

Delirium in the elderly admitted to an emergency hospital service

Delirium em idosos admitidos em um serviço hospitalar de emergência

Delirio en ancianos admitidos en un servicio hospitalario de urgencia

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ABSTRACT

Objective: To check for the presence of delirium in the elderly entering the emergency room (ER) of the University Hospital of Santa Maria (HUSM) and their relationship with sociodemographic variables, reason and time of hospitalization, comorbidities, and death. **Methods:** A quantitative, cross-sectional exploratory study, which analyzed data from the sociodemographic profile, Confusion Assessment Method, Charlson Comorbidity Index, and follow-up of the outcomes "in-hospital death" and "length of hospitalization." The period analyzed in the study was between July and December 2019. **Results:** Of the 732 participants, 394 (53.90%) were men, with an average age of 72 years. The study identified Delirium in 99 (13.52%) participants, and death, in 120 (16.39%). There was an association of this disorder with age, comorbidities, length of hospitalization, death, and some reasons for hospitalization, such as diseases of the circulatory, respiratory and genitourinary systems. **Conclusion:** The results warn of the high incidence of delirium in emergency units and their relationship with a worse prognosis.

Descriptors: Delirium; Elderly; Emergency Service, Hospital; Death; Length of Hospitalization.

RESUMO

Objetivo: Verificar a presença de *delirium* em idosos que ingressam no pronto-socorro (PS) do Hospital Universitário de Santa Maria (HUSM) e sua relação com variáveis sociodemográficas, motivo e tempo de internação, comorbidades e óbito. **Métodos:** Estudo quantitativo, transversal exploratório, que analisou dados do perfil sociodemográfico, *Confusion Assessment Method*, Índice de Comorbidades de Charlson e seguimento dos desfechos "óbito intra-hospitalar" e "tempo de internação". O período analisado no estudo foi entre julho e dezembro de 2019. **Resultados:** Dos 732 participantes, 394 (53,90%) eram homens, com idade média de 72 anos. *Delirium* foi identificado em 99 (13,52%) participantes; e óbito, em 120 (16,39%). Houve associação desse distúrbio com idade, comorbidades, tempo de internação, óbito e alguns motivos de internação, como doenças do aparelho circulatório, respiratório e geniturinário. **Conclusões:** Os resultados alertam para a alta incidência de *delirium* em unidades de emergência e sua relação com um pior prognóstico.

Descritores: *Delirium*; Idoso; Serviço Hospitalar de Emergência; Óbito; Tempo de Internação.

RESUMEN

Objetivo: Verificar presencia de *delirium* en ancianos que ingresan en hospital de urgencias del Hospital Universitario de Santa Maria (HUSM) y su relación con variables sociodemográficas, motivo y tiempo de internación, comorbilidades y óbito. **Métodos:** Estudio cuantitativo, transversal exploratorio, que analizó datos del perfil sociodemográfico, *Confusion Assessment Method*, Índice de Comorbilidades de Charlson y seguimiento de los desfechos "óbito hospitalaria" y "tiempo de internación". El período analizado en el estudio fue entre julio y diciembre de 2019. **Resultados:** Entre los 732 participantes, 394 (53,90%) eran hombres, con edad mediana de 72 años. *Delirio* fue identificado en 99 (13,52%) participantes; y óbito, en 120 (16,39%). Hubo relación de ese distúrbio con edad, comorbilidades, tiempo de internación, óbito y algunos motivos de internación, como enfermedades del aparato circulatorio, respiratorio y genitourinario. **Conclusiones:** Los resultados alertan para la alta incidencia de *delirium* en unidades de urgencia y su relación con un peor pronóstico.

Descriptor: Delirio; Anciano; Servicio de Urgencia en Hospital; Óbito; Tiempo de Internación.

INTRODUCTION

Delirium can be considered an acute brain failure, the official definition of which is determined by the DSM-5 as a disorder in attention and consciousness that develops acutely, with varying severity throughout the day⁽¹⁾. Its pathophysiological mechanisms are still unclear, but the main models indicate an imbalance of neurotransmitters and neuroinflammation⁽²⁾.

