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Clinical Study

Evaluating Voting Competence in Persons with Alzheimer Disease

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Voting by persons with dementia raises questions about their decision-making capacity. Methods specifically addressing voting capacity of demented people have been proposed in the US, but never tested elsewhere. We translated and adapted the US Competence Assessment Tool for Voting (CAT-V) to the Italian context, using it before 2006 elections for Prime Minister. Consisting of a brief questionnaire, this tool evaluates the following decision-making abilities: understanding nature and effect of voting, expressing a choice, and reasoning about voting choices. Subjects' performance was examined in relation to dementia severity. Of 38 subjects with Alzheimer's disease (AD) enrolled in the study, only three scored the maximum on all CAT-V items. MMSE and CAT-V scores correlated only moderately ($r = 0.59$; $P < 0.0001$) with one another, reflecting the variability of subjects' performance at any disease stage. Most participants (90%), although performing poorly on understanding and reasoning items, scored the maximum on the choice measure. Our results imply that voting capacity in AD is only roughly predicted by MMSE scores and may more accurately be measured by a structured questionnaire, such as the CAT-V. Among the decision-making abilities evaluated by the CAT-V, expressing a choice was by far the least affected by the dementing process.

1. Introduction

Mental disorders, including dementia, can impair competence, but a diagnosis of dementia does not imply a complete loss of competence [1]. There is a wide consensus on considering competence as the capacity of a person to make a specific decision [2]. Voting is a decision of particular interest since a consensus does not exist on which abilities the patient with dementia should retain to express a reliable choice [3]. Voting is among the fundamental rights of citizens in democratic countries. Thus, identifying patients who, despite the presence of dementia, maintain the capacity to vote and increasing their chance to take part in a ballot (e.g., allowing their caregivers to have a role in facilitating this) would be of crucial importance. Participation in the electoral process by citizens with dementia has become especially important in recent years, both for the growing number of individuals suffering from Alzheimer disease (AD) or other progressive cognitive disorders, and in light of the fact that in at least two cases (2000 US presidential elections and 2006 Italian elections for the Prime Minister designation), a small number of votes had a decisive effect on the results. It is especially in long-term facilities that inappropriate assumptions about the absence of voting capacity may deprive still capable and willing residents of the right to vote [4, 5].

Recently, a novel test to assess the capacity to vote has been proposed: the Competence Assessment Tool for Voting (CAT-V) [6], which evaluates an individual's performance on four decision-making abilities: understanding the nature and effect of voting, appreciating the reality of voting situation, making a choice, and reasoning about voting choices. In this paper, we report the results of a study that applied a modified version of the CAT-V to individuals with mild-moderate AD who were temporarily residents in a long-term care facility before 2006 Italian elections for designating the Prime minister. Our primary hypothesis was that although voting capacity would be inversely associated with dementia

severity, the single decision-making abilities evaluated by the CAT-V would be affected unequally by the dementing process.

2. Methods

2.1. Subjects. The subjects included in the present study ($n = 38$) represent all the patients with mild-moderate dementia (Mini-Mental State Examination [7] (MMSE) ≥ 11) and a clinical diagnosis of probable AD (according to the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) and the Alzheimer Disease and Related Disorders Association (ADRDA) criteria) [8] who were admitted into the Alzheimer Centre of the Ospedale Gazzaniga (Bergamo, Italy) from sixty to thirty days before 2006 Italian general elections. Although, in some respects, our centre has several characteristics of a long-term care facility, no patient is a permanent resident. The primary requirement for a patient's admission into our centre is the presence of behavioural abnormalities or psychopathologic symptoms in the context of a dementing syndrome but, once these features are significantly relieved, the patient is discharged.

2.2. Assessment Tool and Scoring. The instrument we used to evaluate the capacity to vote was a modified version of the CAT-V, an instrument that measures a person's ability to understand the nature and effect of voting, make a choice, appreciate, and reason through a voting decision. These criteria were operationalized into five questions preceded by an introduction reminding each person that soon he/she would have the opportunity to take part in a ballot for the election of the Prime Minister. Thus, as opposed to the original US version of the CAT-V, in which subjects are asked to *imagine* that two candidates are running for Governor and that the day of the interview is the Election Day, the scenario we proposed was real rather than hypothetical. Furthermore, in order to shorten the time of interview, unlike the original, our version of the CAT-V did not include a question evaluating subjects' appreciation of the significance of voting. For each CAT-V item, the scores assigned to each person ranged from 2 (correct response reflecting adequate performance) to 0 (inadequate performance). The instrument and criteria for scoring are shown in the appendix.

