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ARTICLE

Lower mortality rate in people with dementia is associated with better cognitive and functional performance in an outpatient cohort

Melhor desempenho cognitivo e funcional está associado a menores taxas de mortalidade em pessoas com demência em acompanhamento ambulatorial

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ABSTRACT

We describe a three-year experience with patients with dementia. **Method:** clinical, cognitive and functional evaluation was performed by a multidisciplinary team for persons above 60 years. Mortality was assessed after three years. **Results:** Mini-Mental State Examination (MMSE) (n=2,074) was 15.7 (8.4). Male patients MMSE (n=758) was 15.6 (8.3) and female's (n=1315) was 15.8 (8.3). Instrumental Activities of Daily Living Scale (n=2023) was 16.5 (7.6); females (n=1277) was 16.9 (7.2) and males (n=745) was 15.7(8.2). From these patients, 12.6% (n=209) died within three years. Baseline cognition of patients still alive was higher ($p<0.001$) than MMSE of those who died [MMSE=16.3 (8.1) vs. 10.6 (7.6)]. Mortality rate decreased 6% (IR=0.94) for each additional point on MMSE. Higher functional status decreases the mortality rate approximately 11% (IR=0.89) independently of age, gender, and education. **Conclusion:** Three-year mortality rates are dependent on baseline functional and cognitive status

Keywords: Alzheimer's disease, activities of daily living, Mini-Mental State Examination, mortality, outpatient service, Brazil.

RESUMO

Descreve-se experiência de três anos em relação à mortalidade em pacientes diagnosticados com demência. **Método:** Foi feita avaliação clínica, cognitiva e funcional por equipe multidisciplinar em pessoas com mais de 60 anos. Mortalidade foi aferida no período de três anos. **Resultados:** O teste do Mini Exame do Estado Mental (MEEM) (n=2.074) foi 15,7 (8,4). MEEM dos homens (n=758) foi 15,6 (8,3) e das mulheres (n=1315) foi 15,8 (8,3). As atividades da vida diária (AVD) (n=2023) foi 16,5 (7,6); nas mulheres (n=1277) foi 16,9 (7,2) e nos homens (n=745), 15,7(8,2). Do total de pacientes, 12,6% (n=209) morreram em 3 anos. O estado cognitivo basal dos pacientes vivos ao final dos 3 anos era maior ($p<0.001$) que o daqueles que morreram [MEEM=16,3 (8,1) vs. 10,6 (7,6)]. Mortalidade decresceu 6% (IR=0,94) para cada ponto adicional no MEEM, ajustado para idade, gênero e educação. Mortalidade decresce em 11% (IR=0,89) independentemente da idade, gênero e educação para funcionalidade mais alta. **Conclusão:** A mortalidade em três anos depende do estado funcional e cognitivo basal.

Palavras-chave: doença de Alzheimer, atividades de vida diária, Mini Exame do Estado Mental, mortalidade, Brasil.

The latest Brazilian census has shown that people with more than 65 years of age account for 21,736,000 (11.3%) of the total population (IBGE, 2010)[1]. Data from 2000 show that despite being 9% of the total population at that time,

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older persons were responsible for as much as 26% of the expenditures with hospitalizations in the whole country[2]. The state of Rio de Janeiro concentrates the highest rate of older persons in the country, totaling 2,376,000 inhabitants (15%). However, to this date there is no direct study on the epidemiology of dementia, depression, and Parkinson's disease in Rio de Janeiro. If one is to calculate prevalence rates of these disorders considering the studies performed in the southern and southeastern regions of the country (most often in Sao Paulo)[3-6], the state of Rio de Janeiro should have now 166,320 older persons with dementia (7%).

Despite the increasing number of people with dementia and other psychiatric geriatric disorders, there is a dearth of services provided for this population, and the initiatives so far have not been organized so as to follow the guides of the national healthcare system (*Sistema Único de Saúde* – SUS). All over the country, few outpatient units mostly from the university[7-10], have trained specialists and have given assistance to older persons with dementia and other related disorders, whereas primary and tertiary care are still difficult to find.

Since 2005, the Center for Alzheimer's disease of the Institute of Psychiatry of the *Universidade Federal do Rio de Janeiro* has launched a training program for multidisciplinary teams focused on building reference centers for the care of older persons with dementia in the State of Rio de Janeiro. Altogether, seven such centers have been working each within their own municipality with a common protocol so as to improve recognition, diagnosis, and treatment of the patients as well as to improve the quality of life of the caregivers. Of these seven centers, we have gathered data from Campos dos Goytacazes as an example of what has been done so far. This description of the center and of its protocol will hopefully serve as a model for other centers to be formed in the near future. It is also the aim of this study to present data which will be further investigated in the next manuscripts.

