;13:e12130. https://doi.org/10.1002/dad2.12130