

DELIRIUM AND LENGTH OF STAY IN THE INTENSIVE CARE UNIT

DELIRIUM E TEMPO DE PERMANÊNCIA EM UNIDADE DE TERAPIA INTENSIVA

DELIRIUM Y TIEMPO DE PERMANENCIA EN LA UNIDAD DE CUIDADOS INTENSIVOS

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Objective: to analyze the association between *delirium* and length of stay in the Intensive Care Unit. **Method:** prospective cohort study conducted in the intensive care unit of a university hospital of São Paulo, Brazil, between October and December 2017. The participants were all patients aged over 18 years. The independent variables were the clinical and demographic data, and the length of stay. The dependent variable was the *delirium*, measured by the instrument Confusion Assessment Method (ICU). Data analysis was performed with descriptive statistics, Spearman's correlation, V Cramer test, and the logistic regression model to test the association. **Results:** *delirium* was identified in 48.5% of severe patients and correlated with the number of doses of medicine and length of stay. The condition of liberation showed a significant difference between patients with and without *delirium*. **Conclusion:** the length of stay increased in almost 10.0% the chance of *delirium* in the Intensive Care Unit.

Descriptors: Nursing. Intensive Care Units. Critical Care. *Delirium*. Length of Stay. Nursing Assessment.

Objetivo: analisar a associação entre *delirium* e tempo de permanência na Unidade de Terapia Intensiva. **Método:** estudo de coorte prospectivo conduzido na terapia intensiva de um hospital universitário de São Paulo, Brasil, entre outubro e dezembro de 2017. Participaram todos os pacientes acima de 18 anos. As variáveis independentes foram os dados clínicos, demográficos e o tempo de permanência. A variável dependente foi o *delirium*, medido pelo instrumento Confusion Assessment Method (ICU). Na análise dos dados, foi realizada a estatística descritiva, correlação de Spearman, teste V Cramer e o modelo de regressão logística para o teste de associação. **Resultados:** o *delirium* foi identificado em 48,5% dos pacientes graves e correlacionado com número de doses de medicamento e tempo de permanência. A condição de saída apresentou diferença significativa entre pacientes com e sem *delirium*. **Conclusão:** o tempo de permanência aumentou em quase 10,0% a chance de *delirium* na Unidade de Terapia Intensiva.

Descritores: Enfermagem. Unidades de Terapia Intensiva. Cuidados Críticos. *Delirium*. Tempo de Internação. Avaliação em Enfermagem.

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Objetivo: analizar la asociación entre el delirium y el tiempo de permanencia en la Unidad de Cuidados Intensivos. Método: estudio de cohorte prospectivo realizado en la unidad de cuidados intensivos de un hospital universitario de São Paulo, Brasil, entre octubre y diciembre de 2017. Participaron todos los pacientes mayores de 18 años. Las variables independientes fueron los datos clínicos, demográficos y el tiempo de permanencia. La variable dependiente fue el delirium, medido por el instrumento Confusion Assessment Method (ICU). En el análisis de datos, se utilizaron estadística descriptiva, correlación de Spearman, prueba V de Cramer, y el modelo de regresión logística para probar la asociación. Resultados: el delirium fue identificado en 48,5% de pacientes graves y se correlacionó con el número de dosis de medicamento y el tiempo de permanencia. La condición de salida mostró una diferencia significativa entre los pacientes con y sin delirium. Conclusión: el tiempo de permanencia incrementó en casi 10,0% la probabilidad de delirium en la Unidad de Cuidados Intensivos.

Descriptor: Enfermería. Unidades de Cuidados Intensivos. Cuidados Críticos. El Delirio. El Tiempo de Internación. Evaluación en Enfermería.

Introduction

Delirium is a neurobehavioral dysfunction characterized by agitation, defined as an acute confusion and floating state of consciousness, cognition and thought, which can evolve with delusions and hallucinations. In the Intensive Care Unit (ICU), *delirium* is a dysfunction often triggered from factors that may lead to confusion or psychomotor agitation, such as: treatment, clinical severity of patients, complexity of the environment, drugs and specialized interventions⁽¹⁾. These aspects make essential to investigate its incidence.

