Published in final edited form as:

Gerontology. 1998 ; 44(5): 281–287. doi:10.1159/000022027.

Memory Awareness in Nursing Home Residents

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Abstract

Background: Health care providers often believe that individuals with cognitive disturbance are unaware of their deficits. The term unawareness was first used to describe hemiplegia following right hemisphere stroke but has since been applied to unawareness of any neurological or neuropsychological deficit. Clinicians usually rely on their subjective observations to evaluate the patient's awareness of deficits, and few investigators have systematically evaluated this important clinical phenomenon.

Objective: The aim of this study was to compare cognition, depression, health, and metamemory (capacity, change, locus, and strategy) in four groups of nursing home residents: the cognitively impaired (29%), depressed (18%), mixed with both cognitive impairment and depression (32%), and controls (21 %).

Methods: Subjects were 106 residents of six nursing homes between the ages of 79 and 87 with a mean age of 84.18 (SD = 10.01) years, and an average of six comorbid medical conditions. Cognitive function was measured with the Mini Mental State (MMSE); depression with the Geriatric Depression, and metamemory with the Meta-memory in Adulthood scales. Anyone scoring <15 on the MMSE was excluded. Subjects included 31 with cognitive impairment, 19 depressed, 34 mixed, and 22 controls.

Results: In this sample, 61% were cognitively impaired; however, only 12 had a diagnosis in their records indicating cognitive disturbance. Forty-three percent were depressed. The correlations between depression and capacity ($r = -0.38$), change ($r = -0.50$), and locus ($r = -0.25$) were significant. The controls were significantly younger than the cognitively impaired group. The controls also had higher perceived health status scores than either the cognitively impaired or the depressed group. However, the mixed group's perceived health status scores were significantly higher than the depressed group's scores.

Conclusion: The metamemory components of capacity and change were able to differentiate the cognitively impaired from the mixed group. Information on the etiology of cognitive impairment was not available since residents' charts in the six nursing homes provided inadequate documentation and incomplete diagnostic histories. Therefore, quantitative methods for examining memory awareness and the affective state of elderly patients is important for clinicians in order to make informed treatment decisions.

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Keywords

Anosognosia; Cognitive impairment; Depression; Metacognition; Metamemory; Nursing home

Introduction

The nursing home population in the US increased by 24.2% in the period from 1980 to 1990. In residents of nursing homes the incidence of mental disorders has been estimated to be 80% or higher [1]. Cognitive impairments, primarily the dementias, are the most prevalent, but major depressive disorders and depressive symptoms have been documented to be 13–48% in both American and European facilities [2, 3]. Cognition and depression, singly and in combination, predict older patients' ability to perform daily activities and participate in rehabilitation programs [4–6]. For example, among patients with traumatic brain injury and stroke the presence of depression has been shown to have a serious negative impact on cognitive function during rehabilitation [7, 8].

Health care providers often believe that individuals with cognitive disturbance are unaware of their deficits, a neuropsychological syndrome known as anosognosia for dementia. The term was first used by Babinski to describe unaw'areness of hemiplegia following right hemisphere stroke and it has since been applied to unawareness of any neurological or neuropsychological deficit [9]. However, there has been relatively little study of awareness of cognitive function in nursing home residents [10, 11]. Further, although the relationship of intellectual impairment to awareness of deficits is an important issue, this relationship has rarely been assessed systematically with instruments having reliable psychometric properties [12–14]. In fact, after a review of the literature Mullen et al. [15] concluded that there are no well-validated or even often used instruments for the assessment of insight in Alzheimer's disease. If insight, broadly defined as awareness of affect, health, or memory, is measured with instruments having known psychometric properties, then it can be examined objectively. But clinicians usually rely on their subjective observations, or on caregivers' assessments to evaluate the patient's awareness of deficits, and few investigators have developed quantitative methods for examining the presence or degree of awareness of disturbance [16–18].