Every participant was enrolled after an initial contact with his/her principal caregiver. Once informed about the characteristics of the study and made sure that its results would be used exclusively for research purposes, each participant (or his/her caregiver) provided a written informed consent. The study was approved by our local institutional review board.

2.3. Data Analyses. All of the 38 participants were interviewed and rated by one investigator (M. Sala), who was blinded to their MMSE score. Thirty of them were also interviewed and rated by another investigator (E. Chitò). Weighted kappa and Kendall tau-B were used to determine the interrater reliability. Twenty-nine subjects were again interviewed by M. Sala two weeks later, to evaluate the test-retest reliability. The scores included in the main data analysis are those assigned to all participants at baseline by M. Sala The Spearman correlation coefficient was used to examine the association of the capacity to vote (as expressed by the score on each of the CAT-V items) with severity of both cognitive impairment (as expressed by the MMSE score) and behavioural and psychopathological symptoms (as expressed by the Neuropsychiatric Inventory (NPI) [9] score). Each participant was administered the CAT-V, the MMSE, and the NPI during the same session.

Table 1: Demographics of the subjects ($n = 38$).

	Mean	Standard deviation	Range
Age (years)	81.1	5.1	68–93
Gender (M/F)	9/29	—	—
Education (years)	5.6	2.3	3–13
Disease duration (years)	3.3	1.6	1–8
MMSE score	18.2	4.2	11–27
NPI score at baseline	43.0	17.5	11–72
NPI score prior to discharge	21.2	11.7	0–50

MMSE, Mini-Mental State Examination, NPI, Neuropsychiatric Inventory.

Table 2: Subjects' score distribution on each item of the Competence Assessment Tool for Voting (CAT-V).

CAT-V item and score	*N*	%
Understanding the nature of voting		
0	7	18,4
1	10	26,3
2	21	55,3
Understanding the effect of voting		
0	18	47,4
1	6	15,8
2	14	36,8
Choice		
0	4	10,5
2	34	89,5
Comparative reasoning		
0	13	34,2
1	9	23,7
2	16	42,1
Generating consequences		
0	21	55,3
1	11	28,9
2	6	15,8

3. Results

3.1. Subjects' Characteristics. All the subjects who were asked to participate in the project ($n = 38$) did complete the interview. Their demographic characteristics are reported in Table 1. There was a clear female preponderance. Severity of cognitive impairment was, on average, relatively mild.

Table 3: Cross-tabulation relating scores on understanding and making a choice to scores on reasoning.

Score on questions assessing reasoning	Score on questions assessing understanding and choice		
	Number of subjects scoring 0–5	Number of subjects scoring 6	Total
Number of participants scoring 0–3	25	9	34
Number of participants scoring 4	1	3	4
Total	26	12	38

Table 4: Competence Assessment Tool for Voting (CAT-V) scoring criteria, interrater, and test-retest reliabilities.

		N	Cohen Kappa	Kendall tau-b	*P* value
Interrater reliability*	Understanding and choosing	30	0.65	0.7	0.0001
	Reasoning	30	0.41	0.65	0.0001
Test-retest reliability#	Understanding and choosing	29	0.42	0.65	0.0001
	Reasoning	29	0.22	0.57	0.0001

*Determined in the first 30 of the 38 patients enrolled in the study.
#Retest was administered only to patients not yet discharged from our center after two weeks (29/38).

Behavioural and psychopathological symptoms were moderately severe at baseline but were significantly relieved prior to discharge.

3.2. Performance on CAT-V. Subjects' performance on CAT-V is shown in Table 2. Over a half of the subjects appeared to fully understand the nature of the vote, but only approximately a third was entirely able to understand its effect. However, the great majority of participants (~90%) was deemed to be completely able to make a choice. Conversely, subjects' ability to reason about voting by comparing the choices at disposal and, above all, by evaluating the possible consequences of the preference for a candidate on their life was considerably more impaired. In fact, only about 16% of the participants had a completely adequate performance on the latter measure.

As shown in Table 3, which relates subjects' combined performance on understanding and choice to their performance on reasoning, only three of the 38 participants (8%) scored the maximum on all items. As emerges from Table 4, there were better test-retest and interrater reliabilities for scores on understanding and choice than for scores on reasoning.

3.3. Relation of CAT-V Performance to Severity of Dementia. There was no relation of CAT-V scores to severity of behavioural and psychopathological symptoms ($r = -0.14$, $P = 0.41$). Conversely, as expected, lower CAT-V scores were associated with lower MMSE scores (Figures 1, 2, and 3).

