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Will elderly people take advantage of a telephone-based screening service for mild cognitive impairment? A feasibility study

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Summary

The risk of developing mild cognitive impairment (MCI), and subsequently dementia, increases with age. Early detection requires a comprehensive clinical examination, which is time consuming and expensive; a face-to-face examination may also be problematic for people living in rural areas which may result in unequal access to services. Telephone-based screening may provide a feasible method of identifying people who would benefit from a full diagnostic workup. We conducted a pilot study in which we offered telephone screening to all patients aged over 60 years at a health clinic in rural northern Norway (n=259). Fifteen percent of them volunteered (n=39). Screening identified a number of suspicious cases and we recommended to their general practitioner that 7 patients (18%) be offered a follow-up. Surveys showed that the volunteers were generally positive towards the service, as was the general practitioner who found it helpful to be provided with such information about the elderly patients in his care. In addition, we surveyed the opinions of all general practitioners (n=480) in the three northernmost counties of Norway concerning such a potential service. There was a response rate of 40% (n=190). Almost half of respondents (45%) would like to make use of such a service if it existed, and 34% believed that their patients would make use of it if available. The pilot study demonstrates the feasibility of telephone screening for clinically significant memory decline, and that users (general practitioners and the elderly) are positive towards such a service.

Introduction

Dementia is a devastating neurodegenerative condition characterised by dramatic memory loss. It represents one of the major problems for health systems since globally 37 million people suffer from the disorder. In Norway, there are approximately 66,000 people with a diagnosis of dementia, affecting 250,000 close family members.[1,2] As a consequence of longer life expectancies, twice as many people with dementia are expected in the next 35 years. However, people with dementia are not a homogeneous group. The most common form is Alzheimer's disease (AD), affecting around 60-70% of all those with dementia, followed by vascular dementia after a stroke. There is currently no cure for dementia, but medications can improve cognition and function in daily life activities, if administered early enough in the illness, and thus early detection is critical. In addition, early detection can be helpful in planning the future for an affected person, their family and the subsequent long-term medical care required.

Mild Cognitive Impairment (MCI) is often a precursor to dementia, although the probability of this is partly determined by genetics, possibly being more common among $\epsilon 4$ carriers of the apolipoprotein E gene[3,4,5] especially when in combination with a stroke.[6,7] From a preventative and treatment perspective, it is noteworthy that a recent randomized double-blind controlled trial of high-dose folic acid (i.e. homocysteine-lowering) vitamins B₆ and B₁₂ in 271 individuals over 70 years old with MCI significantly slowed the accelerated rate of brain atrophy. A high proportion of people in this age group (16%) have MCI and about half will develop AD, so this is of enormous clinical value,[8] especially since drug trials in dementia have not been particularly successful. However, dietary treatments need to be given early in the disease process, further emphasising the importance of early identification of people with MCI.

Very often the burden for early detection of MCI falls on the general practitioner (GP), who may be suspicious that the patient is displaying cognitive decline or perhaps has been approached by a family member who is concerned about a possible reduction in cognitive function. In Norway, evaluation of MCI and dementia can be made by a GP or they can refer the patient to specialist services. Since it is not mandatory to visit one's GP regularly it is possible that early MCI clues can be missed. A freely available service that assesses memory and overall cognition and that can be accessed simply by telephone may offer a practical method of detecting MCI in elderly people. Although clearly a face-to-face full diagnostic and neuropsychological assessment of cognitive function is the gold-standard for identifying cognitive impairment, this is more time-consuming and expensive. Telephone-based screening is almost as sensitive at detecting critical signs of cognitive decline as in-person neuropsychological assessments[9], and can be delivered at much lower cost.[10] Furthermore, telephones are simple devices that most of the population have access to and are familiar with using. Telephone-based screening could therefore be used in the early detection of individuals presenting with MCI[11,12] and may be especially useful in geographically dispersed populations so as to ensure equal access to high quality medical care.

The telephone interview for cognitive status (TICS) consists of 11 items assessing orientation, learning, attention/calculation and language.[13] The TICS was derived from, and is highly correlated with, the Mini-Mental State Examination (MMSE).[14,15] A modified version, the TICS-M, includes a delayed memory recall item.[16] Good reliability and validity have been demonstrated for these measures[13,16] and studies have shown that both versions of the TICS can be used as valid tools to screen for dementia[16,17] and even MCI.[18]

We have therefore conducted a study of telephone-based cognitive screening in a sparsely populated region of northern Norway. The primary aim of the investigation was to assess the feasibility of a screening service. A free telephone cognitive screening service was offered to people aged over 60 years who were patients of a GP in rural northern Norway. We surveyed the opinions of those who used the service. In addition we surveyed the opinions of all GPs in the three northernmost counties of Norway about whether they would like to make use of such a service if it was made widely available.

