JAMDA xxx (2014) 1–5

JAMDA

journal homepage: www.jamda.com

Original Study

Cognitive Decline After Entering a Nursing Home: A 22-Year Follow-Up Study of Institutionalized and Noninstitutionalized Elderly People

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Keywords:
Cognitive decline
institutionalization
nursing home research

A B S T R A C T

Objective: The objective of this study is to compare cognitive decline of elderly people after entering an institution with that of elders living in the community with similar clinical conditions.
Design: The Personnes Agées QUID (PAQUID) cohort is a prospective population-based study which included, at baseline, 3777 community-dwelling people aged 65 years and older. Participants were followed-up for 22 years. Among those who were nondemented and living at home at baseline, 2 groups were compared: participants who entered a nursing home during study follow-up (n = 558) and those who remained living at home (n = 3117). Cognitive decline was assessed with Mini-Mental State Examination (MMSE), Benton visual retention test, and verbal fluency Isaacs Set Test.
Results: After controlling for numerous potential confounders, including baseline MMSE and instrumental activities of daily living scores, incident dementia, depressive symptoms, and chronic diseases, nursing home placement was significantly associated with a lower score on MMSE between the last visit before and after institutionalization (difference of 2.8 points, $P < .0001$) and greater further cognitive decline after institutionalization (difference of 0.7 point per year, $P < .0001$). Similar results were found for the Benton memory test. In a second series of analysis in which the persons who became demented over the study follow-up were excluded, the results remained unchanged.
Conclusions: The present study suggests that institutionalized elderly people present a greater cognitive decline than persons remaining in the community. The reasons of that decline remain unclear and may be related to physical and psychological effects of institutionalization in elderly people.

Changes in societal and family models generate new debates in scientific but also medical areas because of their broad implications in disease management. The debate about what to do with our elders is a part of this relevant discussion and a core part of health policies in developed countries. Each country has developed its own solutions for the needs of elderly people according to socioeconomic model and resources. All of them target the integral care of the elders who cannot live independently, almost always because of the need of special medical and nursing care. Indeed, several studies have shown that the major predictors of institutionalization are to be dependent in 3 or more basic activities of daily living (ADL) or to have cognitive impairment,[1–3] but also to lack economic resources or a family environment able to cope with the patient.

Residential care has considerably evolved these last decades.[4] Nowadays, nursing homes are comprehensive geriatric centers where innovative strategies to promote physical autonomy and cognitive stimulation, as well as internal social interactions among residents, families, and caregivers, are regularly implemented in an effort to make the residential life as comfortable and adequate as possible. The benefits are obvious for dependent elderly who cannot remain at home. However, for those who do not present cognitive impairment or major functional restrictions, negative consequences on cognitive functioning or quality of life can be expected due to the drastic and particularly abrupt change in psychosocial environment experienced when moving to a nursing home, which is known as "transfer trauma" or "relocation stress syndrome."[5,6]

The authors declare no conflicts of interest.

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1525-8610/$ - see front matter
http://dx.doi.org/10.1016/j.jamda.2014.02.006

Surprisingly, very few studies have objectively measured the potential effects of institutionalization on cognitive functioning. Among them, in a cross-sectional study, Winocur and Moscovitch[7] compared normal elders living in institutions and elders living in the community on a series of cognitive tests. They found that institutionalized people performed worse than their matched noninstitutionalized counterparts. The differences observed were not due to age, intelligence quotient level, health, or other controlled variables. It was suggested that cognitive function in the institutionalized elderly might be influenced by other factors and, possibly, by their capacities to adjust to the demands of institutional life.[8] The study by Scocco et al[9] conducted a case series of 100 patients who were recently admitted to a nursing home and compared several health outcomes just after admission and 6 months later. They showed that the clinical condition of the residents after 6 months, in particular the females, had significantly worsened with a decrease in Mini-Mental State Examination (MMSE) score,[10] ADL score, and quality of life. The mortality rate was 33%.

In another cohort study of 432 patients suffering from Alzheimer's disease, Wilson et al[11] showed that nursing home placement is associated with accelerated short-term cognitive decline. This finding could suggest than the transition from the community to a nursing home is cognitively deleterious especially for patients with Alzheimer's disease. Moreover, in an interesting review by Volkers and Scherder,[12] the authors found that cognitive performances worsened when people moved into an institution because of the environment.

