



## Screening of Cognitive Impairment: Undiagnosed or Over Diagnosis in a Vulnerable Population

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### Abstract

The goals of our project is to act on effective dementia interventions with a focus on vulnerable populations. In 2016 the Hospital El Cruce launched a specialist medical service for elderly patients free of charge in F. Varela, one of the poorest areas of the Province of Buenos Aires with a population of over two million people. Our Institute ENyS, established a Memory Clinic (MC) as part of this service. The patients referred by GPs to the MC, in two years, we found that none of the patients referred reporting symptoms of cognitive decline or diagnosis of dementia had been cognitively evaluated. Mostly female patients were enrolled in our study. Patients with few educational qualifications were predominant. For all patients referred to MC, slightly less than half of women and more than half of men had a pathological cognitive evaluation. We observed a correlation between low level of formal education and greater cognitive deterioration. One interesting finding is that most of patients with cognitive impairment had functional autonomy. Of all the patients, only 53 (14.4%) met the criteria for dementia. More than half of the patients with probable diagnosis of dementia did was not receiving any type of pharmacological treatment, while a quarter of the population without dementia was receiving the treatment often used for such condition. A long-term deliverable will be to improve public policy in F. Varela around dementia prevention, diagnosis, treatment, care and support.

### Introduction

Population aging is a phenomenon whose importance is now recognized at all levels due to its economic and social repercussions. One of the fields on which aging affects with more transcendence is that of health. Among the most prevalent health problems in older populations is cognitive decline.

The demographic structure of Latin America (LA) is rapidly approaching that of developing countries. According to WHO, in LA, the estimated prevalence of dementia in people over 60 years of age is 6.54%, exceeding the international prevalence, which is 5.2%. From 2015 to 2050, it is predicted that the number of people with dementia in LA will increase 4 times [1].

In 2015, a group of experts from several LA countries agreed on the central axes in identifying the barriers and challenges in clinical research in dementia in the region [2]. Although there is agreement in considering dementia as a global challenge, however, regions around the world show differences in both the nature and the magnitude of the challenge.

In Argentina, as in most LA countries, the need to overcome the existing barriers with respect to resources, culture and stigmas is shared. In our country, the limited of epidemiological data, standardization of clinical practice and training of physicians becomes a challenge that varies depending on the geopolitical context [2]. Our healthcare system, in caring for older adults through the National Institute of Social Security for retirees and pensioners (INSSJP or PAMI), is organized on the basis of two structures in outpatients: Primary Care, based on General Practitioners (GPs), and Specialized Care. Primary care is the gateway to the health system, is the closest to citizens and more accessible health care level. In the theoretical design planned by PAMI, patients are referred from GPs to specialized care when necessary to complete or corroborate the diagnostic hypothesis, and decide the best therapeutic strategy. And according to depending on assistance PAMI plan, patients can be followed jointly or exclusively by the GP [3,4].

In the suburbs of the province of Buenos Aires, in El Cruce Nestor Kirchner Hospital, providing free medical care to all patients, a center for outpatient comprehensive health care (AMI) was launched in 2016. This center offers specialized care to patients of PAMI in the area, dependent on PAMI. The AMI receives the patients referred by GPs of PAMI network in Florencio Varela region.

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Received Date: 24 Jul 2018

Accepted Date: 25 Aug 2018

Published Date: 01 Sep 2018

#### Citation:

Silvia K, Zulma S, Julieta L, Medel N, Patricia S. Screening of Cognitive Impairment: Undiagnosed or Over Diagnosis in a Vulnerable Population. *J Neurosci Cogn Stud.* 2018; 2(1): 1009.

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**Table 1:** School Education.

