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Cognitive screening for elderly people in long-term care institutions in the Miranda do Corvo municipality, Portugal

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Abstract *This study aimed to screen the cognitive profile elderly people living in long-term care institutions in the municipality of Miranda do Corvo by evaluating 174 participants with the Mini Mental State Examination (MMSE) (n=96) and the clinical dementia diagnosis (n=78). According to the MMSE, 41.7% of respondents had scores suggestive of cognitive impairment. The percentage rose to 67.8% (n=118) by adding the diagnosis of dementia reported in individual medical records to this result. The comparison of our results with those obtained nationwide showed that this proportion was significantly higher (p<0.001). The educational level was a predictive factor for MMSE scores (p=0.001). We can conclude that the high prevalence of suspected cognitive impairment and dementia revealed in our study should lead us to reflect on the quality of care provided and on the lack/scarcity of cognitive stimulation programs in long-term care institutions for seniors. Thus, it is imperative to implement regular cognitive assessment and to apply intervention programs for the preservation and improvement of the cognitive functioning of institutionalized elderly of deprived areas.*

Key words *Elderly, Institutionalization, Cognitive deficit, Cognitive screening.*

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Introduction

Observing the research produced since the end of the twentieth century, the critical discussion about aging has been fruitful. The growing interest in this subject was predicted by Philippe Ariès in 1983 when he affirmed that when the academic bulldozer started, an authentic library on aging would emerge[1]. This interest stems from the increased numerical expression of older people as a result of both declining birth rates and rising mean life expectancy. It should be noted that in Portugal, the elderly population in 1960 was 7.97%, while this proportion hiked to 19,03%[2] in the last census of 2011. More recently, the annual estimates of the resident population show that the percentage of the elderly population continues to increase, standing at 20,90%[3] in 2016.

The reflection on aging explores a process that is not unitary, but complex and experienced through biological, psychological and social changes, with an increased complexity with age. As a multidimensional and multidetermined process, aging is associated with the natural decline of physiological functions that influence individuals[4], from which frailty[5] and various physical diseases[6] stand out. It is also related to the need to address many losses (e.g., retirement, reduced personal social network), lower behavioral plasticity[7], fewer social interactions, increasing selectivity of social relationships and emotional behavior change[8,9].

A progressive degrading process, common to all living beings and not necessarily associated with the existence of disease, aging occurs differently with each subject. For this reason, gerontological research began at the end of the 20th century to spread the concept of successful aging, consisting of a combination of low probability of disease, maintenance of physical and cognitive functions, and commitment to productive activities, besides maintaining interpersonal relationships[10]. The multidimensionality of the successful aging concept emerges, relating it to the adaptation to the physiological (physical, cognitive and mental) functioning.

Social involvement, the support system, the presence of personal resources (resilience, coping and independence/autonomy), extrinsic factors (environment and finances) and well-being (affective state and satisfaction with life) are realms that are also reported to a greater or lesser degree on successful aging[11]. The analysis of age cohorts, assessed through neuropsychological tests, reveals differences in the performance, functional capacity and different cognitive realms. The neuropsychological assessment reports a declining working memory with age, while in the case of pathological aging, alterations in memory, language, and executive functioning[12-14] are evidenced.

Concerning mild cognitive impairment (potential precursor of dementia) and dementia syndrome, age is commonly considered a significant risk factor. In Portugal, it is estimated that 182,526 people live with dementia, accounting for 1.71% of the total population[15].

According to Buntinx, Lepeleire, Paquay, Iliffe, and Schoenmakers[16], dementia is a progressive disorder, insidious, presenting a very different initial clinical picture and may even mimic a depressive situation. However, about the predictive potential of depression in dementia, the authors do not show consensus[17,18]. The evolution of dementia brings about the progressive loss of functional capacity, and dependence is established.