Due to the multiplicity of clinical manifestations, *delirium* is classified according to the degree of psychomotor activity, in hypoactive, hyperactive or mixed⁽²⁻³⁾. The clinical manifestations of *delirium* have different intensities, which vary according to the patient and the stimuli received. The hypoactive *delirium* is characterized by drowsiness; the hyperactive *delirium*, by emotional changes, erroneous and unconnected interpretations with disorientation, loss of recent memory, disorders of the sleep-wake cycle and inability to cooperate; the mixed *delirium* presents a variation of the hypoactive clinical characteristics and sleepiness until extreme psychomotor agitation with hallucinations in the hyperactive form⁽⁴⁾.

The hospitalization, especially in the ICU, characterized by its complex and closed environment, treatment with analgesic and sedative drugs, comorbidities, interruption of sleep-wake cycle, infections, use of mechanical ventilation, metabolic disorders and various

invasive interventions that interfere in the senses, undermines the perception of the environment, favoring the occurrence of *delirium*⁽⁵⁾.

Studies that investigated the incidence of *delirium* found evidence from 47% to 80% of the dysfunction among severe patients⁽⁶⁻⁸⁾, which may be associated with increased use of sedatives and mechanical restraints⁽⁹⁾. Despite the high incidence, the diagnosis is not often performed correctly, jeopardizing the treatment and the clinical evolution of the patients⁽⁸⁾, in addition to the difficulty of rehabilitation of functional and cognitive deficit, which can jeopardize safety⁽⁹⁾.

Studies that investigated the relationship between *delirium* and patient safety found that the lack of diagnosis and treatment can lead to accidental removal of invasive devices, such as catheters and tubes, due to psychomotor agitation, the increased use of invasive mechanical ventilation, morbidity and mortality of patients⁽⁹⁻¹⁰⁾.

Another study identified the association between *delirium* in the ICU and age in 35,4%⁽²⁾ of the patients, severity of acute pathologies, decreased functionality and increased cognitive impairment and intra-hospital mortality in up to four times⁽²⁾, in addition to the use of sedatives and analgesics. These circumstances led to the indication of non-pharmacological measures as an alternative detention of *delirium*, and the use of scales for the early detection of this dysfunction^(5-6,11).

Another complication identified in association with the occurrence of *delirium* is the length of stay in the ICU. When extended, it exposes

the patient to a greater number of invasive procedures, necessary for the treatment of the severe patient, use of sedatives and complications arising from the clinical condition itself, which affect the sensory and cognitive perception of the patient and, consequently, the occurrence of *delirium*. Furthermore, it increases the cost of care in up to 39% compared to patients without the condition⁽¹¹⁾.

Studies that investigated the incidence of *delirium* and length of stay in the ICU reinforce that its increase time is associated with the occurrence of *delirium*⁽¹²⁻¹³⁾.

The identification and diagnosis of this dysfunction promote the planning of care and fundamental aspects for the clinical evolution of the patient in the ICU. The early treatment of clinical manifestations affects the patients' outcomes, decreases the length of stay and the complications that may result from exposure to the ICU environment.

This study aims to analyze the association between *delirium* and length of stay in the Intensive Care Unit (ICU).

Method

A prospective cohort study was conducted in the general ICU of a university hospital in West São Paulo, Brazil. The unit has 20 beds for the treatment of severe patients from the emergency room, surgical center and inpatient units. The study was carried out between September and November 2017.

The non-probabilistic sample of convenience comprised clinical and surgical patients aged 18 years or more, regardless of the length of stay, and excluded those patients with diagnosis of senile dementia and Alzheimer's disease.

The independent variables were: sex, age range, age, type of treatment (clinical or surgical), length of stay in the ICU, comorbidities, number of comorbidities, SAPS III⁽¹⁴⁾, use of mechanical ventilation, use of sedation, use of daily awakening, diagnosis of infection, use of drug therapy for *delirium*, number of doses of medicine for *delirium* and condition of liberation from

the ICU (discharge or death). The dependent variable was represented by the Confusion Assessment Method-ICU (CAM-ICU), which measures the presence or absence of *delirium*.