Schooling (years)	0 a 3	4 a 5	6 a 7	8 a 12	University
%	29,5	14,10	39,7	15,13	1,1

**Table 2A:** Relation between impairment cognitive (MMSE) School Education and Gender.

MMSE	School Education				Total
	< 5 años	5 - 7 años	8 - 12 años	>12 años	
Yes	77	86	22	0	185
	41,62%	46,49%	11,89%	0%	100,00%
NO	71	81	37	6	195
	36,41%	41,54%	18,97%	3,08%	100,00%

**Table 2B:** Relation between impairment cognitive (MMSE) School Education and Gender.

MMSE	Gender	
	Women	Men
Impairment cognitive	Yes	55 (63,22%)
	No	32 (36,78%)
ACE-R	Yes	50 (60.2%)
	No	33 (39.8%)

In this first stage, it covers a population of approximately 13,000 outpatients, which would otherwise suffer the severe consequences of the scarcity of specialists in neurosciences in the region. This scarcity also impacts negatively on the GPs that do not have the support needed to establish an accurate diagnosis. In turn, it also affects PAMI's system, due to the lack of adequate information both for diagnosis and treatment, generating unnecessary indirect and direct costs. Another important aspect is that the population treated by AMI presents significant barriers due to poverty, and cultural and socio-economic conditions. As part of AMI, our Neuroscience Center, which had already been functioning in the hospital, created an area of Neurology and a Memory Clinic (MC).

With the objective to make early diagnosis of cognitive status and define the best therapeutic strategy of patients referred to the MC, it was developed in the first stage, a diagnostic algorithm involving from clinical evaluation to the characteristics socio-epidemiological of the population. We have started with an education plan for the GPs and caregivers [5,6].

## Materials and Method

A prospective longitudinal study was conducted from January 2016 to January 2018. Outpatients of both sexes evaluated in the MC were included in the investigation. Patients whose data were incomplete and patients younger than 60 years old were excluded.

Patients are referred to the MC by our team. In the beginning, we observed that none of the patients referred to the neurology area by the GPs reporting symptoms of cognitive decline or diagnosis of dementia had been cognitively evaluated, and only approximately 5 % had an MRI. From this observation, we devised a first step, the creation of a medical consultation room, in charge of the neuropsychologists of the group. After a brief interview with the patient, it was exceptionally necessary to perform more than one; if

the complaint of cognitive failure was confirmed, based on the data collected from the patient and relatives or caregivers, the patient was referred to the MC. Patients with severe cognitive impairment and functional dependence were referred to the neurology clinic to complete the diagnosis and propose a therapeutic strategy. Once the procedure was finished, the patient was referred to the GP.

In the MC, health professionals apply the diagnostic algorithm, neurologists specialized in cognitive neurology keep a medical record of each patient, with information about personal history, complete neurological examination, pharmacological treatment, laboratory and imaging studies. In parallel the neuropsychologists perform a cognitive and socio-environmental assessment. We found a serious problem regarding Magnetic Resonance Imaging (MRI). We cannot choose in any case the definition and quality of the resonator used since this is determined by PAMI. For this reason, most patients had low-quality MRI, open resonator with 0.23 Tesla, and without specific protocols.

### Cognitive evaluation protocol

The tests used to distinguish between the cognitive changes present in the normal aging process and the cognitive decline compatible with Alzheimer's dementia or other dementias are detailed below [7,8].

We consider the following Cut-Off values (CO), adjusted for age and education of each of the tests.

- Mini Mental State of Folstein Examination (MMSE) [9]

Designed to evaluate the general cognitive state, accepted for simplicity and shortness of administration. Values orientation (spatial and temporal), memory (fixation and recall), attention, language (denomination, comprehension, repetition and reading and writing) and visuoconstruction.

#### Score:

Age 66 - 75 years: Education less than 5 years, CO: 24; Education from 5 to 7 years old, CO: 26; Education from 8 to ≤ 12 years old, CO: 27.