The project aims at: 1) evaluating the progression of cognitive impairment and activities of daily living over three years of monitoring; 2) studying the mortality of patients; 3) identifying factors associated with mortality; 4) assessing the comorbidity of PD with dementia processes and depression. The present study will outline the methods and show the baseline description of the sample.

METHOD

This is a cohort study of an outpatient sample. Patients are routinely seen at the clinic for dementia of the SUS named *Centro de Doença de Alzheimer e Parkinson* (CDAP) at the municipality of Campos since 2007.

Participants

The Brazilian census showed the city of Campos has a population of 463,545 inhabitants. The population over 60 years of age consists of 51,761 (11.2%) people (IBGE, 2010)[1]. To date, there are 2,352 registered older persons as outpatients at the Center for Alzheimer's disease and Parkinson's disease (CDAP) from Campos dos Goytacazes. This is therefore a convenience sample, in which all patients admitted to the CDAP will have their data analyzed retrospectively, as all procedures have been following a routine service. All subjects treated in the CADP must comply with the following criteria. They have to be at least 60-years-old attested by some credible documentation; the patient who is not diagnosed with dementia is sent back to his original doctor when this is the case or is recommended to return to service after a year.

Instruments

At the first interview, all subjects are submitted to a sociodemographic questionnaire and to a clinical protocol which includes a cognitive evaluation using the Mini-Mental State Examination (MMSE) and the CAMCOG; a functional evaluation using the Activities of Daily Living Scale (ADL)[11], and the Instrumental Activities of Daily Living (IADL)[12] and the Tinetti Performace Oriented Mobility Assessment (POMA)[13]; also, the severity of dementia is assessed by the Clinical Dementia Rating[14]. Depression is diagnosed using the DSM IV[15] criteria.

The MMSE is a brief screening test for cognitive capabilities that evaluates orientation (spatial and time), attention, concentration, memory, calculation, language, and praxis. The score ranges from 0 to 30, with higher scores indicating better performance. The Brucki et al[16] Brazilian version was used for this study[16].

The CAMCOG is a structured interview for the diagnosis of neuropsychiatric disorders of the elderly which takes about 30 minutes to be applied. It is a test designed to detect cognitive deficits that comply with DSM-III R operational criteria. It consists of 60 items in 11 subscales. The cutoff score that discriminates normal from dementia cases in subjects with more than 5 years of education is 79-80. A Brazilian version was used for the present study[17].

Furthermore, to diagnose dementia and to rate its severity the patients were screened with the Brazilian validated versions of the Clinical Dementia Rating Scale (CDR)[14,18].

The patients were also submitted to a complete physical and neurological examination. Blood exams (including the red and white cell blood count, glucose, sodium, potassium, triglycerides, total and fractions cholesterol, creatinine, urea nitrogen, amylase, lipase, aspartate aminotransferase, alanine aminotransferase, gama-glutamyl transpeptidase, total and fractions proteins, bilirubins, uric acid, thyroid-stimulating hormone, free thyroxine level, vitamin B12, folic acid and

venereal disease research) and neuroimaging exams (either a computerized tomography or a magnetic resonance image) were also performed in every patient.

Statistical analysis

Average scores and standard deviations were calculated for MMSE, ADL and POMA by age group, educational level and different syndromes. Average scores for MMSE were also calculated and compared between those alive and dead after three years of follow-up. Poisson multivariate regression models were fitted to identify sociodemographic, and functional variables related to the mortality rate.

The project was approved by the Ethics Committee from Campos dos Goytacazes. As this is a cohort who is followed according to complete outpatient routine with no special interventions whatsoever, there were no informed consent forms to be signed by the patients and caregivers. All appropriate measures to insure patient's and caregiver's rights were taken care of.

RESULTS

At baseline, 2073 patients aged 60 years or more were examined [female=1335 (63.4%)]. The overall mean MMSE (n=2,073) was 15.7 (8.4). MMSE of male patients (n=758) was 15.6 (8.3) and of females (n=1315) was 15.8 (8.3). Overall IADL (n=2022) was 16.5 (7.6), whereas for females (n=1277) it was 16.9 (7.2) and for males (n=745) it was 15.7 (8.2). Table depicts the baseline results of cognitive and functional domains according to age, education, and syndrome.

Overall, 12.6% (n=209) have died within the following three years. At baseline, the cognitive status of patients still alive was significantly higher ($p<0.001$) than the MMSE of those who died [MMSE=16.3 (8.1) vs. 10.6 (7.6)]. The multivariate analysis for death (Poisson) showed that mortality rate decreased nearly 6% (IR=0.94) for each additional point to the total MMSE score. This result is controlled for age, gender, and education. In other words, the mortality rates increases about 6% (1/0.94) for each point lost in the total MMSE score. The analysis for functional status reveals that the mortality rate decreases approximately 11% (IR=0.89) independently of age, gender, and education. This means that for each point lost in the total ADL scale, mortality rate increases about 13% (1/0.89).