Methods

The study was approved by the appropriate ethics committees. The study was conducted during May 2012. In the first part of the study, all patients over 60 years of age from one GP's list were invited to take part in telephone-based screening of cognitive impairment, and those who participated were subsequently asked to rate their overall experience of the telephone screening. Also, the GP whose patients were assessed was also asked to provide feedback via a user-satisfaction survey. In the second part of the study, GPs in northern Norway were invited to give their opinion about a potential free service that would provide telephone-based screening of cognitive impairment.

Telephone screening

All those aged over 60 years who were patients of a GP's practice in Bardu in northern Norway received letters sent from their health centre describing the study and inviting them to participate (n=259). The invitation letter stated the purpose of the study and invited the person to call the psychologist who would conduct the telephone-screening and make an appointment. Those who volunteered were given further detailed information on the purpose

of the study, as well as on possible positive and negative effects, and on data protection matters. All participants provided oral informed consent. The invitation letter was sent only once, with no follow-up if patients did not reply. A presentation about the project was held at a meeting for the area's pensioner's group, so that many elderly people received a second invitation through this meeting.

The telephone interviews took approximately 20 min. The interview consisted of three neuropsychological tests and was administered by a specifically trained psychologist. The primary measure was the Telephone Interview of Cognitive Status (TICS).[13] The Norwegian TICS consisting of 11 items that assess different domains of cognitive function (orientation, learning, attention/calculation and language) was utilized. In addition, we assessed delayed recall by asking the participant to repeat 10 words presented 3-5 min earlier. For participants with less than 12 years ($n = 17$) of education, the TICS raw score (not counting the delayed recall score) was standardized as described in the manual, by converting it to a corresponding MMSE score. Since it has been suggested that some brief neuropsychological tests may add diagnostic sensitivity and specificity,[19] participants were given two additional neuropsychological tests. Speeded measures of verbal fluency, namely phonetic (FAS) and semantic (animals and boys' names) fluency from the Delis-Kaplan Executive Function System (D-KEFS)[20] were included, since there is evidence that a discrepancy between phonetic and semantic fluency can be important when attempting to identify early MCI or Alzheimer's disease.[21] A measure of working memory, the Letter Sorting Test,[22] was included because it has been shown to increase the sensitivity to MCI when administered along with memory and semantic fluency tests.[23] For the Letter Sorting Test we used the Norwegian word "fjord". The participant was instructed to spell "fjord" in forwards, backwards and alphabetical order and awarded 1 point for each correct answer, giving a possible total of 3 points. Participants could call the psychologist for information on the results of the telephone screening. Reports from the telephone screening interview were sent to the GP, and where deemed appropriate it was recommended that the GP follow-up.

All volunteers received a survey a couple of days after completing the interview which asked them to rate their overall experience and satisfaction with the telephone-screening service. Specifically they were asked to rate their degree of agreement with 13 statements on a Likert-type scale (1-5). Participants were asked to return the completed questionnaire using pre-stamped envelopes. The participating GP was also asked to rate his overall satisfaction with the service and the usefulness of receiving information on his patients.

Survey of GPs

A 2-question survey including information on the current study was mailed to all GPs ($n=480$) listed in the Norwegian public GP-registry for the three northernmost counties in Norway. We chose these counties because they are most similar to the geographic area where the telephone screening was conducted and also because these areas have long distances between patients and health services. The GPs were asked to return the completed questionnaire using pre-stamped envelopes.

Results

A total of 39 patients (15%) volunteered for screening; their demographics are summarised in Table 1.

Telephone screening

None of the 39 participants reported any previous testing for dementia (or diagnosis of dementia). Eight (21%) wore hearing aids, but several had difficulties in doing so when using a telephone. Twenty-five (64%) had access to a person (proctor) to confirm name, address and that the environment was suitable for testing, and some proctors were able to sit beside the participant for the duration of the telephone screening thus ensuring that the participant did not use a pen and paper to write down details that should be remembered without any aids.

The median TICS score in the 39 participants was 34 (interquartile range 31.5-36). Five patients had one or more scores that could be regarded as outliers, i.e. below the 5th percentile (see Table 2). One patient scored below the 5th percentile on all four variables.

Reports of the results of the screening were sent to the GP. Based on our clinical judgement, the GP was alerted to the fact that seven of the participants had screening results that indicated a lower level of cognitive function than age-adjusted norms, possibly indicative of MCI (see Table 3). These seven participants were compared to the rest of the sample (n=32) using independent samples *t*-tests. Group differences were highly significant for all cognitive tests. Dementia was confirmed in the majority of cases for whom follow-up by the GP was possible.