Despite being a syndrome common among hospitalized elderly, it continues to be poorly recognized and underdiagnosed, leading to worsening of the clinical picture and overload to the companion⁽²⁾. Some time ago, specialists considered *delirium* a completely reversible event and the result of only one cause but today is known as the result of several factors and is linked to the possibility of developing severe sequelae⁽³⁾.

Its prevalence varies according to the adopted population, patient assessment period, and method used. Studies indicate that the incidence of *delirium* turns around 24% in patients after hip fracture. In the Intensive Care Unit (ICU), it can have a prevalence of 80%; in an emergency sector, 37%; and in long-stay institutions (ILPI), 40%⁽⁴⁻⁶⁾.

The result of periods of acute disturbance is worse in the long term since they directly increase the risk of falls, the length of hospitalization, hospital costs, the duration of mechanical ventilation, the degree of cognitive and functional impairment after hospitalization, as well as the chances of institutionalization and mortality^(2-3,6).

Prevention has proven to be the best way out, with the detection of the most fragile patient as the most important. Assessing the patient's clinical picture, his reserves, physical, cognitive, behavioral, and social disabilities is the first step towards building effective prevention strategies⁽⁷⁾.

The risks to *delirium* can be divided into predisposing and precipitating factors. Predisposing factors are alcoholism, chronic pain, history of lung, liver, kidney, heart, brain and/or terminal diseases, age over 65 years, male sex, dementia, depression, violence, falls, history of *delirium*, malnutrition, polypharmacy, pressure injuries, sensory insufficiency, decreased motor activity and social isolation. The main precipitating factors are dehydration, fracture, infection, ischemia, use of improper medications, disease in a high degree of severity, surgery, lack of pain control, urinary or stool retention, being in an ICU environment, sleep deprivation, and physical restraint. There are still some drugs that are inducers of *delirium*, with anticholinergics, benzodiazepines, dopamine agonists, and meperidine being the most at risk. The medications of moderate degree are antibiotics, anticonvulsants, antihypertensive, antiviral, tricyclic antidepressants, among others^(2,8-9).

It is already a consensus in the literature and clinical practice in emergency services that the instrument Confusion Assessment Method (CAM) is the most effective way to identify *delirium*, which can assist the team for the diagnosis at admission or during the period of hospitalization of the patient. It has high sensitivity (94.1%) and specificity (96.4%), demonstrating credibility for use in clinical practice^(2,8-10).

In Brazil and around the world, emergency services are marked by the continuous movement of people, sounds, and noises every minute, building a chaotic and stressful environment for

patients. These conditions will eventually be characterized as triggering factors to the development of cognitive impairments such as *delirium*⁽¹¹⁾.

Although scholars widely investigated it in International Literature, this disorder is still little studied in Brazilian samples of the elderly, especially when the place of study is the hospital emergency. Therefore, this situation characterizes the present research as pertinent to the scientific field.

OBJECTIVE

To check for the presence of *delirium* in the elderly entering the emergency room (ER) of the University Hospital of Santa Maria (HUSM) and their relationship with sociodemographic variables, reason and time of hospitalization, comorbidities, and death.

METHODS

Ethical aspects

The study observed the ethical aspects according to Resolution No. 466, of December 12, 2012, of the National Research Council, which defines the regulatory standards for research involving human beings.

The Ethics Committee of the Federal University of Santa Maria (UFSM) approved the project. The collected data will be analyzed and published anonymously. The researcher assumes confidentiality concerning the research data. The term of free and informed consent is not necessary because the application of the instrument occurs independently of the research, as it is part of the assistance provided routinely.

Design, period and place of study

This study is part of the project entitled "Predictive Validity of a Complex Patient Identification Instrument in Hospital Admission (CPI)," which takes place at HUSM, being a quantitative, cross-sectional exploratory study guided by the STROBE tool. The study analyzed data relating to *delirium*, describing the sample profile and follow-up of the outcomes "in-hospital death" and "length of hospitalization." The period analyzed in the study was between July and December 2019.

HUSM is academically affiliated to UFSM, it is characterized as a general, public, and teaching hospital of tertiary level with 100% service focused on the Public Health System (SUS). It is a reference in urgency and emergency within the State of Rio Grande do Sul, serving a population that exceeds 1.2 million people, coming from 45 municipalities.