Metacognition is the self-monitoring of one's cognitive processes when focused on a specific task or goal. To successfully execute memory processes, the individual must have knowledge and control over the processes. Research on metacognition thus emphasizes both knowledge about cognitive states and processes, and control or executive aspects of metacognition. Metamemory, a construct derived from metacognition, is closely related to memory[1] and is defined as: (a) factual knowledge about memory tasks and memory processes; (b) memory monitoring or awareness of how one typically uses memory as well as the current state of one's memory system; (c) memory beliefs or one's sense of mastery or ability to use memory effectively in memory-demanding situations, and (d) memory-related emotional states including anxiety, depression, and fatigue [19]. Memory knowledge can provide insight into how individuals view their own cognitive functioning, and

complaints about memory can be an early sign of dementia or of depression and may help to distinguish reversible and irreversible forms of dementia [20]

In dementia, metacognitive functioning has been conceptualized as executive dyscontrol, explaining the breakdown of self-monitoring, lack of goal selection, and inappropriate behavior [21,22]. Metacognitive functions were found to be unimpaired in amnesiacs even in the face of dramatic failures in short-term episodic memory, though patients w'ith Korsakoff s syndrome demonstrated global deficits similar to those seen in individuals with dementia; however, the Korsakoff s patients were able to organize information, follow rules and principles, and recall previously acquired knowledge from semantic memory, even though recent memory was impaired [23,24]. Investigations of metamemory in depression and amnesia resulting from Korsakoffs syndrome showed that the memory problems experienced in these syndromes are distinguishable with self-assessment techniques [25]. Finally, investigations of memory awareness in neurological patients with memory loss showed that they had awareness of their losses and reported their performance at a lower level than normal subjects; moreover, the agreement between their self-assessment and actual performance was greater after memory testing [26].

Cognitive impairment often coexists with depression, and depression has been found in patients with and without anosognosia [27–29]. Until recently these coexisting conditions were labeled pseudo dementia; however, current investigations are directed at determining whether depression is a prodromal state of dementia or whether individuals with depression are more vulnerable to dementia [30–32].

Individuals with depression may underestimate their memory ability, while individuals with dementia may overestimate their ability [33, 34]. In a study of cognitive complaints of elderly with depression or dementia, the demented subjects performed worse than controls on all cognitive measures, although the demented subjects rated their deficits less severe than the controls [35]. Depressed subjects, however, rated their deficits as more severe than controls. In a study of outpatients with dementia of various etiologies depression was not related to awareness, though awareness of one's deficits may lead to psychic anxiety, one of the individual items from the Hamilton Rating Scale of Depression [36].

When memory was tested in patients with dementia and depressive pseudodementia, the individuals with dementia gave many false recognition errors while the depressed patients missed the real stimuli, thus being more conservative in their responses [37]. When executive function was assessed by the Wisconsin card sorting test (WCST) in two groups of individuals classified into mild and moderate dementia by the Mini Mental State Exam (MMSE). Agnosognosia was significantly related to executive function, i.e. subjects' verbal fluency (ability to sort names of animals and words beginning with the letter M) and a graphic series (requiring alternation between open squares and open triangles). Behavioral abnormalities observed were also assessed separately [38]. This finding suggests that anosognosia is not related to cognitive impairment but with scores on tests of executive functions. A study of memory awareness in Alzheimer's disease operationalized awareness as everyday memory with the Rivermead Behavioral Memory Test, and the findings indicated that awareness of cognitive problems was preserved more often than awareness of

psychiatric and behavioral problems [39]. Awareness was assessed using the Metamemory in Adulthood Questionnaire (MIA) in 55 nursing home residents with cognitive impairment as indicated by MMSE scores between 15 and 22. In this sample, perceptions of decreased memory capacity and worsening memory ability were clearly related to depression [40]. The examination of metamemory may have implications for the remediation of memory deficits in the elderly since strategic and adaptive behaviors are often more amenable to change than are cognitive deficits such as dementia. What has not been clearly determined, however, is the differing relationships between depression and anosognosia in individuals with cognitive impairment, depression, and mixed conditions. Therefore, the study reported here examined cognition, depression, health, and metamemory in four groups of nursing home residents: the cognitively impaired, depressed, those with both cognitive impairment and depression, and controls.

Materials and Methods

Subjects

Subjects included 31 elderly with cognitive impairment (1 male and 30 female), 19 who were depressed (2 male and 17 female), 34 with mixed depression and cognitive impairment (8 male and 26 female), and 22 who had neither depression nor cognitive impairment (4 male and 18 female). Subjects were residents of six nursing homes in the greater Cleveland area.