Thirty-eight of the participants (97%) completed the satisfaction questionnaire. Overall the volunteers were generally positive towards the service (see Table 4). The GP also expressed an overall positive perspective about the study and service, and found it helpful to be provided with such information about the elderly patients in his care.

Survey of GPs

The survey was returned by 190 GPs (a response rate of 40%). Almost half (45%) indicated that they would utilize a telephone-based screening service if it existed, whereas one quarter (24%) said they would not (see Table 5). A one-sample Chi-square goodness-of-fit test confirmed that these results were significant ($P=0.002$). They were less sure whether their patients would be interested in such a service as reflected in half of the respondents (46%) replying “do not know” to this question. The results were significant (one-sample Chi-square goodness-of-fit test: $P<0.001$).

Discussion

We assessed the feasibility of conducting telephone-based cognitive screening among elderly people in a rural region of northern Norway. The TICS was used along with two neuropsychological tests. Fifteen percent of those invited volunteered, of whom 18% were recommended for a full neuropsychological examination. Both the volunteers and the GP were positive towards the service. A survey among GPs yielded similar results, with 45% stating their interest in such a service should it be offered. Thus, the present study indicates both the feasibility of such a screening service and that users (GPs and elderly patients) are positive towards it. Telephone-based screening therefore provides a feasible method of identifying people in rural Norway who would benefit from a full-diagnostic workup.

The primary goal with telephone-based cognitive screening is to identify people who are in need of a comprehensive clinical and diagnostic work-up. This can serve two purposes. First, it can ensure that access to these more time-consuming and costly methods is prioritized for

those with real evidence of cognitive decline. This enables more and better care to be delivered to patients, without the need to travel to a healthcare facility.[24] Second, it can identify signs of cognitive decline or early dementia at a very early phase of illness. This can improve both the patients' and carers' quality of life by reducing uncertainty and helping the affected person come to terms with their condition; it can also permit earlier decision-making regarding financial, legal and care arrangements. In addition, if and when drugs that halt disease progression, such as high dose vitamin folic acid injections, become readily available, many valuable quality years can be provided. Indeed, recent research suggests that services for early diagnosis and intervention in dementia can be beneficial in terms of both quality of life and overall cost effectiveness.[25]

The present study had certain limitations. Several participants had problems in using their hearing aids while being interviewed by telephone. This is a human-technology challenge to accurate telephone screening, which increases the probability that some people are incorrectly referred to their GP, i.e. low cognitive scores could be due to difficulties with using hearing aids when on the telephone, and not to cognitive decline. Consequently, when we were unsure, we erred on the side of caution and informed the GP that follow-up was recommended.

There are many reasons that people can score poorly on any test. In addition to test anxiety, a score indicating putative decline could be the consequence of a recent stroke, current medication and ~~of course~~ depression. These three conditions are relatively common in the elderly and although they are likely to be known by the GP they were not factors that we could check easily, and this constitutes another limitation of the study.

Based on the TICS scores, there were at least three patients who required further investigation. (In our clinical judgement, there were seven patients who required follow up). These three patients also had low scores on the other screening measures used. This demonstrates the feasibility of the approach used to identify putative cases. Further work is now required to confirm sensitivity and specificity, and whether identified cases are true positives. Also, it remains to be established to what extent the present findings are generalizable. Future work needs to evaluate all suspected cases of MCI (as determined via the telephone screening) with a full-scale face to face clinical (neuropsychological) examination (i.e. the gold standard).

In conclusion, our study clearly demonstrates that users (GPs and the elderly) are positive towards a telephone-based screening service in order to detect mild cognitive impairments. This opens the way to large scale trials of prophylactic therapy in rural populations at risk.

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Table 1. Demographics and cognitive test results for the volunteers

	No	Range	Mean	SD	Median	Interquartile range
Age, years ¹	39	61-91	-	-	70	14
Education, years	39	5-19	12	3.9	-	-
Sex (males/ females)	39	-	28/11	-	-	-
TICS total raw score ¹	39	19-38	-	-	34	5
TICS T score	39	24-69	53.3	10.6	-	-
TICS delayed recall ^{1,2}	38	0-9	-	-	3	3
Phonetic fluency scaled score ¹	39	4-17	-	-	10	4
Semantic fluency scaled score	39	4-19	11.6	3.9	-	-
Letter Sorting Test: total raw score ¹	39	1-3	-	-	3	1

¹ not normally distributed

² maximum score is 10

Table 2. Screening results. Values highlighted are below the 5th percentile for the variable concerned. Age ranges are provided to ensure anonymity.