According to statistics sector data, HUSM generates 15,209 hospitalizations per year; 7,053 surgeries in the operating room and 17,158 in short outpatient surgeries; 2,125 births; 180,439 outpatient appointments attended, and 210,365 outpatient appointments scheduled, thus demonstrating 15% absenteeism on the part of patients. There were also 30,254 emergency room visits and 1,013,405 examinations. Regarding the hospitalization of the elderly, the quantitative is around 4,370 per year in the entire hospital, being more than 2 thousand only in the ER.

Population or sample; criteria of inclusion and exclusion

All elderly patients admitted to HUSM between July and December 2019 were included as the target population. The inclusion criteria of the participants were: age equal to or greater than 60 years at the time of admission to the emergency service and their evaluation by the CPI instrument within 48 hours after hospital admission. The exclusion criteria were: age less than 60 years, no CPI instrument evaluation within the stipulated period due to clinical instability, examinations, or transfer to another hospital unit. Thus, of the 1,027 elderly patients admitted to the emergency room of the hospital of this study between July and December 2019, 732 (71.27%) were classified as eligible and included in the analysis.

Study protocol

The CPI is an instrument implemented in the ER in July 2019, being part of the daily practice of professionals to evaluate patients at the entrance door of the service. It was developed to characterize the profile of hospitalizations in the ER, giving subsidies for the implementation of institutional policies of reception more consistent with their reality, evaluating functional capacity, the impact of comorbidities, *delirium* as indicators of complexity for care requirements. Nursing professionals apply the instrument upon the first contact with the patient as part of hospital admission and care planning. It is available on the HUSM intranet and completed by the professional within 48 hours of hospital admission to the ER for all adult patients of this sector. This time was stipulated seeking to minimize extraneous factors that would cause confusion bias for the criteria involved in the instrument.

The application generates an automatic message to the responsible person who fills it up and to the assistant team informing whether or not the patient is considered complex. Also, it automatically stores the data in a database developed by the HUSM computer service to carry out the analysis of indicators.

The CPI includes several instruments, but the present research will analyze the data from the CAM and the Charlson Comorbidities Index (CCI). The CCI identifies 17 comorbidities divided into 19 clinical situations; each, with different scores, between 1 and 3, whose sum signals the chance of survival in one year. It considers a risk signaling score of 6 points or more. The study chose this instrument to evaluate the prognosis when patients are affected by different comorbidities at different levels, indicating an overview of the patient's severity. The CAM identifies the presence of *delirium*, and it is composed of five attributes: acute onset, fluctuating course, inattention, disorganized thinking, and altered level of consciousness. Signals risk when there is the presence of the first three associated with the fourth or fifth attribute^(10,12).

Analysis of results and statistics

The variables analyzed in the study are age, sex, the reason for hospitalization, marital status, if the patient lives with someone, in addition to the presence of *delirium* (Positive CAM) and

impact of comorbidities (indicated by CCI), obtained using CPI. As outcomes, researchers defined the occurrence of death during hospitalization and the length of stay indicated in days, provided by the statistics sector of the hospital itself.

Concerning the reason for admission, the pathologies, as indicated by the International Classification of Diseases (ICD), were grouped in the following categories: infectious and parasitic diseases (A00 – B99), neoplasms (C00 – D48), mental and behavioral disorders (F00 – F99) diseases of the circulatory system (I00 – I99), diseases of the respiratory system (J00 – J99) diseases of the digestive system (K00 – K93) diseases of the genitourinary system (N00 – N99) pregnancy, childbirth and the puerperium (O00 – O99), fractures, and injuries (S00 – T98), and other external causes (V01 – Y98), and other causes may be (other codes).

The data was organized in an Excel database automatically generated through the CPI application. Data relating to the observation of the outcomes were added to this database. The program R, version 3.6.3 carried out the statistical analysis. The presentation of categorical variables was performed using absolute and relative frequencies; for continuous variables, mean, standard deviation, median, minimum and maximum.

The study used the chi-square test to verify the association between the variables Sex and Death with *delirium*. The *t* test evaluated the ratio between age and length of hospital stay with *delirium*, according to the verification of variance through the F test. For the analysis of the marital status, whether the patient lives with someone, the reason for hospitalization, and the results of CCI concerning *delirium*, it employed Fisher's exact test. As a level of significance, it adopted the value of 5%.