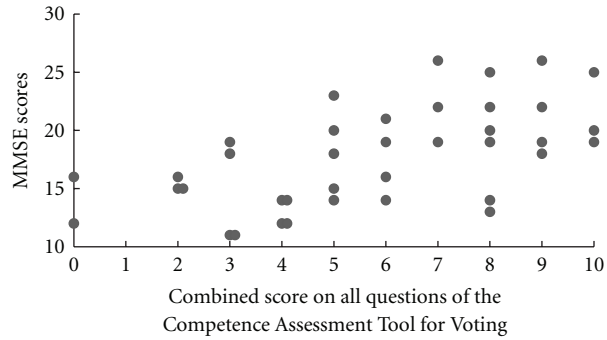

Figure 1: Relation of scores on the Mini-Mental Exam to combined scores on all questions of the Competence Assessment Tool for Voting ($r = 0.59$, $P < 0.0001$).

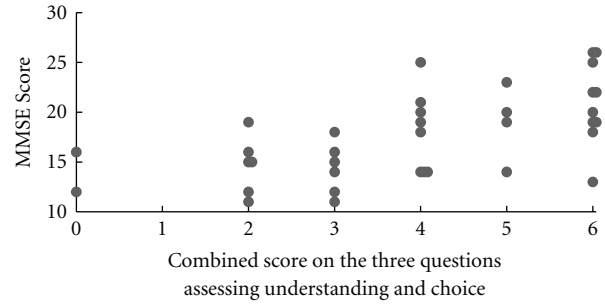

Figure 2: Relation of scores on the Mini-Mental State Exam to scores on questions assessing understanding and choice ($r = 0.61$, $P < 0.0001$).

However, a great variability in subjects' performance was noted at any stage of disease. On questions evaluating understanding and choice (Figure 2), for example, only 58% of subjects with mild AD (MMSE $\geq$ 20) obtained the maximum score but, remarkably, over one-third of those who scored the maximum was beyond mild-stage disease (MMSE < 20).

Lower CAT-V scores were also associated with fewer years of education but, as opposed to disease severity, poor education had an impact exclusively on measures of understanding and choice ($r = 0.32$, $P = 0.049$).

No relationship was found between education and MMSE scores ($r = 0.05$, $P = 0.76$).

4. Discussion

Among persons with mild to moderate AD, global measures of cognitive functioning, such as the MMSE, cannot adequately substitute for an assessment of voting capacity. The present study has examined the capacity to vote in a sample of 38 mild-moderate AD patients using a modified version of the CAT-V. Originally designed in the US, this instrument consists of a brief questionnaire, which has been translated and adapted to the Italian context and by which we have explored the following functional abilities: understanding the nature and effect of voting, expressing a choice, reasoning about the choices at disposal, and

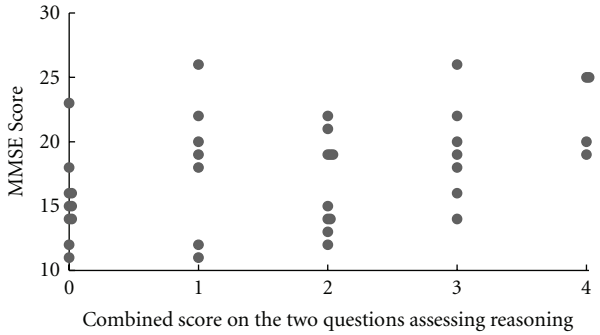

Figure 3: Relation of scores on the Mini-Mental State Exam to scores on questions assessing reasoning ($r = 0.41$, $P = 0.01$).

reasoning about the consequences of voting. We have also calculated the reliability of the test and its relation to dementia severity.

On the basis of our results, a full capacity to vote (as expressed by integrity of all above mentioned decision-making abilities) appears to be retained by a small minority of AD subjects (3/38), and exclusively at mild-stage disease (MMSE $\geq$ 20).

However, when we applied less restrictive criteria for determining voting competence, as those identified in the Doe standard (a legal standard based on a 2001 federal district court decision in Maine (US), which solely requires an intact ability to understand and make a choice) [10], subjects' voting capacity was not completely predicted by MMSE scores. On understanding and choice measures, in fact, only 58% of our less deteriorated subjects (MMSE $\geq$ 20) obtained the maximum score but, remarkably, over one-third of those who scored the maximum were beyond mild-stage disease (MMSE 13–19). As a result, the relation of these measures to severity of cognitive impairment was only moderate ($r = 0.61$).