DISCUSSION

Dementia and depression are considered landmarks of the geriatric clinical practice. Brazil has do deal now with the urgent issue of the aging of the population. Public health policies have to be discussed and implemented as soon as possible, not only for the present situation but also as a plan for the future[20]. In Rio de Janeiro, there are some centers which are responsible for a multiprofessional support and care for dementia patients, although its number is still small in face of the magnitude of the problem. This is a first report which describes one such outpatient unit in the second most important city of the state. Overall, there is now coverage of the elderly population who is estimated to have dementia in Campos dos Goytacazes. We estimate 3,675 persons to

Table. Mini-Mental State Examination, Activities of Daily Living, and Tinneti Scale by age, education and syndrome of the sample.

	Mini Mental State Examination m mean (SD)	Activities of daily living mean (SD)	Tinetti scale
Age (n;%)			
60-64 (89;4.2)	20.1 (7.9)	21.3 (7.1)	N=24 21.3 (4.74)
65-69 (188;8.9)	19.3 (8.3)	19.9 (7.6)	N=62 22.4 (5.0)
70-74 (300;14.3)	18.3 (8.2)	18.4 (7.3)	N=67 21.5 (6.3)
75-79 (447;21.3)	16.6 (7.8)	17.1 (7.1)	N=99 18.7 (6.7)
80-84 (529;25.2)	15.3 (7.8)	15.9 (8.4)	N=99 20.2 (6.1)
85-89 (353;16.8)	13.0 (8.1)	14.1 (6.3)	N=46 17.3 (6.9)
>90 (196;9.3)	10.7 (7.5)	12.2 (5.3)	N=15 18.5 (5.3)
Education (years) (n;%)			
Illiterate (328;15.7)	10.6 (6.6)	13.3 (6.1)	N=38 17.1 (6.7)
1-4 (1,231;59.1)	15.6 (7.9)	16.4 (7.8)	N=245 19.6 (6.3)
5-8 (276;13.2)	19.1 (7.7)	18.6 (7.2)	N=71 21.3 (5.7)
>9 (249;12.0)	20.4 (9.1)	18.4 (7.4)	N=57 22.6 (5.5)
Syndromes			
None (39;3.7)	24.8 (5.6)	24.7 (5.0)	N=7 25 (3.5)
Mild cognitive Impairment (120;11.2)	21.9 (4.7)	22.5(5.5)	N=20 20.1 (6.0)
Dementia (685;63.3)	12.0 (7.4)	13.3 (5.8)	N=155 19.5 (6.3)
Parkinson (177;16.3)	20.8 (7.10)	18.1 (7.3)	N=42 18.6 (6.2)
Other (hydrocephalus etc) 51	19.0 (8.9)	20.5 (7.5)	N=16 22.2 (6.6)

be the total number of persons with dementia in Campos dos Goytacazes, if one is to follow the available information on prevalence in Brazil[3]. So, this sample in our service is now representative and may serve as a good example of how possible it is to provide simple and straightforward care for the elderly. This report also shows that there are many issues to be discussed in the future. Among them, we would like to underline the importance of assessing mortality rates and to relate them to cognitive, functional, and mobility status in a prospective study. The use of medication is also an issue to be taken into account to study the cost-effectiveness of the drugs and the overall treatments.

In this preliminary study, cognitive impairment and especially ADL impairment were positively correlated with the death risk. This is in accordance to several prospective studies which have confirmed that low educated patients who live alone or in long term institutions are most prone to have cognitive and ADL impairment leading to impending death[21]. Furthermore, patients with clinical diseases such as diabetes or hypertension tend to have more cognitive impairment than those without any disease, and also they have higher mortality rates[22-25].

Cognitive reserve is a concept which has been related to the protection against dementing disorders and to the delay of onset of many central nervous system disorders[26-31]. This is also what this baseline description seems to show, although further prospective studies are needed to confirm our data. As shown, each additional point on the baseline MMSE protects from mortality by 6%.

To the best of our knowledge, ours is the first study to look into this issue in Brazil and in Latin America. One of the problems with the present report is that we could not confirm the mortality data with official data banks. Future studies however, will try to obtain this permission so as to calculate survival curves related to cognitive and functional status. The protective effect of cognitive status upon mortality risk in our sample needs to be studied, and we hope to do this in the near future. To conclude, this is a description of a three-year experience of a reference service designed to assess and treat dementia and PD in older persons in the state of Rio de Janeiro. The methods and data hereby described are of interest for other municipalities which have the same problems nationwide.

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