Researchers used multiple logistic regression to identify the factors associated with this syndrome and their respective odds ratios. For the selection of the model, they used the technique stepwise. After the choice, they used the ROC curve (Receiver Operating Characteristic) for quality evaluation. For the model, they only selected the significant variables ($P \leq 5\%$).

RESULTS

The sample presented in Table 1 is composed essentially of male subjects ($n = 394$; 53.90%), aged between 60 and 97 years, mean of 72 years and standard deviation (SD) of ± 8.62 , married or in a stable union ($n = 369$; 50.41%) and who do not live alone ($n = 704$; 96.17%).

The main reasons that led them to seek ER were diseases related to the circulatory system ($n = 221$; 30.19%); followed by fractures and injuries ($n = 101$; 13.80%). The maximum hospitalization time was 83 days, and the Mean Time was 10.08 days, with an SD of ± 10.92 (Table 1).

Table 1 indicates the results of the CAM instrument and signals the presence of *delirium* in 99 patients (13.52%). At a significance level of 5%, the findings indicate no association between sex ($p = 0.2938$), living with someone ($p = 0.5681$), marital status ($p = 0.4583$) and reason for hospitalization ($p = 0.0863$) with *delirium*. The statistical analysis indicates that there is a statistically significant association between death and the results of CCI with *delirium* ($p < 0,0001$).

Table 1 - Descriptive statistics of categorical variables related to *delirium*, Santa Maria, Rio Grande do Sul, Brazil, 2019

Variables (N = 732)	Delirium		Total n (%)	Test used	p value (α = 0.05)
	Positive CAM* n (%)	Negative CAM* n (%)			
Sex				Qui-square	0.2938
Male	48 (6.56)	346 (47.27)	394 (53.90)		
Female	51 (6.97)	287 (39.21)	338 (46.10)		
Marital Status				Fisher's exact	0.4583
Married	41 (5.60)	328 (44.81)	369 (50.41)		
Single	15 (2.05)	93 (12.70)	108 (14.75)		
Widow	28 (3.83)	152 (20.77)	180 (24.59)		
Divorced / Separated	9 (1.23)	53 (7.24)	62 (8.47)		
Others	6 (0.82)	7 (0.96)	13 (1.78)		
Live with someone				Fisher's exact	0.568
No	3 (0.41)	25 (3.42)	28 (3.83)		
Yes	96 (13.11)	608 (83.06)	704 (96.17)		
Reason for admission				Fisher's exact	0.0863
Diseases of the circulatory system	33 (4.51)	188 (25.68)	221 (30.19)		
Fractures and injuries	13 (1.78)	88 (12.02)	101 (13.80)		
Neoplasms	8 (1.09)	69 (9.43)	77 (10.52)		
Diseases of the digestive tract	6 (0.82)	64 (8.74)	70 (9.56)		
Diseases of the respiratory system	15 (2.05)	47 (6.42)	62 (8.47)		
Diseases of the genitourinary system	8 (1.09)	23 (3.14)	31 (4.23)		
Infectious and parasitic diseases	2 (0.27)	23 (3.14)	25 (3.42)		
Other external causes	4 (0.55)	44 (6.01)	48 (6.56)		
Other causes	10 (1.37)	87 (11.89)	97 (13.25)		
Death				Qui-square	< 0.0001
Yes	36 (4.92)	84 (11.48)	119 (16.27)		
No	63 (8.61)	549 (75)	612 (83.72)		
Charlson comorbidities index				Fisher's exact	< 0.0001
98% chance of survival	37 (5.05)	5 (0.68)	42 (5.73)		
89% chance of survival	21 (2.86)	296 (39.07)	317 (43.30)		
79% chance of survival	44 (6.01)	186 (25.40)	230 (31.42)		
64% chance of survival	29 (3.96)	114 (15.57)	143 (19.53)		
Total	99 (13.52)	633 (86.48)			

*CAM = Confusion Assessment Method.

It is relevant to point out that, by setting the significance level at 10%, the category reason for hospitalization would be associated with *delirium*. The study verified that this result occurs because not all reasons for hospitalization are related to this disorder. By reclassifying this variable to group the diseases of the circulatory, respiratory and genitourinary system and separating them from the other reasons for hospitalization in a binary variable, it shows that the reason for hospitalization has a significant association with the *delirium* at a significance level of 5% ($p = 0.0031$).