As may be seen, little is known about how institutionalization induces cognitive changes in the elderly without apparent memory impairment when entering a nursing home. The purpose of this study is to compare cognitive decline in patients moving from a community to an institution with noninstitutionalized counterparts with comparable clinical conditions. The analysis was conducted in the Personnes Agées QUID (PAQUID) cohort, a prospective population-based study that followed participants for 22 years.

Methods

General Study Design

The data was gathered from the PAQUID cohort, a prospective population-based study; the methodology has been described elsewhere.[13] Briefly, the study has included at baseline 3777 community-dwelling people aged 65 and older, in 2 areas of the southwest of France. The study has received the approval of the Ethics Committee of the Bordeaux University Hospital, and all participants gave their written informed consent to participate in this study. Standard questionnaires and cognitive tests were administered by trained psychologists who interviewed participants at home at baseline visit and after 1, 3, 5, 8, 10, 13, 15, 17, 20, and 22 years. The information collected related to sociodemographic characteristics, functional status in instrumental activities of daily living (Lawton IADL scale),[14] depressive symptoms (Center for Epidemiologic Studies Depression [CES-D] scale),[15] subjective and objective physical health, and self-reported medication consumption and diseases. Three tests were used to evaluate cognitive status: MMSE[10] for global cognitive functioning, the multiple choice recognition form of the Benton Visual Retention Test (BVRT)[16] assessing visual memory (scores range from 0 to 15), and the Isaacs Set Test (IST)[17] assessing verbal fluency consisting in generating lists of words in 4 semantic categories (colors, animals, fruits, and cities) in a 15-second interval (scores range from 0 to 40). Participants who entered a nursing home remained in the study. They were visited and were administered questionnaires and cognitive tests. After the interview, the psychologists completed a standardized questionnaire designed to assign the Diagnostic and Statistical Manual of Mental Disorders-3rd edition-Revised criteria for dementia.[18] Individuals who met these criteria were seen by a neurologist or a geriatrician who confirmed or rejected the diagnosis. The diagnosis was reviewed by a panel of specialized neurologists who applied the following criteria for each etiological category: National Institute of Neurological and Communicative Disorders and Stroke and Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) criteria for Alzheimer's disease, National Institute of Neurological Disorders and Stroke and Association Internationale pour la Recherche et l'Enseignement en Neurosciences (NINDS-AIREN) criteria for vascular dementia, standardized clinical criteria for frontotemporal dementia, Lewy body disease, and a history of Parkinson's disease for Parkinson dementia.

Sample Selection

Participants who were demented at the baseline visit were excluded from the study. Among those who were nondemented (and living at home) at baseline, 2 groups were compared: participants who entered a nursing home during study follow-up and those who were living at home.

Statistical Analysis

The χ^2 and t tests were used for demographic and neuropsychological variables at baseline comparisons between the 2 groups. Linear mixed-effects regression models[19] were used to assess the effect of institutionalization on tests scores and further cognitive decline over the 22-year follow-up period. The mixed model procedure accounts for the correlations that are due to the repeated measurements of cognitive scores over time within the same subject. In our implementation of the mixed model, the intercept and the slope regression coefficient for the follow-up time (visit) were treated as random effects. Our model controlled the potentially confounding effects of the following variables: baseline MMSE score, age, sex, educational level, comorbidities (high blood pressure, diabetes, stroke, angor, dyspnea), dementia, depressive symptoms, and dependency in IADL. Institutionalization was taken as a time-dependent variable. The effect of institutionalization on cognitive functioning was measured by 2 components. One element describes the acute effect on tests scores between the last visit before and after the change point (ie, the time of institutionalization). It is modeled by an indicator variable that equals one for all follow-up observations after a participant was placed into a nursing home and zero otherwise. The other element designates the effect of nursing home placement on change in test scores. It is modeled by terms for time since placement for each follow-up observation after a participant was placed into a nursing home and zero otherwise. This procedure consisting in analyzing nursing home placement as a time-dependent variable allows reducing the bias of causality between cognitive decline and nursing home placement.

To ensure that the results could not be explained by different rates of dementia incidence in the group of institutionalized and noninstitutionalized participants, we computed a second analysis excluding all the participants who became demented over the study follow-up. This analysis relied on the same statistical model (ie, a linear mixed-effects regression model assessing the effect of nursing home placement analyzed as a time-dependent variable on test scores and cognitive decline controlling for baseline MMSE score, age, sex, educational level, comorbidities, depressive symptoms, and dependency in IADL). Statistical significance was set at $P = .05$. All analyses were conducted using PROC MIXED of SAS (v. 9.3) software (SAS Institute Inc., Cary, NC).