Of note, over two-thirds of our AD patients, although still able to express a choice, did not appear to be entirely able to understand the nature and, especially, the effect of the vote, thereby failing to meet the Doe standard. A similar pattern (choice considerably less impaired than understanding) has previously been reported by US investigators [5]. In their study, however, the percentage of AD patients who failed to fulfil the Doe standard was lower than that seen in our study (55% versus 68%), and there was a much more substantial link between declining voting capacity and increasing dementia severity ($r = 0.87$ versus 0.61).

There are several possible reasons for the discrepancy between our results and those previously reported by the US investigators. For example, compared to these authors, we examined a sample characterized by more advanced age (81.1 versus 77.7 years), greater female preponderance (76% versus 52%), less severe impairment (mean MMSE 18.2 versus 16.4), and considerably lower education (5.6 versus 14 years). Furthermore, since we excluded patients with severe AD from analyses, the range of cognitive impairment was more compressed in our sample (MMSE 11–27) than in the US sample (MMSE 2–28). The exclusion of patients with severe AD may also explain the only low-moderate test-retest reliability values of our study (understanding and choice, $k = 0.42$; reasoning, $k = 0.22$), as well as the less satisfying agreement between our raters than between the raters of the US study (understanding and choice, $k = 0.65$ versus 0.91; reasoning, $k = 0.41$ versus 0.74). Subjects with severe AD have in fact a greater likelihood than those with mild-moderate disease to invariably provide completely inadequate performances, so as to be assigned the minimum score unambiguously and consistently over time.

Not requiring a particular expertise, the CAT-V is easily administrable, since no more than five minutes are needed for its administration. This time might further be shortened if one decides to skip the reasoning questions because, at least in our experience, these questions were too demanding even for mildly deteriorated patients and generated performances characterized by insufficient test-retest and inter-rater reliabilities. Interpreting subjects' performance remains, however, problematic even when analyses are restricted to the questions inherent in the Doe standard (understanding and choice). Clearly, performances at the extremes of the spectrum are not controversial, so that a performance generating the minimum score unequivocally indicates absence of voting capacity and, by contrast, a performance generating the maximum score indicates a full compliance with the Doe standard. However, intermediate scores need a judgement to be made, the basis of which is not obvious and deserves further comments. For example, in both the US and our study, almost all of the participants with intermediate scores appeared to be invariably capable to make a choice, while what varied was their ability to understand the nature and effect of voting. Consequently, if we had applied more liberal criteria than those identified in the Doe standard for determining voting competence and, for example, we had deemed a patient to retain the capacity to vote if he/she was able to express a choice regardless of understanding, the great majority of AD subjects (90% in our study and 88% in the US study) would have been categorized as such.

The limitations of this study relate to lack of data from nondemented persons, whose availability would have been extremely helpful in interpreting intermediate scores by the identification of appropriate cutoffs and of more detailed neuropsychological information than that provided by the MMSE. Other issues are the relatively small sample size, the relatively narrow range of cognitive impairment, and the presence of significant behavioural and psychopathological symptoms (although their severity did not appear to influence the performance of our patients on the CAT-V). Since this study was restricted to persons with mild-moderate disease, and most of them had significant behavioural disturbances, its results may be not entirely representative of all patients with AD. Despite these flaws, the primary hypothesis of the present study has been tested and verified. There was an inverse relationship between voting capacity and dementia severity but, somewhat unexpectedly, the strength of this association was not substantial. However, as predicted, the single decision-making abilities evaluated by the CAT-V were unequally impaired by the dementing

Table 5

What already known on this topic is
People with dementia are underrepresented at the polls. Many of them are denied the opportunity to vote even when retaining the mental capacity to do so.
Methods that address voting capacity of demented people, such as the Competence Assessment Tool for Voting (CAT-V), have been proposed and tested in the US, but never elsewhere.
Using the CAT-V in patients with Alzheimer Disease (AD), US investigators have shown a robust association between declining voting capacity and increasing dementia severity.
What this study adds
Using a modified version of the CAT-V, we found only a moderate association between declining voting capacity and increasing dementia severity in AD.
The capacity to express a choice is largely preserved even in moderate-stage AD.
Many patients with AD, although no longer capable of understanding the nature and importance of voting, are still able to express a choice. Their right to vote should therefore be respected.

process (reasoning > understanding > choice). On the basis of these data, the use of a structured interview, such as the CAT-V, may offer advantages over unstructured or clinical assessments, especially in light of the fact that global measures of cognitive functioning, such as the MMSE, do not appear to be strong predictors of the capacity to vote. Further studies are needed to refine the clinicians' approaches to identifying demented people who are still capable to vote from those who are no longer capable. Nevertheless, a tool like the CAT-V can adequately assist in this distinction (Table 5).