The results related to age and length of hospitalization also indicated an association with *delirium*, with $p < 0.0001$ e $p = 0.0003$, respectively. The analysis of the hospitalization time of patients who evolved to death demonstrated significance in the relationship with *delirium* (0.0156) (Table 2).

Table 3 presents the final model using the *stepwise*. The final evaluation of the model using the area under the ROC curve showed good discrimination of the results, with a value equal to 0.6924 in a 95% confidence interval (CI: 0.6378-0.7469).

Table 2 - Descriptive statistics of continuous variables related to *delirium*, Santa Maria, Rio Grande do Sul, Brazil, 2019

Variables	Delirium		Test used	p value (α = 0.05)
	Positive CAM*	Negative Cam*		
Age (years)			Teste t	< 0.0001
Mean (±SD**)	75.49 (8.92)	71.58 (8.46)		
Median	74	71		
Minimum-maximum	60-96	60-97		
Length of hospitalization (days)			Teste t	0.0003
Mean (±SD**)	10.17 (9.64)	10.06 (11.12)		
Median	8	7		
Minimum-maximum	0-64	0-83		
Hospitalization time for patients with death (days)			Teste t	0.0156
Mean (±SD**)	8.77 (7.43)	13.42 (13.12)		
Median	6.5	10		
Minimum-maximum	0-28	0-63		

*CAM = Confusion Assessment Method; **SD = standard deviation.

Table 3 - Multiple logistic regression model of the factors associated with *delirium*, Santa Maria, Rio Grande do Sul, Brazil, 2019

Variables	Estimate	Default error	Final Model		p value
			z Value	OR* (95% CI)	
(Intercept)	-6.4065	1.0064	-6.37	-	0.0000
Diseases of the circulatory system	0.6082	0.2565	2.37	1.84 (1.11-3.04)	0.0177
Diseases of the genitourinary system	1.3103	0.4549	2.88	3.71 (1.52-9.04)	0.0040
Diseases of the respiratory system	0.9888	0.3463	2.85	2.69 (1.36-5.30)	0.0043
Charlson	0.0703	0.0420	1.67	1.07 (0.99-1.16)	0.0944
Age	0.0517	0.0134	3.86	1.05 (1.03-1.08)	0.0001

*OR = Odds Ratio.

DISCUSSION

The results presented in this study demonstrate that the prevalence of *delirium* at ER is high (n = 98, 13.41%), in line with that indicated in other Brazilian screening studies conducted in the same environment⁽¹³⁻¹⁴⁾. The results also match the findings of research carried out in the emergency services of other countries and a meta-analysis^(7,15-16).

Age emerged as a variable strongly associated with *delirium* in this study (p < 0.0001). Several studies show that the disorder is age-dependent, that is, the older the age, the higher the chance of diagnosis, converging with the results presented here (OR: 1.05; CI (95%): 1.02-1.08)⁽¹⁷⁻¹⁹⁾. The sample was characterized, in its majority, by male individuals (n = 394, 53.90%), something common in research in the hospital environment, given the culture that discourages men to care for their health^(14,20).

Data related to death indicate a strong association with *delirium* (p < 0.0001), and among the patients who died, 35 (4.79%) were positive for this syndrome. The literature describes *delirium* as an independent predictor of mortality, with studies indicating a death rate between 6% and 15% in the emergency sector. In the present study, there was an association between time to death and *delirium* (p = 0.0156), showing that subjects with the syndrome end up dying earlier, according to the indication in the literature^(16,21-23).

A Brazilian study conducted in an intensive care unit (ICU) found that death, when related to *delirium*, reaches a rate of more than 28%. Another Brazilian study with elderly patients victims of femur fracture, pointed out that patients with such a disorder had approximately six times more chance of progressing to death⁽²³⁻²⁴⁾.