Patient	Age (years)	Sex	Education (years)	TICS (t-scores)	Letter sorting	Letter fluency (scaled)	Category fluency (scaled)
1	90-94	F	7	56	2	11	10
2	65-69	F	16	64	3	13	13
3	70-74	M	18	53	3	9	11
4	70-74	M	17	66	2	16	14
5	80-84	M	15	28	3	4	5
6	60-64	M	18	64	3	10	7
7	70-74	M	18	49	3	9	13
8	75-79	M	9	43	2	7	6
9	85-89	F	8	56	3	9	10
10	75-79	M	8	63	3	14	13
11	65-69	M	15	60	3	4	8
12	70-74	M	12	45	3	5	10
13	60-64	M	12	55	3	11	12
14	80-84	M	12	49	3	10	11
15	80-84	M	14	24	1	4	4
16	65-69	M	7	62	3	9	8
17	70-74	M	10	50	2	9	11
18	60-64	M	10	50	3	10	14
19	60-64	M	13	46	3	9	10
20	65-69	M	15	36	3	11	8
21	65-69	F	13	55	3	12	13
22	65-69	F	10	57	3	12	17
23	70-74	M	14	66	3	14	19
24	60-64	F	19	51	3	9	8
25	60-64	M	12	51	3	9	16
26	60-64	M	14	39	2	10	12
27	80-84	M	15	61	3	12	18
28	65-69	M	16	46	3	17	16
29	75-79	M	7	64	2	6	5
30	80-84	M	5	61	2	11	12
31	65-69	F	19	64	3	12	17
32	90-94	F	7	50	2	8	7
33	80-84	M	10	63	3	16	16
34	70-74	M	11	69	3	7	18
35	80-84	F	11	59	3	9	11
36	80-84	F	8	34	1	5	12
37	70-74	M	18	57	3	13	16
38	75-79	M	9	57	3	6	9
39	65-69	F	9	57	3	10	11

Table 3. Demographics and cognitive test results for those volunteers with suspected cognitive decline (n=7) and those without any suspected cognitive decline (n=32)

	Suspected cognitive decline (n=7)	No suspected cognitive decline (n=32)	P-value*
Age, years (SD)	77.6 (10.1)	71.6 (7.8)	ns
Education, years (SD)	11.7 (3.6)	12.5 (4.1)	ns
Sex (males/females)	5/2	23/9	ns
TICS T score (SD)	36.3 (8.8)	57.1 (6.6)	<0.01
TICS delayed recall (SD)**	1.6 (2.5)	3.9 (2.3)	0.02
Phonetic fluency scaled score (SD)	7.0 (2.8)	10.4 (3.1)	0.01
Semantic fluency scaled score (SD)	7.7 (3.2)	12.4 (3.6)	<0.01
Letter Sorting Test: total raw score (SD)	2.0 (0.8)	2.8 (0.4)	<0.01

*NS, $P \leq 0.05$

**n=31 in the no cognitive decline group (maximum score is 10)

Table 5. Responses from the survey of GPs (n=190)

	No of responses	Agree n (%)	Disagree n (%)	Do not know n (%)
If my general practice was offered a (free) service for patients over 60 years of age that could identify MCI and early dementia, I would want to take advantage of it	188	85 (45)	46 (25)	57 (30)
My patients would be likely to make use of a telephone service that could check for signs of cognitive decline or dementia	189	65 (34)	37 (20)	87 (46)

Table 4. Satisfaction with telephone screening

	N o f r e s p o n s e s	Strongly disagree (%)	Disagree (%)	Neutra l (%)	Agree (%)	Strongly agree (%)
1. It was easy to do this interview at home	38	0	3	2	63	32
2. It was difficult to find time to do the interview	38	5	16	13	55	11
3. It was straightforward to find someone who could be with me during the interview	36	8	8	14	39	31
4. It felt like a great effort to do this interview	37	0	30	19	40	11
5. It was easy to hear the interviewer	38	0	0	16	55	29
6. I became tired from doing the interview	37	11	13	22	38	16
7. I would recommend others to do the interview if they are worried about dementia	37	0	5	19	46	30

8. It is important for me to be checked as to whether I am showing signs of dementia	36	0	0	22	42	36
9. I am not happy about my doctor getting the results of this interview	37	6	8	17	36	33
10. Health services over the telephone save time	37	0	0	19	65	16
11. Health service over the phone do not seem necessary to me	36	3	14	19	47	17
12. My overall experience of the interview was positive	37	0	0	8	68	24
13. My overall experience of the interview was negative	36	3	25	3	39	30