Lists of individuals were received from the nursing staff. In order to avoid diagnostic ambiguity, level of cognitive impairment was determined with a screening instrument known to be reliable and valid. Cognitive function was assessed by trained registered nurse interviewers using the MMSE. This instrument contains 11 questions and scores may range from 0 to 30; scores of 23 or less indicate cognitive impairment. Usually a score between 18 and 22 indicates mild cognitive impairment and a score between 0 and 17 indicates severe cognitive impairment [41]. Individuals scoring <15 on the MMSE were excluded since the ability to report about memory is questionable below that score. Subjects were not excluded based on pre-existing medical or psychiatric diagnoses. However, diagnoses and prescription medications were recorded. All participants were able to hear questions and respond appropriately. Written informed consent was obtained from each resident. Since the subjects were considered a captive population, the staff were not notified of residents' participation. Subjects were interviewed in their rooms without distractions and other outside noises.

Rating Scales

The MMSE, which was used to screen potential subjects, contains three recall questions, scored 0–3, which are measures of memory performance and give some indication of recall ability [42]. The four-point score included in the analysis as a limited memory performance measure.

The Geriatric Depression Scale (GDS) is a 30-item yes/no questionnaire [43]. Depressive responses arc tallied, and the score indicates the presence of depression (0–10 = normal; 11–20 = mild depression; 21–30 = moderate or major depression). The GDS correlates highly

with other depression measures. The GDS has been successfully used with elderly residents of nursing homes with and without cognitive impairment [44]. The alpha reliability of the GDS in this study was 0.87.

The Health Scale, a subscale of the Multilevel Assessment Instrument, measures perceived health [45]. Subjects rate the quality of their health using a 4-point response format. Anchors are 'better' to 'not so good' and 'excellent' to 'poor'. Total scores on the 4-item tool range from 4 to 13, wdth higher scores indicating better health. The alpha reliability of the health scale in this study was 0.72.

Memory Tests

The Metamemory in Adulthood Questionnaire (MIA), a measure of the memory components of knowledge, beliefs, and affect, was used to assess memory awareness and knowledge [46]. The MIA consists of 108 statements, with responses rated on a 5-point Likert scale. Four of the seven subscales, measuring capacity, change, locus, and strategy, were utilized in this study because they are most relevant to nursing home residents. *Capacity* is the perception of memory capacities as measured by predictive report of performance on given tasks (+ = high capacity). *Change* is the perception of memory abilities as generally stable or subject to long-term decline (+ = stability). *Locus* is the individual's perceived personal control over remembering abilities (+ = internal locus). *Strategy* is knowledge of one's remembering abilities such that performance in given instances is potentially improved; it includes reported use of both internal and external strategies (+ = high use). In this study, Chronbach's alphas for the meta-memory scales were capacity 0.84, change 0.84, locus 0.69, and strategy; internal 0.75 and external 0.72.

Statistical Analyses

One-way analysis of variance, 2 factor (ANOVA) and Pearson correlation coefficients was used to compare the cognitively impaired, depressed, mixed, and control groups on various measures. Assumptions of homogeneity of variance were not violated in any analyses. Comparisons of group and task means was carried out using the Fisher PLSD post hoc test.

Results

Cognitive Function and Depression

The MMSE scores of the cognitively impaired were, as expected, significantly lower than those of either the depressed or control groups [$F(3,102) = 54.22$, $p < 0.0001$; table 1]. There was no significant difference between the cognitively impaired and the mixed groups' scores, or between the depressed and the control groups' MMSE scores. Also as expected, GDS scores indicated that the depressed group were significantly more depressed than the cognitively impaired and control groups: all subjects in that group were above the cutoff score of 11 for clinical depression [$F(3,102) = 69.66$, $p< 0.0001$; table 1]. There were no significant differences betwen the mixed group's depression scores and the depressed group's scores or between the cognitively impaired group's depression scores and the control group's scores. Subjects in the cognitively impaired group were older than all other groups but only significantly older than the control group. The depressed group were taking

more medications than other groups and significantly more medications than the cognitively impaired group [F(3,102)= 1.84, p< 0.05; table 1]. There were no differences between the groups in the number of diseases or years of education.

Perceived Health

The perceived health status score for the control group was significantly higher than for either the cognitively impaired group or the depressed group [F(3,102) = 6.49, p < 0.001; table 1]. The mixed group's score was significantly higher than the depressed group's score.

Memory and Metamemory

The mixed group's recall score on the MMSE was lower than that of the depressed group. The cognitively impaired group's recall score was significantly lower than the score of both the control and depressed groups [F(3,102) = 11.13, p < 0.0001; table 2]. The cognitively impaired group's score on memory capacity was significantly higher than the mixed group's score [F(3,102) = 2.93, p < 0.05; table 2], but there was no difference in memory capacity between the other groups. The mixed group's memory change score was significantly lower than the cognitively impaired group's score [F(93,102) = 5.05, p < 0.005; table 2]. There were no other group differences in memory change scores, and no group differences on the metamemory subscales of locus and strategy. Pearson correlations were significant ($p \leq 0.05$) between recall and change (r = 0.37) and recall and locus (r = 0.38).