In the face of these losses, the need for help and support from third parties becomes crucial. When the family network is unable to respond to these needs, due to several constraints, there is a need to resort to social responses addressed to this population. Integration in these social responses, more concretely in a Residential Structure for the Elderly, is a process that is neither simple nor easy, insofar as it implies the adaptation to a new setting with new organizational rituals and new roles[19,20]. For this reason, in addition to the difficulty in maintaining the social network integrity, different studies report that older people prefer to remain in their homes[21-26].

Although cognitive impairment is a factor that predicts institutionalization, many social institutions are not structured for this reality either at the organizational or human resources level[23], since they adopt an organizational model that is conducive to overprotection, not stimulating physical and cognitive performance[20]. The legislation that defines the conditions to which these residential structures must comply (Ordinance No. 67/2012 of March 21) defines a restricted technical team. This legislation, besides a technical director, requires only a sociocultural entertainer, a *part-time* geriatrics social or technical educator for every 40 residents and one nurse for every 40 residents (our emphasis).

The investigation established in this area refers to the adverse effects of overprotection and lack of control on the part of the residents, which reinforces dependent behaviors, without this

Ciência & Saúde Coletiva, 24(11):4355-4366, 2019

meaning the resident's lack of true competence[27]. The lack of control[28] and cognitive stimulation may act as accelerators of cognitive decline[29], besides the characteristics of this generational cohort. Therefore, it seems to us essential to carry out an objective assessment of cognitive functions in residential structures for the elderly and perform this evaluation as early as possible. In addition to cognitive assessment, a multidimensional assessment should be activated so that suspected dementia is progressively confirmed[30-32] and its consequences (e.g., changes in functionality) are adequately monitored[33]. It should be noted, however, that there are several mental state assessment tools, but no gold standard instruments for diagnosis[34]. We should stress that variables such as age and schooling interfere with performance in neuropsychological tests[35].

This study aimed to: (1) identify the cognitive profile of people living in Residential Structures for the Elderly in Miranda do Corvo, using the Mini Mental State Examination (MMSE) as a tool; (2) study the impact of age and schooling on cognitive status; (3) determine the prevalence of cognitive impairment (MMSE) and diagnosis of dementia (patient charts); and (4) compare prevalence values with a representative sample of the Portuguese population.

Methods

This cross-sectional study included the social response "Residential Structures for the Elderly" (ERPIs) of the Municipality of Miranda do Corvo, and was approved by the Research and Development Department of the Miguel Torga Higher Institute. The information on the ERPIs of the Municipality was made using the database of the Portuguese Social Charter[36]. This municipality was selected due to its geographical proximity to researchers and has a surface area of approximately 126.4 km², distributed across four boroughs considered less-favored mountain areas according to Ordinance No. 22/2015 of February 5. Contact with the ERPIs started with a letter mailed in the post with the detailed description of the study. The ERPIs that accepted to integrate this study obeyed to the required by law at the level of technical teams, the conditions of operation and installation.

The only selection criterion was age – equal to or greater than 65 years. This condition returned 174 people, of which only 96 people were interviewed because the remaining 78 people had a diagnosis of dementia recorded in their patient's medical records and were in no condition to be evaluated, namely suffering from loss of spoken language, difficulties in understanding the language and motor difficulties. Thus, the sociodemographic information of these 78 people was also collected in the respective patient records.

After signing an informed consent form by the elderly themselves or their caregivers/relatives, a team of psychologists trained in the "Aging Path" project applied a brief sociodemographic and clinical questionnaire and the MMSE for three months in the Municipality of Miranda do Corvo.

The patient's medical records in the ERPIs, where data were collected, include sociodemographic, family, social situation and health status information, from which gender, age, marital status, schooling and the diagnosis of dementia were extracted.

The sociodemographic and clinical questionnaire included questions about gender (coded as female and male), age (categorized into two age groups: [65-75 [and ≥75 years]); marital status (coded as single, married, separated or divorced and widowed), schooling [no schooling, schooling below 4th grade 4; 4th grade (1st year of primary education); 5th-6th year (2nd cycle of primary education); 7th-9th grade (3rd cycle of primary education); 12th year (secondary education); secondary education and higher education].