Validated for the Brazilian culture⁽¹⁵⁾, the CAM-ICU evaluates the *delirium* through four dimensions: fluctuation of the baseline mental status, inattention, altered level of consciousness and disorganized thought. The presence of *delirium* is defined when the first two characteristics are positive, and the last two are present⁽¹⁶⁻¹⁷⁾.

The clinical and demographic data were collected from the medical records by the resident nurse of the Multiprofessional Residency in Intensive Care. The CAM-ICU was also strictly applied by the resident nurse every 12 hours during the first five days of hospitalization to all patients. In case of absence of the disorder, the evaluation continued on alternate days until the patient's from the ICU. In case of presence of *delirium*, the application of the instrument continued daily for five consecutive days or until its remission.

The data analysis was performed through descriptive statistics with absolute and relative frequencies, measures of central tendency (means, standard deviations), maximum and minimum values. The groups with and without *delirium* were compared through the V Cramer test. The Spearman correlation test evaluated the correlation between quantitative variables and the presence of *delirium*. The strength of weak correlation measured 0.20-0.29, mean 0.30-0.49 and strong ≥ 0.50 ⁽¹⁸⁾. To identify the association between length of stay and the presence or absence of *delirium*, the logistic regression analysis was used, with adjustment by the Hosmer-Lemeshow test. Statistical analyses were performed with the Statistical Package for Social Sciences (SPSS) 23.0, considering the statistical significance p-value < 0.05.

This study was approved by the Research Ethics Committee of the institution with Opinion n. 1355 and protocol CAAE n. 72192717.0.0000.5515, following the ethical precepts required in Resolution 466/12 of the National Health Council. When the patient had no clinical conditions to

authorize his/her participation in the study, the contact was made with the family or guardian.

Results

The sample was composed of 101 patients, and, among these, 49 (48.5%) presented *delirium* at some time during the stay in the ICU.

The main conditions of patients with *delirium* had cardiorespiratory, neurological and hematological origin. Among the surgical patients (21.8%), the main reasons were orthopedic, neurological, gastrointestinal surgeries. The patients with comorbidities presented a higher proportion of presence of *delirium* (37.6%). As only 9.9% of patients made use of

sedatives in some moment of their stay in the ICU, the proportion of the daily awakening was low, both in patients with positive diagnosis of *delirium* (8.9%), as in patients without *delirium* in the ICU (5.9%).

The main infections were sepsis and septic shock (with the main sources of pulmonary, urinary and skin types) in greater proportion among the patients without *delirium* (16.8%).

In relation to the behavior to treat *delirium* in this study, 36.7% of the patients presented the use of physical restraint and 11.9%, in addition to the physical restraint, made use of pharmacological measure, with haloperidol as the drug of choice used in all cases.

Table 1 – Comparison of clinical and demographic variables of patients, according to the presence and absence of *delirium*. Presidente Prudente, São Paulo, Brazil – 2017 (N=101)

Variables	<i>Delirium</i>		Total (%)	p*
	Yes (%)	No (%)		
Sex				0,824
Female	17.8	17.8	35.6	
Male	30.7	33.7	64.4	
Age range				0.192
Up to 30 years	4.0	2.0	5.9	
31 - 60 years	14.9	25.7	40.6	
61 - 80 years	23.8	20.8	44.6	
Over 81 years	5.9	3.0	8.9	
Type of treatment				0.369
Surgical	21.8	27.7	49.5	
Clinical	26.7	23.8	50.5	
Comorbidities				0.603
Yes	37.6	37.6	75.2	
No	10.9	13.9	24.8	
Mechanical ventilation				0.653
Yes	20.8	19.8	40.6	
No	27.7	31.7	59.4	
Sedation				0.582
Yes	9.9	12.9	22.8	
No	38.6	38.6	77.2	
Daily awakening				0.335
Yes	8.9	5.9	14.9	
No	39.6	45.5	85.1	
Infection				0.822
Yes	14.9	16.8	31.7	
No	33.7	34.7	68.3	
Condition of liberation				0.004
Discharge	44.6	35.6	80.2	
Death	4.0	15.8	19.8	

Source: Created by the authors.