Depression and Metamemory

When the entire sample was divided into depressed and non-depressed groups using a score of 11 or above on the GDS as the cutoff, ANOVA indicated significant differences between the depressed and non-depressed groups on the metamemory subscales of capacity, change, and locus. The depressed group scored significantly lower on memory capacity (3.00 vs. 3.27) [F(l, 104) = 5.37, p < 0.05] and on memory change (2.33 vs. 2.76) [F(1,104) = 13.38, p < 0.0005]. The depressed group also scored significantly [F(l, 104) = 4.45, p < 0.05] lower on memory locus (3.15 vs. 3.38). There were no differences between the groups on the use of strategies.

Discussion

Weaknesses of this study included a limited assessment of memory function, lack of information on the etiology of dementia, and lack of matching of groups. Even though recall was tested with three items from the MMSE, the scores did not provide wide variance in memory performance. Further, information on the etiology of cognitive impairment was not available since residents' charts in the six nursing homes provided inadequate documentation and incomplete diagnostic histories. Finally, the groups were not matched for age, and the cognitively impaired group was in fact substantially older than the controls.

Despite these limitations, this study provides interesting new evidence of the relationship of anosognosia to dementia and depression. All previous studies of awareness looked at discrepancy between subject and informant, usually the caregiver of the impaired older adult, as a measure of awareness. Recent findings, however, indicate that the caregiver

experiences anxiety and depression as the cognitive function of the care recipient worsens, and this raises questions about the accuracy of the informant [47].

Reliable and valid metamemory measures are one way to effectively operationalize awareness or insight in the elderly [13, 18, 25, 35, 38]. Metamemory may be specific enough to detect differences in various groups of affective and cognitive conditions. For example, one study of three groups of elderly: controls, memory complainers, and complainers worse than peers found a relationship between objective test performance and subjective complaint (awareness) among memory complainers [48]. Also, a recent study found that awareness of memory function was related to memory performance in non-depressed, non-demented community-dwelling older people [49]. The results of the current study lend further support to the accuracy of the responses of individuals with differing cognitive and affective states. Perhaps individuals know more or have greater awareness of their cognitive and affective states than others do. This study also provides confirming evidence that patients with depression underestimate their memory abilities while those with cognitive impairment tend to overestimate their abilities. A previous study reported that the symptom profiles of patients with minimal and mild dementia were significantly correlated and both were similar to the profiles of elderly with depression [29].

Of the four subscales of the metamemory questionnaire used in this study, the capacity and change subscales were able to clearly differentiate between the cognitively impaired group and the group with both impairment and depression, with the latter group indicating significantly less memory capacity and more memory change (or worsening of memory). The most remarkable finding was the robust inverse correlations seen between depression and the metamemory factors of capacity ($r = -0.38$), change ($r = -0.50$), and locus ($r = -0.25$). Less depression was associated with self-assessment of better memory capacity and less perceived loss of memory. Further, as depression increased, the locus score decreased indicating that individuals perceived themselves to be less in control of their memory. Thus, if depression were treated, memory capacity and stability might both improve. This important clinical finding has recently been supported by memory training studies in which older adults who were less depressed became more accurate in performance predictions over time than those who were more depressed [50, 51].

Of the six nursing homes participating in this study, none assessed or measured depression in residents, and the large percentage (43%) of individuals in the sample with depression ($\overline{X}$, SD = 4.5) was unexpected. In another nursing home study in the US, only 21% of the sample was depressed [52], though 68% of the individuals with progressive cognitive decline attending a memory disorder clinic were found to be depressed [24]. In a study of 220 geriatric medical patients, 30% scored above the cutoff score of 11 for depression [53]. In the Italian study reported by Rozzini et al. [3], 48% of the nursing home sample was depressed.

This sample had a mean age of 84.18 (SD = 10.01) years, and they had an average of six comorbid medical conditions and varying levels of recall ability and overall cognitive function. Previous investigations of depression in elderly adults have reported that individuals who were older and less verbally articulate acknowledged less distress [54].