The MMSE is an instrument that allows to evaluate the cognitive functions and to track the cognitive impairment. It was developed in 1975 by Folstein et al.[37] and is one of the most widely used and studied instruments[38,39]. It is a simple test with quick application (5-15 minutes), allowing to evaluate *orientation* (time and space); *short-term memory* (retention and recall); *attention and calculation* (serial subtraction); *language* (name objects, repeat sentence, fulfill three commands, read-follow a command and write a sentence); and visuoconstructive ability (copying two intersected pentagons). The final rating can range from 0 to 30 points. While this tool has some useful resources for clinical practice, according to Guerreiro[40], it does not support the responsibility of a formal diagnosis. Nevertheless, through the MMSE, it is possible to determine the presence of cognitive impairment through its cutoff points.

The cutoff points of this tool are differentiated by level of schooling of the subjects[41]. In this regard, cognitive impairment is considered when the score is equal to or lower than 15 points, in

the case of illiterates; 22 points in individuals with eleven years or fewer years of schooling; and 27 points for those with schooling higher than eleven years[41]. However, it should be noted that the MMSE has limitations, including the possibility that age, schooling, and health may influence cognitive performance in the test[42]. Therefore, we can say that its precision will depend on possible adjustments of cutoff points, especially for the educational level, because the use of a cutoff point can lead to false positives among patients with low schooling levels, as well as false negative results among those with a high educational level[37].

Thus, our outcome variable – cognitive status – was defined based on the cutoff points defined for the Portuguese population of the MMSE and based on the medical information collected from the patients' medical records.

Preliminarily, the Cronbach alpha coefficient was determined for the study of MMSE accuracy. Regarding the univariate description of the variables, we used frequency analysis, measures of central tendency and dispersion. The chi-square adjustment test was used to verify whether the distribution of observed frequencies of the data fit a predetermined theoretical model, in this case, the population of Portugal and the Study on the Profile of the Aging of the Portuguese Population. We used the Yates continuity chi-square test to explore the relationship between two categorical variables. We used a linear regression analysis to assess whether age and schooling predicted the scores determined by the MMSE. A significance level of 5% was defined for the study.

Results

Data on sociodemographic characterization were collected through the consultation of patients' medical records and the questionnaire created for this purpose.

Thus, we found that most were female (79.3%), and the chi-square fit test indicated that their proportion was significantly different from that found in the population of Miranda do Corvo aged 65 or over[43] (women: $n_{amostral}$ = 138 and $N_{populacional}$ = 1,672 vs. men: $n_{amostral}$ = 36 and $N_{populacional}$ = 1,148; χ^2 = 28.89, gl = 1, $p < 0.001$). Concerning age, there was an average of 84.22 (SD = 7.58), with most people aged 75 or over (86.80%). Likewise, the age proportion was significantly different from the elderly population of Miranda do Corvo[43] (65-74 years: $n_{amostral}$ = 20 and $N_{populacional}$ = 1,424; ≥ 75 years: $n_{amostral}$ = 151 and $N_{populacional}$ = 1,396; > 65 years, but with no specification of age: n = 3; χ^2 = 102.98, gl = 1, $p < 0.001$).

Regarding marital status, most people were "widowed" (51.7%), which is higher when compared to the elderly population of Miranda do Corvo[43] (single: $n_{amostral}$ = 16 and $N_{populacional}$ = 149; married: $n_{amostral}$ = 47 and $N_{populacional}$ = 1,698; divorced: $n_{amostral}$ = 8 and $N_{populacional}$ = 89; widowed: $n_{amostral}$ = 90 and $N_{populacional}$ = 884; No information: $n_{amostral}$ = 13; χ^2 = 64.97, gl = 3, $p < 0.001$). Finally, concerning schooling, the category "illiterate" (44.8%) predominated. We had to merge categories to compare the categories with those presented at the National Institute of Statistics regarding the elderly population of Miranda do Corvo[43]. Thus, the proportion in the different categories was significantly different (no schooling [includes illiterate and schooling below 4th grade – no diploma]): $n_{amostral}$ = 110 and $N_{populacional}$ = 1,048; With full schooling level: $n_{amostral}$ = 51 and $N_{populacional}$ = 1,772; No information: $n_{amostral}$ = 13; χ^2 = 66.94, gl = 1; $p < 0.001$).