The model found in this study indicates that patients diagnosed with diseases of the circulatory system [OR: 1.81; 95% CI: 1.10-2.99], genitourinary [OR: 3.68; 95% CI: 1.51-8.96], and respiratory [OR: 2.68; 95% CI: 1.36-5.28] have greater chances of presenting *delirium* during their hospitalization since it corroborates to what was found in other studies, evidencing that the results presented here are satisfactory. The literature specifies the strong influence of diabetes, renal failure, and pneumonia as the principal diagnoses related to *delirium*⁽¹⁹⁾.

The findings also demonstrate a strong association between ICC and *delirium* (p < 0.0001), stating that patients with more coexisting diseases are more at risk of developing this syndrome during hospitalization. Relevant literature points out that cases of *delirium* not detected by the assistant team generally present a greater burden of comorbidities, indicating that the recognition

of this disorder may be affected by the number and/or complexity of previous diagnoses. Other studies evaluating survival and readmission show a strong association between *delirium* and higher results in CCI, increasing the chances of returning to the hospital and death during hospitalization and after discharge^(19,25-28).

The length of hospitalization of patients with *delirium* was higher when compared with those not diagnosed with the syndrome (p = 0.0003), ratifying the literature. A multicenter study conducted in Canada indicated that an episode of *delirium* increases hospital stay time by four days, so it has important implications for patients and can contribute to overcrowding^(18,26,29).

Regarding the reason for hospitalization and its relation to *delirium*, the specificity in the sample studied of diseases of the circulatory system is clear. Hypertension and diabetes mellitus are among the principal diseases that affect the elderly population in Brazil, causing significant limitations in the quality of life and increased mortality, which contributes to the development of cognitive impairments such as *delirium*^(14,20).

The literature extensively relates the diseases of the genitourinary system to *delirium*. In addition to generally being silent infectious conditions with less apparent symptomatology, they tend to require quite invasive practices, such as the use of a bladder probe^(13,25).

Despite the findings described here, the relationship between pathologies of the respiratory system and *delirium* is most commonly described in the literature in ICU or post-surgical settings, given the use of mechanical ventilation and the high risk of pneumonia after performing specific procedures^(3,19,23).

It is essential to highlight the absence of patients diagnosed with dementia in the sample, considering that, to date, there are no screening instruments for *delirium* validated for this specific population, which can generate a confounding factor for the data presented, considering some similarities in its manifestation. If there were patients diagnosed with dementia, they could not be part of the sample, which would characterize an exclusion criterion⁽³⁰⁾.

The number of Brazilian surveys involving *delirium* has been growing recently, but when it comes to the emergency sector, this number decreases again. Conducting a study in an emergency environment is a challenge already pointed out by the literature because it is a space marked by overcrowding, where professionals are usually overloaded, in poor working conditions, in search of the balance between the care of the critically ill patient and those who are waiting for a bed for hospitalization⁽³¹⁻³²⁾. Such a scenario requires a research framework capable of covering these limitations, with selection criteria and sample size that

suit the environment, but without losing its scientific rigor and generalization capacity. Therefore, the cross-sectional design was adequate to the requirements of the study site⁽³³⁾.

Study limitations

The study limitations are those intrinsic to cross-sectional studies conducted in a single location, given its limited ability to generalize the results and inability to make causal inferences. In addition, the use of pre-existing clinical data restricted the number of variables and the overall adequacy of the data according to the clinical picture studied.

Contributions to the fields of Nursing, Health or Public Policy

The results described here are valuable for future analyses related to the impact of aging on practical issues of Health Services, clinical pictures with higher prevalence among the elderly, and their respective results, contributing to a more precise analysis of the situation of this population in hospital emergency services.

CONCLUSION

This study aimed to verify the incidence of *delirium* in the emergency sector, presenting relevant results that require greater attention, such as high incidence of the syndrome among the elderly and a strong relationship with death. Because it is reversible and exhibits such adverse outcomes for patients, the scientific community must turn its attention to this clinical picture, especially when observing the rapid demographic transition that the country faces.

The shortage of studies related to *delirium* in the elderly in Brazil is undeniable. This lack can lead to health professionals having less knowledge about its significant impact on the clinical evolution of the patient, as demonstrated in this study.

Therefore, it is necessary to investigate issues related to hospitalized elderly, especially in the emergency sector. Not modifying the behaviors and not adapting the protocols of care is a way of denying the aging of the population and its high demand for health care, causing preventable deaths, development of unnecessary limitations, and overcrowding.

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