



## ORIGINAL ARTICLE

## Underdiagnosed Delirium on Elderly Patients in the Emergency Room Principal Author

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### Abstract

**Introduction:** Delirium is a fluctuant, transitional and acute affection of cognition and attention, with multifactorial aetiologies. It is a medical emergency and requires an integral evaluation to identify the underlying causes. In elderly people, over 65 years old, the incidence of Delirium oscillates greatly between 14% to 24% at the moment of hospitalization and 6% to 56% during the time of hospitalization. The prevalence of Delirium acquired in the community oscillates from 1% to 2%. However, this prevalence increases as high as 10% when entering the emergency department. The identification of Delirium in the emergency department usually is not realized, leading to a delay in the instauration of treatment, which increases morbidity and mortality, leading to prolonged permanency at the hospital.

**Material and methods:** A prospective study with no probabilistic sample was evaluated through logistic regression analysis, central tendency measurements, standard deviation and comparison between means. This study included 118 patients over 65 years old who were admitted to the emergency service of the Hospital General de Zona #50 (HGZ #50) in San Luis Potosí, S.L.P. Mexico; between the months of March and May of the year 2016. We utilized the Confusion Assessment Method (CAM) scale to evaluate the presence or absence of Delirium and its clinical subtypes in these 188 patients. T-Test was utilized to recognize the existence of under diagnose of Delirium.

**Objective:** To identify the frequency of underdiagnose cases of Delirium in elderly patients in the emergency service of the HGZ#50.

**Results:** A total of 118 patients over 65 years old admitted to the emergency service were included in the study, having 51.7% males (n = 61) and 48.3% females (n = 57). From the total number of patients, in only 26 patients Delirium was diagnosed thought CAM scale. Nevertheless, in only 6 patients (5.1%) the diagnosis was recorded in their medical record. Utilizing T-Test, to compare the 26 patients with Delirium and the 6 patients with Delirium recorded in their medical record we obtained a  $p = 0.014$  as a result meaning that diagnosis of Delirium is under diagnosed.

**Conclusions:** In this study Delirium was present in 22% of the 118 patients analysed and only 5.1% had the diagnosis of Delirium recorded in the medical record. This result shows that underdiagnose of Delirium is not uncommon. We, therefore, recommend the use of CAM scale in patients over 65 years old to diagnose Delirium, during their stay in the emergency service, paying special attention to patients with metabolic affections, mixed syndromes and age over 76 years old. Identifying the presence of Delirium in patients admitted in the emergency room could improve the prognostic and also could decrease the time hospitalized by initiating treatment promptly.

### Keywords

Delirium, Elderly, Confusion assessment method, Emergency service

### Introduction

Delirium is a fluctuant, transitory acute affection of cognition and attention, which has a multifactorial aetiology and is associated with a physical acute illness.

It is a medical emergency; therefore, it requires an evaluation and an opportune treatment [1]. The Global epidemiology reports an incidence close to 15% (one of every three subjects admitted in the emergency service) [2].

Delirium depends on the characteristics of the patient, the assistance level, the sensibility of the detection method and the age. In post operated elderly people, Delirium oscillates between 15% -53%; in patients at intensive care from 70% to 87%; at 60% in patients with post-acute care or patients who get sick in non-hospital institutions; and 83% in those in need of palliative care. Delirium prevalence goes from 1%-2% in the community, however, it reaches 10% in the emergency room. In elderly people, over 85 years old, Delirium prevalence reaches up 14% in the community [3]. In elderly people, over 65 years old, Delirium incidence at the moment of hospitalized is 14% to 24%, in contrast, during the time hospitalized the incidence is 6% to 56% [4,5].

Mortality of hospitalized elderly patients with Delirium is 22% to 76%, existing increase in patients with myocardial infarction and sepsis. Mortality associated to hospitalize patients who acquired Delirium oscillates between 10% and 26%, likewise, mortality reaches up 22% to 76% in hospitalized patients which develop Delirium, even so, frequency of presentation oscillates from 10% to 56% in elderly hospitalized patients [1,2,6].

In Mexico, in the next five decades, the birth rate will drop until it reaches 11 births for every one thousand inhabitants for the year 2050. Even so, mortality descends until 5 deceases for every one thousand inhabitants for the year 2006 and it will reach 10.4 for the year 2050. Therefore, in Mexico, there will be an increase in the population of people over 65 years old who will use the medical care service [7].