In the MMSE reliability study, internal consistency using the Cronbach's alpha coefficient (α = 0.73) indicated acceptable reliability according to Peterson[44] for instruments administered in the hetero-administration mode.

Regarding the first objective, we observed in Table 1 the scores obtained in the six aptitudes evaluated by the MMSE. The skills with the greatest number of hits were Retention and Language (94% and 80%, respectively). In Language, the item "Naming the Clock object" was answered by all respondents. The ability with fewer hits was the visuoconstructive ability (21%) and the recall of the word "ball", with 34% hits.

We performed a linear regression to determine whether age and schooling had an impact on the MMSE score. As can be seen in Table 2, the only predictor of MMSE scores was the schooling variable that showed a statistically significant contribution to the model (p = 0.001).

When we dichotomized the MMSE scores in the "presence" or "lack of impairment" categories, and when we combined the data obtained with the diagnosis of dementia extracted from the patient's medical records, we observed that the proportion of people with scores suggestive of cognitive impairment was higher in all levels of qualifications (Table 3). Therefore, there was no association between qualifications and the presence/lack of cognitive impairment [χ2 (1,161) = 5,147; p = 0.076].

Ciência & Saúde Coletiva, 24(11):4355-4366, 2019

In Table 4, we observed a high prevalence of people with scores suggestive of cognitive impairment, considering the total number of people residing in these institutions (67.8%).

The proportion of people with scores suggestive of cognitive impairment was significantly higher in Miranda do Corvo's social responses than in the 2010 Portuguese Population Aging Profile Study[45] for both age cohorts (Table 5).

Discussion and conclusion

The primary objective of this study was to identify the cognitive profile of a population residing in the social response "Residential Structure for the Elderly" in the Municipality of Miranda do Corvo. The data collected through the MMSE were analyzed by item and size and for the total scale. Thus, of the six aptitudes assessed by the MMSE,

Table 1. Mean scores and percentage of scores on responses to Mini-Mental State Examination (MMSE) items (n=96).

MMSE		% correct answers/ actions	M (SD)*
Orientation (maximum - 10 points)		14.6	0.72 (0.23)
What year are we?		39.6	0.40 (0.49)
What month are we?		75.0	0.75 (0.44)
What day of the month are we?		31.3	0.31 (0.47)
What day of the week are we?		81.3	0.81 (0.39)
What season of the year are we?		77.1	0.77 (0.42)
In what country are we?		93.8	0.94 (0.24)
In what district do you live?		81.3	0.81 (0.39)
In what land do you live?		91.7	0.92 (0.28)
In what home are we?		86.5	0.86 (0.34)
In what floor are we?		61.5	0.61 (0.49)
Retention - Word repetition (maximum - 3 points)		84.4	0.94 (0.15)
Pear		94.8	0.95 (0.22)
Cat		93.8	0.94 (0.24)
Ball		93.8	0.94 (0.24)
Attention and calculation – Sequential subtraction (maximum - 5 points)		30.2	0.46 (0.43)
Recall – Words recall (maximum - 3 points)		21.9	0.48 (0.37)
Pear		56.3	0.56 (0.50)
Cat		52.1	0.52 (0.50)
Ball		34.4	0.34 (0.48)
Language (maximum - 8 points)		14.6	0.80(0.14)
Name objects	Watch	100.0	1.00 (0.00)
	Pencil	96.9	0.97 (0.18)
Repeat sentence 'o rato roeu a rolha'		68.8	0.69 (0.47)
Obey three commands	Grab with the right hand	80.2	0.80 (0.40)
	Fold in half	92.7	0.93 (0.26)
	Put in the right place	80.2	0.80 (0.40)
Read and perform an instruction 'close your eyes'		81.3	0;81 (0.39)
Write a meaningful sentence, with subject and verb		38.5	0.39 (0.49)
Constructive Ability (maximum - 1 point)		20.8	0.21 (0.41)
Draw two partially overlapping pentagons			