Appendix

Italian Version of the Competency Assessment Tool for Voting

"I will ask you a few questions about next elections. This it is going to take five minutes or less. If you do not understand something of what I am saying or asking, please let me know and I will repeat it. Some of the questions might seem very simple to you, but do not worry about that. We only need straightforward answers. Do you have any questions before we start?"

Understanding. "Next elections will take place within few weeks. Two candidates are running for Prime Minister (make the patient name the candidates or, if he/she does not remember, remind him/her of their names)."

Understanding the Nature of Voting. "What will you do to pick the Prime Minister on Election Day?"

(if patient gives an indirect answer, describing how he/she or people in general would choose between the candidates, for example watching TV, listening to their campaign issues, ask:

"Well, that is how you might decide who you like to be the Prime Minister. But how would actually express your choice?")

Score of 2: Entirely correct response, for example, "I will go to the polls and vote" or "I will cast my vote for one or the other", and so forth.

Score of 1: Ambiguous or partially correct response, for example, "That is why we have Election Day", and so forth.

Score of 0: Incorrect response, for example, "There is nothing you can do; the TV guys decide", and so forth.

Understanding the Effect of Voting. "Once the election for Prime Minister is over, how is it going to be decided who is the winner?"

Score of 2: Entirely correct response, for example, "The votes will be counted and the candidate with more votes will be the winner."

Score of 1: Ambiguous or partially correct response, for example, "The better between the two candidates will be the winner", and so forth.

Score of 0: Incorrect or irrelevant response.

Choice. Hand patient a card with the information in the following paragraph in large print; allow to retain and consult this card for the remainder of the interview.

"For the sake of simplicity, the first candidate (of the right party) is willing to lower taxes by decreasing the burden of bureaucracy and public administration, in order to make people spend more as a result of higher income. The second candidate (of the left party) is willing to either raise taxes or, by fighting tax elusion, keep them unchanged getting every citizen to pay, so that the rights to education and welfare remain protected. Based on either what I have just told you or what you already knew about the candidates, do you think you are able to choose between the two? Mind that I do not want to know from you which candidate you would vote for, but only if you have made your choice?"

Score of 2: The patient clearly indicates the choice, including a reasoned choice not to vote or a manifestation of indetermination ("I still do not know which candidate to vote for").

Score of 0: No choice is stated because the patient is unable to choose, does not understand what is asked, and so forth.

Reasoning

Comparative Reasoning. If the patient identifies a choice, ask: "Why do you think that it is worth voting for either of the candidates?" or "Why do you think neither of the candidates deserves to be voted for?"

Score of 2: Entirely correct response, for example, "Because it is right to maintain the welfare state", "Because it is right that everybody pays taxes", "Because the State should not empty the citizen's pockets with too high taxes", "Because, despite different views, neither of the candidates

will fulfill the promises made before Election Day", and so forth.

Score of 1: Ambiguous or partially correct response, for example, "Healthcare", "it is better to spend more than spend less", and so forth.

Score of 0: The patient fails to mention a comparative attribute of the respective candidates.

Reasoning on Consequences. If the patient is able to make his/her choice for either of the candidates or even in the case he/she wants to abstain from voting, ask: "In your opinion, should the first candidate, that one who wants to lower taxes by decreasing the burden of bureaucracy, or second candidate, that one who wants to maintain the welfare state by fighting against tax elusion, be elected, how could that affect your life?"

Score of 2: Entirely correct response, for example, "I will have more money to spend", "Public Services won't be reduced", "I cannot predict what will happen, because they won't do what they promised to do", and so forth.

Score of 1: Ambiguous or partially correct response, for example, "Health will improve", and so forth.

Score of 0: The patient does not give a consequence for his/her life or a reason for saying that there are no personally relevant consequences.

Authors' Contribution

All authors contributed to the design of the study. C. A. Defanti and L. Sacco identified the participants. M. Sala and E. Chitò did the individual interviews. S. Stefanini, L. Sacco, and C. Defanti administered the neuropsychological and neurobehavioural scales. All authors contributed to the analysis and interpretation of data. P. Tiraboschi drafted the article, and all authors revised it critically for important intellectual content. P. Tiraboschi is the guarantor.

Conflict of Interests

All authors have completed the Unified Competing Interest form (available on request from the corresponding author) and declare that P. Tiraboschi, E. Chitò, L. Sacco, M. Sala, S. Stefanini, C. A. Defanti, their spouses, partners, and children have not had any supports or relationships with companies that might have an interest in the submitted work. All authors also declare that they have no nonfinancial interest that may be relevant to the submitted work.

Ethical Approval

The study was approved by our local institutional review board. Each participant (or his/her caregiver) provided a written informed consent.

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