Delirium is the 8<sup>th</sup> most common cause for use of emergency care, with an incidence of 14.5%. Prevalence is 38.3% and the incidence in hospitalize elderly is 12%, of which, half of them have dementia, no controlled pain or a recent surgical procedure as an antecedent [1,2].

Risk factors statistically associated to the presence

of Delirium are illness, immobility, cognitive affectation, vesicle catheter, sepsis, myocardial infarction, anaemia, faecal matter impaction, polypharmacy use over three pills, recent surgical procedure, hip fractures, Parkinson disease, dementia and antecedents of brain vascular disease [1,8].

It has been demonstrated the existence of diminishing on regional brain blood flow: Being normalized after the resolution of Delirium, there for, cerebral hypoperfusion is a possible mechanism producer of Delirium. Moreover, additional neurological stress product of a metabolic alteration or an infection could play an important role in Delirium development. Inflammation process could be a factor in the development of Delirium for their presence in most of the causes of Delirium [3].

There are three clinical subtypes of Delirium, which characteristics are displayed on Table 1 [1,6].

The patient with a high risk of developing Delirium needs a full medical evaluation: Barthel index is used for physical functionality; Charlson index is used for comorbidity, and the diagnosis can be made through Diagnostic and Statistical Manual for Mental Disorders Fifth edition or through Confusional Assessment Method (CAM). CAM has a sensibility of 94% to 100% and a specificity of 90%-95%- His diagnostic algorithm is based on four aspects: Acute onset and fluctuating course, decreased attention, disorganized thinking and affection of the conscience level [2,9,10]. Reactive C protein is a biomarker of an acute inflammatory response and it is an independent Delirium predictor. Some independent clinical predictors of Delirium (hyponatremia, severe illness, dementia, fever, hypothermia, azotaemia and use of a psychoactive treatment, as well as the accumulative presence over three factors, generate an increased risk of Delirium that could be up to 60% [3,11].

No pharmacologic and pharmacologic treatments are the fundamental approach to treat Delirium. Pharmacologic treatment is divided into etiologic and in symptomatic approach. The first one consists in the treatment of the trigger factors, and the second one consists in the use of neuroleptics drugs. Neuroleptics drugs can be divided into typical and atypical. Haloperidol is the typical neuroleptic most used.

**Table 1:** Characteristics Delirium's clinical subtypes.

From: El Delirium. Una revisión orientada a la práctica clínica. Z. Alonso, M. A. González-Torres, M. Gaviria.

Type	Hyperactive	Hypoactive	Mixed
<b>Alertness</b>	Hyperalert, agitated	Hypoalert, lethargy	Agitated periods and lethargy
<b>Symptoms</b>	Hallucinations, psychomotor agitation, delusion	Somnolent,decayed, bradypsychic	Combination of symptoms
<b>Causes</b>	Abstinence syndrome, Steroid use	Metabolic encephalopathies, benzodiazepine,poisoning, dehydration	Metabolic encephalopathies
<b>Physiopathology</b>	Elevate or normal brain metabolism, normal o rapid EEG, decreased GABA ergic activity	Decrease brain metabolism. EEC: diffuse slowing. Over stimulation of GABA systems.	Combination of GABA receptor stimulation and inhibition

**Table 2:** Delirium diagnostic by CAM scale, diagnose indicate on medical record.

Single simple test						
	Test value = 0					
	t	gl	Sig. (bilateral)	Mean differences	95% confidence interval of the differences	
					Inferior	Superior
Delirium	5.750	117	0.000	0.220	0.14	0.30
Diagnosed	2.504	117	0.014	0.051	0.01	0.09

Clozapine, olanzapine and risperidone, are the atypical neuroleptics most used. Atypical neuroleptics show the same effectiveness in the symptomatology control of Delirium, and also, there are less secondary effects, compared with haloperidol [12].

## Objectives

The main objective of this study is to know the underdiagnose frequency of Delirium in elderly patients over 65 years old at the emergency service of the Hospital General de Zona #50 (HGZ#50). Secondly, we sought to know the frequency of diagnosis of Delirium in elderly patients over 65 years old, who were admitted to the emergency department, analyse the sociodemographic characteristics of the patients, know the pathogenesis of admission associated with the presence of Delirium and determine the clinical subtypes.