* Weighted average = Dividing the score obtained through the sum of the items that underpin the realm by the number of items in the realm. This strategy allows comparing results of realms with a different number of items.

the two aptitudes with the highest means were Retention and Language. The means obtained in each of these MMSE items were 0.94 (SD = 0.15) with 94% hits for Retention, and 0.80 (SD = 0.14) with 80% hits for Language. Regarding Retention, what can contribute to a possible explanation of these hits is the fact that, in the evaluation of this aptitude, only three words intervene and are repeated in a next sequence to the presentation of the test administrator. Thus, Spar and La Rue[46], when arguing on the poor classification of the Alzheimer's patients in the delayed recall, affirm that, for some older adults, the recall of a few words (one to three) can be within the normal limits. We should remember that Parente, Saboskink, Ferreira, and Nespoulous[47] affirm that phonological and syntactic productions are preserved with age. Studies that evidence differences indicate that there are cognitive changes with aging regarding specific language aspects (e.g., propositional and syntactic complexity in language production and content and rhythm in verbal fluency)[48,49], but the core aspects are robust to brain aging (e.g., speech comprehension and syntactic processing)[50,51]. Again, concerning Language, the worst-performing item was "Write a

Table 2. Linear regression predicting Mini-Mental State Examination scores.

		Coeficientes[a]				
Model		Non-standardized coefficients		Standardized coefficients	t	p
		B	Standard Error	Beta		
1	(Constant)	25.980	5.226		4.971	0.000
	Age	-0.098	0.060	-0.159	-1.626	0.107
	Schooling	1.158	0.347	0.326	3.342	0.001

[a] *Dependent Variable: Mini-Mental State Examination crude scores.*

Table 3. Frequencies and percentages of elderly people without and with scores suggestive of cognitive impairment (established from the Mini-Mental State Examination and the diagnosis of dementia extracted from the patient's records) according to schooling (N=161) [a].

	With cognitive impairment n (%)	Without cognitive impairment n (%)	Total	χ^2
Illiteracy	50 (64.1)	28 (35.9)	78 (100)	5.15[ns]
1-11 years of schooling	46 (62.2)	28 (37.8)	74 (100)	
Over 11 years of schooling	9 (100)	0 (0.0)	9 (100)	
Total	105 (65.2)	56 (34.8)	161 (100)	

χ^2 = Pearson chi-square.
ns = not significant.
a The process did not include information regarding the schooling level of thirteen people.

Table 4. Frequencies and percentages of elderly people without and with scores suggestive of cognitive impairments established from the Mini-Mental State Examination (MMSE) and the diagnosis of dementia extracted from patients' medical records (N = 174).

	MMSE	Patient's medical records	MMSE + Patient's medical records
	n (%)	n (%)	N (%)
With cognitive impairment	40 (41.7)	78 (100)	118 (67.8)
Without cognitive impairment	56 (58.3)	0 (0)	56 (32.2)
Total	96 (100)	78 (100)	174 (100)

Table 5. Comparison of our results with those obtained by the study of the profile of the aging Portuguese population – 2010 for the two age cohorts (N = 174).