Age over 75 years: Education less than 5 years, CO: 22; Education from 5 to 7, CO: 25; Education from 8 to 12, CO: 25; more than 12 CO: 26

- Addembroocke's Cognitive Examination - Revised (ACE-R) [10]

The battery evaluates six cognitive domains: orientation, attention, memory, verbal fluency, language and visuospatiality. The orientation and attention items are taken from the MMSE. The memory item includes the evaluation of episodic and semantic memory. The language is valued by means of the denomination of twelve drawings, repetition, comprehension, reading of regular and irregular words and writing. Viso-spatial functions are explored by copying overlapping pentagons, a cube and the drawing of a clock. The verbal fluency item includes the generation of a list of words that begin with the letter P and a list of animals.

**Score:** With 12 years or more of instruction, Dementia, CO: 88; less than 12 years of Education, CO: 68.

- Dementia Rating Score (CDR) [11]. Individual interviews are carried out to relatives living with the patient. A functional-scale diagnosis is achieved as recreational and leisure activities are

**Table 3:** Functional autonomy of patients in relation with impaired cognitive according to score of MMSE and ACE.

	CDR (= <1) Functionally Dependence	CDR (0/0,5) Functionally Independence
MMSE with impaired cognitive	54 (29.8%)	128 (70%)
ACE-R with impaired cognitive	53 (32,5%)	110 (67,5%)

**Table 4:** Relation between status cognitive and Pharmacological history.

MMSE	No treatment	Anticholinesterases	Memantine	Vasodilators	Others
Impaired Cognitive	64%	18,8%	4%	6,9%	6,9%
Normal	67%	15%	2,1%	8,6%	7%
ACE					
Impaired Cognitive	60,4%	22,7%	5,2%	7,1%	4,5%
Normal	70,6%	11,7%	1,0%	8,1%	8,6%

evaluated, which is useful for patients with slight or initial clinical presentation. This gives a global idea of functioning with an emphasis on memory. Orientation, judgment and problem solving, social life, home and hobbies, personal cares are evaluated.

Severity score: 0 = normal; 0.5 = doubtful; 1 = mild dementia; 2 = moderate dementia; 3 = severe dementia.

### Statistical analysis

A digitized database was prepared in which all the variables studied for each patient were included.

For the statistical analysis SPSS V.24 was used, non-parametric chi-square tests were applied, values of  $p < 0.05$  were considered to assess statistical significance, Fisher's test for qualitative variables and Student's test for quantitative variables, and ANOVA were also included.

## Results

We analyzed 366 patients older than or equal to 60 years, of which 78% were women. The average age in women was of 70.6 years (SD 7, 5), and in men was of 71.5 (DS 6, 6).

In relation to school education, 29.5% have up to 3 years of schooling, in fact they are functional illiterates. 14% up to 5 years, 39.7% have completed primary school (up to 6 or 7 years of schooling), 15.13% have full secondary and only 1.1% has studied at the university. Women have higher levels of schooling (5,7 SD 3,2) than men (4,72 SD 2,6) (Table 1).

We have found in the patients evaluated with MMSE, 49.1% showed impairment cognitive according to age and education. We observed a correlation between low level of formal education and greater deterioration in this test (Pearson  $p = 0,006$ ). And also in relation to gender, we observed greater deterioration in men (Pearson  $p = 0,002$ ) (Table 2A).

Patients evaluated with ACE-R, 45.27% presented cognitive deficit according to schooling, and almost all patients had less 12 years instruction. In regard gender we also observed similar to MMSE, greater deterioration in men (Pearson  $p = 0,002$ ) (Table 2B).

In relation to the functional autonomy of patients who were evaluated with CDR through their relatives, we observed that of all patients with impaired cognitive activity (MMSE and ACE-R) 70%/67.5% respectively was functionally independence (Table 3).

Of all the patients, only 53 (14.4%) met the criteria for dementia, presented cognitive impairment and functional dependence.