## Methods

It's an observational, descriptive and analytic study; with a prospective and transversal design. Made in the emergency department of HGZ #50, from Instituto Mexicano del Seguro Social, in San Luis Potosi, S.L.P., Mexico. During March and May from the year 2016. These studies use a no probabilistic sample. Inclusion criteria were patients over 65 years old, any gender admission to the emergency department and acceptance of participation by informed consent. No inclusion criteria were patients using mechanical ventilation, patients under sedation, dementia antecedents generating impossibility for communication between physician and patient, and patients with caregiver abandonment dues making impossible for obtaining additional information for Delirium diagnose. CAM scale was used for diagnostic purposes.

## Statistical Analysis

Based on 3,241 consultations per year obtained from the database of the Sistema de Información Médico Operativo y Archivo Clínica HGZ#50 of the year 2016, of patients treated in the emergency department over 65 years old, the sample size was calculated, using the formula for finite samples, with a 95% confidence level and a margin error of 5%, as well as an expected proportion of 10%. This analysis indicated that the population sample for the study was 118 patients for a logistic regression model. Using a T student test to assess underdiagnoses; Chi-square for categorical variables,

taking  $p < 0.05$  as significant value; contingency tables to evaluate the possible association between age and Delirium. Using SPSS 4 Statistical Software, as a tool for data processing.

## Results

A total of 118 patients over 65 years of age who were admitted to the emergency department were evaluated in this study, being 51.7% men ( $n = 61$ ) and 48.35% women ( $n = 57$ ). The pathologies on admission were classified as respiratory, metabolic, electrolytic, haematological, infectious, neurological, cardiovascular, trauma, others (encompassing infrequent pathologies) and mixed (considered as 2 or more pathologies), the most frequent being 22% metabolic, 20.3 % other and 16.9% mixed. Of the 118 patients, the diagnosis of Delirium was identified under the CAM scale in 26 patients.

In these 26 patients, the pathologies they presented were; respiratory ( $n = 2$ ), metabolic ( $n = 8$ ), electrolytic ( $n = 1$ ), trauma ( $n = 2$ ), neurological ( $n = 3$ ), cardiovascular ( $n = 2$ ), other ( $n = 1$ ) nature and mixed ( $n = 7$ ).

Delirium subtypes, the most frequent being hypoactive with 16.1%, followed by the mixed subtype with 3.3% and finally the hyperactive subtype with 2.5% of the total of patients studied, only 6 had a diagnosis of Delirium registered in the clinical record, which corresponds to 5.1%. Statistical analysis was performed using the T student test between patients with a diagnosis of Delirium that was established by the CAM scale and those who had the diagnosis recorded in the record, with a  $p = 0.014$ , for which it was determined that Delirium is underdiagnosed (Table 2).

An analysis was carried out with contingency tables for age and the presence of Delirium, finding a higher incidence in the age of 65 and 84 years, with a mean of 75 years ( $p = 0.46$ ), with a frequency of 6 and 5 cases respectively (Table 3).

There was no statistical difference between sex and pathology, but not for age, being 76 years the mean for the development of Delirium to present significantly in patients admitted to the emergency room (Table 4).

Table 5 shows the results of the patients' contingency tests regarding age, sex and pathology, being significant for age only.

**Table 3:** Delirium distribution by gender, pathology and clinical subtype.

		Delirium			
		No Delirium		Present Delirium	
		Mean	Count	Mean	Count
Age		75		76	
Sex	Male		46		15
	Female		46		11
Pathology	Respiratory		10		2
	Metabolic		18		8
	Electrolitic		1		1
	Hematologic		4		0
	Infecicios		1		0
	Neurologic		5		3
	Cardiovascular		12		2
	Trauma		5		2
	Others		23		1
	Mixed		13		7
Clinical Subtype of Delirium	Sin Delirium		92		0
	Hiperactivo		0		3
	Hipoactivo		0		19
	Mixto		0		4

**Table 4:** Pearson's Chi-square test for sex, pathology and age.

		Delirium
Sex	Chi-square	0.480
Pathology	Chi-square	11.874
Age	Chi-square	39.245

**Table 5:** Contingency test for sex, pathology and age.

<b>Sex*Delirium</b>			
		Value	Approximate significance
Nominal by Nominal	Contingency coefficient	0.064	0.488
Number of valid cases		118	
<b>Pathology*Delirium</b>			
		Value	Approximate significance
Nominal by Nominal	Contingency coefficient	0.302	0.220
Number of valid cases		118	
<b>Age*Delirium</b>			
		Value	Approximate significance
Nominal by Nominal	Contingency coefficient	0.500	0.046
Number of valid cases		118	

Table 6 shows the percentages of patients with and without Delirium in the total sample, as well as those diagnosed in the emergency department recorded in the clinical record and the relationship with the pathologies found; noting that patients with metabolic pathologies and mixed disorders have a higher frequency of development of Delirium.