		Miranda do Corvo ERPIs N (%)	Population profile33 N (%)	χ^2
[65-74]	With cognitive impairment	12 (60.0)	32 (3.6)	124.77***
	Without cognitive impairment	8 (40.0)	868 (96.4)	
	Total	20 (100)	900 (100)	
≥ 75	With cognitive impairment	103 (68.2)	74 (12.0)	213.01***
	Without cognitive impairment	48 (31.8)	545 (88.0)	
	Total	151 (100)	619 (100)	
Total	With cognitive impairment	115 (60.3)	106 (7.0)	491.22***
	Without cognitive impairment	56 (39.7)	1,413 (93.0)	
	Total	171 (100)	1519 (100)	

χ^2 = Fisher's chi-square *** $p < 0.001$.

sentence", with only 39% hits. The performance can be explained, from our point of view, the schooling of the generational cohort surveyed.

On the other hand, in the Orientation realm, the mean score was 0.72 (SD=0.23), and the fact that Time Orientation is a marker that is not dependent on educational level contributed to this score. A close examination of cognitive aptitude Time Orientation showed differences in scores when compared to Space Orientation. At this point, it is important to note that the affectation of Time Orientation may be less dependent on the educational level, setting itself as an early marker of cognitive issues[52]. It is also important to remember that the Time Orientation component tends to be affected in Alzheimer's dementia (when compared to frontotemporal dementia and healthy aging) and tends to be more affected than Spatial Orientation patients with Alzheimer's and frontotemporal dementias when compared to the elderly without dementia[53].

Cognitive aptitude Attention and Calculation appeared in the fourth spot, with 46% of hits, while aptitude Recall appeared in penultimate position (5th spot), with 48% of hits. A recurring fact in research in this aptitude is that low educational levels, such as those of our respondents, interfere in the performance of these items[54,55]. It should also be noted that this task is not the one that best discriminates between normal aging, deficit, and dementia[40].

Concerning Recall, Ardila et al.[56] affirm that illiterate people need more repetition of words to memorize them. Likewise, according to Spar and La Rue[47], Alzheimer's patients will have worse scores, especially in delayed recall. Supporting our results, Simning, Conwell and van Wijngaarden[57] found a similar percentage (50.3%) in the recall of three items in the Mini-Cog test in institutionalized older adults.

According to the analysis by Yew et al.[53], older adults without dementia always reveal some loss in the Recall task in a test similar to MMSE (Addenbrooke's Cognitive Examination). The visuoconstructive skill had the lowest score among the six skills assessed, with a mean score of 0.21 (SD = 0.41), that is, with only 21% of hits, and this low performance derives from the fact that the act of writing/drawing implies fine motor movements, acquired aptitude during the literacy process. Thus, it is understandable that illiterates, whose rate is high in our sample, face significant difficulties in performing tasks with complex movements[56]. Also, Simning et al.[57] also found high values of visuoconstructive incapacity (clock-drawing test) in institutionalized individuals. Worth noting is the fact that this task is among the poorest identifiers of healthy aging, deficit, and dementia[40].

Concerning the second objective, the results of this study show that the only factor predicting the MMSE score was schooling. These results are in line with those found by Santana et al[58] where a significant positive correlation was found between MMSE and schooling ($r = 0.24$, $p = 0.01$). However, if we analyze the association between the variable with "cognitive / no cognitive impairment" and schooling, we can observe that people with over 11 years of schooling years have cognitive impairment. The dichotomization of the MMSE scores will explain the apparent contradiction between the results obtained in linear

regression and the chi-square independence test. People with higher schooling levels tend to have higher MMSE scores when compared to their lower education counterparts. However, while these scores are higher, they suggest a higher cognitive impairment for the cutoff point with higher schooling. Additionally, the association between cognitive impairment and high schooling may be explained by the mediation of other variables, namely the economic resources, which may interfere with institutionalization, postponing it. Thus, we envisaged that, in the case of older adults with a high educational level, the relatives activate this type of social response especially when these elderly have dementia or relevant cognitive impairment.