Regarding MRI, in patients with MMSE or ACE-R compatible with impaired cognitive, 91.5% / 93.3% respectively showed abnormal MRI, 16.8% patients had degenerative pathology (cortical atrophy and mixed) exclusively, a 31.2% showed only vascular disease (ischemic gliosis and leukoaraiosis) and 5.4% presented a mixed pathology. For patients with normal cognitive evaluation, 85 % had abnormal findings in MRI, 57,9% had cortical atrophy, 26% had ischemic gliosis, and 8.4% had leukoaraiosis.

In relation to the pharmacological treatment received by the patients admitted to MC, we analyzed only types drugs in relation to neurological pathologies in the population according to the results of the cognitive evaluations. A 64% of subjects who had results compatible with cognitive deterioration did not receive any drug, 17.8% was medicated with anticholinesterases agents, 4% was treated with memantine, and 6.9% with vasodilators.

In the group of patients with normal cognitive evaluation, 67% did not receive any drug, but 15% was treated with anticholinesterase agents, 2.1% with memantine, and 8.6% with vasodilators (Table 4).

In relation to its residential location, 80% patients live with their nuclear or extended family, and 20% patients live alone at home, none of the patients was institutionalized.

## Conclusion

In this study we have analyzed the patients who were referred to the neurology center by the GPs, reporting a cognitive complaint of the patient or his family. In the first interview, we observed that these complaints include a wide range of symptoms from memory failures, unusual behavior, depression or anxiety, apathy, signs of minimal and moderate cognitive impairment and dementia.

None of the patients who came to the consultation with some of these symptoms had been evaluated with minimal neuropsychological tests. As we have already mentioned, our group referred the patients to the CM once the patient's cognitive deficit was confirmed, after a brief interview.

Mostly female patients were enrolled in our study. Patients with few educational qualifications were predominant.

An 80% of the population lives with their nuclear or extended family, and a 20% live alone at home, none of the patients was institutionalized.

In relation to MRI, the low definition of most of the studies carried out prevented the application of volumetric measurement protocols and other parameters. Therefore it has not been possible to establish a

correlation between the findings of the cognitive evaluation with the results of MRI. We were able to show the authorities the lack of cost-benefit in carrying out MRI studies of poor quality. From this study, it will be implemented studies of images with protocols and quality equipment [12-14].

For all patients referred to MC, slightly less than half of women (44.5%) and more than half of men (63%) had a pathological cognitive evaluation.

We observed a correlation between low level of formal education and greater cognitive deterioration. And also in relation to gender, we observed greater cognitive deterioration in men.

One interesting finding is that most of patients with cognitive impairment had functional autonomy. One hypothesis we propose from our results is that there is no correlation observed between cognitive impaired patients and their level of functionality, due to family support received and the level of integration in their community life [3-6]. Of all the patients, only 53 (14.4%) met the criteria for dementia, presented cognitive impairment and functional dependence.

More than half of the patients with probable diagnosis of dementia did not receive any type of pharmacological treatment, while a quarter of the population without dementia was receiving the treatment often used for such condition. The diagnosis of dementia remains a challenge, furthermore in our population most patients are illiterate, but are living in their household, and even provide support at them. The study showed that patients with a probable diagnosis of dementia according to international and national standards, though had a certain degree of autonomy, and to performed some of the daily family activities and were involved in community life. This proves that the concept of functionality is a variable that should be considered as essential to upon completing the diagnosis [8].

Our results allowed us to provide adequate information to the patient and their families, and establish a therapeutic strategy suitable for their needs. The possibility of understanding the arbitrary limit between cognitive impairment and dementia contributes to the goal of destigmatizing old age as synonymous of illness and disability, while improving the quality of life of patients, freeing the caregiver from overloading the patients' family, and allowing the maximum autonomy and independence [12,14].

Our proposal for the near future is that education programs for GPs and all health personnel should be developed, especially targeting the minimum standards for cognitive assessment and the evaluation of functionality as a variable for disease diagnosis. This is essential to educate the professionals so that they can refer patients to specialists applying simple and precise diagnostic criteria [15].

## Acknowledgement

This work received the support from ENyS through CONICET and Hospital El Cruce.

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