In this study the mixed group reported significantly better health than the depressed group. There was also an inverse correlation, though not significant (r = −0.16), between depression and health status. It may be that individuals with greater impairment overestimate their abilities and health, while individuals with less impairment are more vulnerable to the demoralizing effects of depression. The only study to compare these findings to is that of Vasterling et al. [13]. In that study patients with Alzheimer's disease and their caregivers did not differ significantly in their ratings of patient health or depression. However, general health may be easier for patients to monitor and requires less higher-order processing than do memory awareness and knowledge.

Although 61 % of the residents in this study were cognitively impaired as measured by the MMSE, only 12 had a diagnosis in their records indicating a possible disturbance in cognitive function. Only one of the six facilities gave standardized cognitive tests such as the MMSE to residents, and as noted above, no facility assessed depression in residents. The recall scores of the cognitively impaired, mixed, and control groups in this study suggest that they had some awareness of their deficits. The significant Pearson corelations between recall and change (0.37) and recall and locus (0.38) provide further evidence that subjects had some insight into their memory performance. However, since there were few diagnoses of cognitive or mental status in residents' records, the staff did not know the residents' cognitive abilities or inabilities. Clinicians may want to use quantitative methods to examine not only metacognitive awareness but also the affective state of the elderly, to determine their capability to participate in activities which may enhance their everyday quality of life.

Acknowledgments

The statistical consultation of Richard Zeller, PhD, is acknowledged. The investigator also acknowledges the assistance of Jacqueline Balyer, MSN, Kevin Coulter, MSN, Satoshi Ide, MSN, Linda Langford, ND, Russel Leciejewski, MSN, and Kris Ann Loughman, MSN. A special thanks to the DONs and administration of Amasa Stone House, A.M. McGregor Home, Cuyahoga County Nursing Home, Margaret Wagner House, Royalview Manor, and Westbay Manor. This study was supported by a Biomedical Research Support Grant (NCNR-507 RR 05947–07).

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Table 1.

Mean (± SD) scores for age, education, GDS and MMSE, health, diagnoses, medications for cognitively impaired, depressed, mixed, and control groups

	Cognitive impaired	Depressed	Mixed	Controls
Age	87.5 ± 5.7[a]	84.4 ± 8.3	84.2 ± 10.6	79.2 ± 13.3
Education	11.5 ± 2.5	11.9 ± 3.0	10.7 ± 3.0	10.7 ± 2.5
Health	7.6 ± 2.0[d]	6.6 ± 1.9	8.3 ± 2.3[e]	9.5 ± 2.4[e]
Diagnoses	5.3 ± 2.4	6.5 ± 2.2	6.1 ± 3.8	5.9 ± 2.1
Medications	4.3 ± 3.0	6.4 ± 2.4[a]	5.0 ± 3.4	5.0 ± 3.6
MMSE	18.6 ± 3.l[b]	24.9 ± 1.8	18.8 ± 2.4[b]	25.7 ± 2.6[c]
GDS	6.0 ± 2.3	14.6 ± 4.1[c]	16.1 ± 4.9[c]	4.5 ± 2.5[b]

[a]Compared to controls, $p < 0.05$.

[b]Compared to depressed, $p < 0.0001$.

[c]Compared to cognitively impaired, $p < 0.0001$.

[d]Compared to controls, $p < 0.001$.

[e]Compared to depressed, $p < 0.001$.

Table 2.

Mean (±SD) scores recall, metamemory factors of capacity, change, locus, and strategy for cognitively impaired, depressed, mixed, and control groups

	Cognitive impaired	Depressed	Mixed	Controls
Memory test				
Recall	0.7 ± 0.6	1.9 ± 1.0[a]	1.1 ± 1.2[b]	2.2 ± 1.1[a]
Metamemory test				
Capacity	3.3 ± 0.6[c]	3.2 ± 0.6	2.9 ± 0.5	3.4 ± 0.7
Change	2.7 ± 0.4[d]	2.5 ± 0.6	2.3 ± 0.6	2.9 ± 0.9
Locus	3.2 ± 0.4	3.2 ± 0.5	3.2 ± 0.6	3.5 ± 0.7
Strategy	3.1 ± 0.6	3.2 ± 0.8	3.0 ± 0.6	3.1 ± 0.8

[a]Compared to cognitively impaired, $p < 0.0001$.

[b]Compared to depressed, $p < 0.0001$.

[c]Compared to mixed, $p < 0.05$.

[d]Compared to mixed, $p < 0.005$.