Regarding age, although this variable did not have a statistically significant impact on the MMSE scores, it was found that the percentage of cognitive impairment is higher at the more advanced ages. Thus, this is a result partially supported by studies of this area[57,58] that find significant associations. However, the non-impact of age on the cognitive state can be explained, as in schooling, by the mediation of other variables, namely economic resources and comorbidities[5,6] that impact on institutionalization.

Regarding the third objective, the results obtained through the administration of the MMSE allow verifying that, among the interviewed, forty seniors show results suggestive of cognitive impairment (41.7%). If we add to these the remaining patients with a diagnosis of dementia reported in the patients' medical records, this figure rises to one hundred and eighteen people, that is, 67.8% of the people living in this type of social response have scores suggestive of cognitive impairment. However, the prevalence obtained by us is much higher than that of the study by Simming et al.[57], who found a prevalence of 27.6% and 27.1% for cognitive impairments. It should be noted, however, that in the study by Simming et al.[57], 53.2% of the participants had over 12 years of schooling (no reference is made to illiteracy), while in our respondents only 5.1% had this level of education, which reinforces the idea already present in previous analyses of the importance of schooling in neuropsychological tests.

In response to the fourth objective, it was found that the expressiveness of the people in this situation stands at 67.8%, well above that indicated in the Study on the Profile of the Aging of the Portuguese Population of 2010[45]. Although the score obtained with the MMSE taking into account the schooling of the respondents, the results of this study can be enhanced by the conjugation of illiteracy with specific personological features (e.g., some studies highlight the impact of the neuroticism personality trait on cognitive impairment[59] and with socioeconomic conditions experienced in the course of life[60]).

However, the trend is clear for the presence of cognitive impairment in the elderly in this type of social response. This reality poses new societal and organizational challenges in the care of the elderly. With the advent of modernity, the support network for the elderly with impairments assumes increasingly institutionalized practices due to the difficulties of reconciling families – the management of people's time and daily activities seems irreconcilable with this type of care – and due to the increased demands that the impairment implies vis-à-vis knowledge and cognitive stimulation and revitalization tools of the elderly. In agreement with other studies[61], the results seem to indicate that the cognitive functioning of the elderly may be a good predictor of institutionalization. Another explanation for this prevalence is that institutionalization may be a facilitating medium for the development of cognitive impairment. Because of the cross-sectional, non-experimental nature of the study, we could not establish causality. There is no evidence of the presence of prior cognitive impairment that led to institutionalization, such as Pasquini et al.[61], Luppa et al.[23] and Tuokko et al.[62] have shown, or whether the cognitive impairment appeared during institutionalization[29].

As mentioned in the introductory part of this paper, the organizational features of the institutional settings do not stimulate the cognitive skills of its users, an opinion also endorsed by Paúl[63]. However, these results should be reflected in the light of some limitations detected. Thus, when we reported that 78 elderly people had dementia diagnoses in patients' medical records, these data do not refer, in the vast majority of cases, to the way the diagnoses are performed, the nature of the diagnosed conditions (e.g., course, development, comorbidity), the criteria used in the diagnoses (e.g., Diagnostic and Statistical Manual of Mental Disorders Criteria), or other complementary (e.g., imaging or neuropsychological) information.

Following these results, and despite the above limitations, it is essential to reflect on the adequacy of care provided in this type of social response, especially on the absence/scarcity of programs that stimulate cognitive functions. It is, therefore,

Ciência & Saúde Coletiva, 24(11):4355-4366, 2019

crucial to change procedures in daily activities, implementing programs that aim at optimizing the cognitive performance of institutionalized individuals[64]. We could thus delay the worsening of dementia signs or degenerative diseases while providing a better quality of life for people residing in these institutionalized contexts.

Collaborations

F Daniel developed the research project, took part on the literature review, design of the data analysis methodology, article structure and writing of the final version. V Fernandes took part on the literature review and collected the data. A Silva took part on the data analysis. H Espírito-Santo took part on the literature review and writing of the final version.

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