## Discussion

Although 22% of patients admitted to the

emergency department have some type of Delirium, this percentage is not statistically significant; not so when this phenomenon occurs, but it is not diagnosed. The underdiagnoses can differ between 32% and 67%, as reported by Marcela Carrasco, et al. [13]. On the other hand, based on the results, it can be established that the difference between patients diagnosed with Delirium using the CAM scale is significant among those who appear with a diagnosis in the file, with 76% of

**Table 6:** List of pathologies and frequency of diagnosed and undiagnosed delirium in the emergency department.

	Delirium				Diagnostic			
	No Delirium		Delirium		No		Yes	
	Count	% of N table totals	Count	% of N table totals	Count	% of N table totals	Count	% of N table totals
Respiratory	10	8.5%	2	1.7%	11	9.3%	1	0.8%
Metabolic	18	15.3%	8	6.8%	25	21.2%	1	0.8%
Electrolytic	1	0.8%	1	0.8%	1	0.8%	1	0.8%
Hematologic	4	3.4%	0	0.0%	4	3.4%	0	0.0%
Infeccious	1	0.8%	0	0.0%	1	0.8%	0	0.0%
Neurologic	5	4.2%	3	2.5%	7	5.9%	1	0.8%
Cardiovascular	12	10.2%	2	1.7%	14	11.9%	0	0.0%
Trauma	5	4.2%	2	1.7%	6	5.1%	1	0.8%
Others	23	19.5%	1	0.8%	24	20.3%	0	0.0%
Mixed	13	11.0%	7	5.9%	19	16.1%	1	0.8%

patients not being diagnosed with Delirium, compared to 23% who were diagnosed.

The degree of under diagnoses is in the upper range of that published by Meagher in older adults, who reports a 33-66% non-detection, which represents a failure to recognize and treat the disease early. It also mentions that hypoactive Delirium is the most frequent in the elderly and occurs especially in very sick patients with low homeostatic reserve, which conditions a worse prognosis [14]. as is established in the literature in our work it was the most frequently diagnosed, with the least hyperactive subtype. The causes of Delirium are diverse; however, we found that although it is not statistically significant, the patients who presented Delirium more frequently were those who were admitted for metabolic and mixed pathologies, unlike what was found by Zuria Alonso, et al.

Who reports to the urinary tract infections and pneumonia as the main precipitating or triggering factors of Delirium [6]. The multifactorial nature of our study population, which involves between two and six alterations that may be present in a single case, would be an explanation for why the pathologies found in our study were more frequent. Therefore, it is vital to be aware of risk factors and to remain vigilant for the possibility of additional factors [14]. Finally, we found that the mean age to develop Delirium in the emergency department is 76 years, in agreement with what was found by Carrasco et al. In their study in a Chilean hospital in which they report that Delirium was 4.5 times more frequent in the elderly 75 years old [13].

### Limitations

The present study was carried out randomly in patients over 65 years of age who were admitted to the emergency service, however, the length of stay in said service was not taken into account, which could be a factor to control for the development of Delirium and

to clarify if the patient is already admitted with said alteration or acquires it in the service, and the severity of the patient to give a relationship between the severity and the presence of Delirium.

### Conclusions

Of the 118 patients, Delirium was presented in 22% of the elderly patients over 65 years old in the emergency service, and only 5.1% had the diagnostic recorded in the medical record. This result shows that underdiagnose of Delirium is not uncommon. Therefore, we recommend the use of CAM scale in patients over 65 years old to diagnose Delirium, during their stay in the emergency service, paying special attention to patients with metabolic affections, mixed syndromes and age over 76 years old. Identifying the presence of Delirium in patients admitted in the emergency room could improve the prognostic and also could decrease the time hospitalized by initiating treatment promptly.

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Statement of equal authors' contribution

S.M. Fatima Alondra and M.N. Jaime did the conceptualization of the theme of investigation and the recollection of data and also with the help of V.T. Yael Sebastián, the bibliographic consultation. R.M. Alberto did the statistical evaluation.

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