* V Cramer test.

Table 2 shows that the comorbidities, although frequent in patients with a diagnosis of *delirium*, showed no statistical significance.

Table 2 – Comparison of patients' comorbidities according to presence and absence of *delirium*. Presidente Prudente, São Paulo, Brazil – 2017. (N=101) (continued)

Comorbidities	<i>Delirium</i>		Total (%)	p*
	Yes (%)	No (%)		
Alcoholism				0.443
Yes	2.0	4.0	6.0	
No	46.5	47.5	94.0	
Cerebrovascular accident				0.359
Yes	4.0	2.0	5.9	
No	44.6	49.5	94.1	
Sickle cell anemia				0.329
Yes	-	1.0	1.0	
No	48.5	50.5	99.0	
Hepatitis C				0.329
Yes	-	1.0	1.0	
No	48.5	50.5	99.0	
Diabetes mellitus				0.526
Yes	12.9	10.9	23.8	
No	35.6	40.6	76.2	
Systemic arterial hypertension				0.640
Yes	22.8	21.8	44.6	
No	25.7	29.7	55.4	
Heart disease				0.570
Yes	4.0	5.9	9.9	
No	44.6	45.5	90.1	
Parkinson				0.329
Yes	-	1.0	1.0	
No	48.5	50.5	99.0	
Bronchitis				0.966
Yes	1.0	1.0	2.0	
No	47.5	50.05	98.0	
Cancer				0.279
Yes	3.0	1.0	4.0	
No	45.5	50.5	96.0	
Smoking				0.500
Yes	8.9	6.9	15.8	
No	44.6	39.6	84.2	
Depression				0.070
Yes	3.0	0.0	3.0	
No	45.5	51.5	97.0	
Dyslipidemia				0.141
Yes	2.0	0.0	2.0	
No	46.5	51.5	98.0	
Hypothyroidism				0.966
Yes	1.0	1.0	2.0	
No	47.5	50.5	98.0	
Chronic obstructive pulmonary disease				0.443
Yes	2.0	4.0	6.0	
No	46.5	47.5	94.0	

Table 2 – Comparison of patients' comorbidities according to presence and absence of *delirium*. Presidente Prudente, São Paulo, Brazil – 2017. (N=101) (conclusion)

Comorbidities	<i>Delirium</i>		Total (%)	p [*]
	Yes (%)	No (%)		
Drug addiction				0.301
Yes	1.0%	0.0	1.0	
No	47.5	51.5	99.0	
Epilepsy				0.952
Yes	2.0	2.0	4.0	
No	46.5	49.5	96.0	
Nephropathy				0.966
Yes	1.0	1.0	2.0	
No	47.5	50.5	98.0	
Heart failure				0.329
Yes	-	1.0	1.0	
No	48.5	50.5	99.0	
Miastenia gravis				0.329
Yes	-	1.0	1.0	
No	48.5	50.5	99.0	
Obesity				0.329
Yes	-	1.0	1.0	
No	48.5	50.5	99.0	
People living with HIV/AIDS				0.598
Yes	3.0	2.0	5.0	
No	45.5	49.5	95.0	

Source: Created by the authors.

Note: Conventional signal used:

- Numerical data equal to zero not resulting from rounding.

* V Cramer test.

The drug of choice for the treatment of *delirium* was haloperidol, with a maximum of 13 doses in the same patient.

In relation to the length of stay of patients with a positive diagnosis for *delirium*, the

minimum was 2 days, in a patient from orthopedic surgery, and the maximum, 30 days, in a patient with respiratory dysfunction.

Table 3 – Descriptive measure of quantitative variables. Presidente Prudente, São Paulo, Brazil – 2017 (N=101)

Variables	n	Mean	Standard deviation	Minimum	Maximum
Age (years)	101	58	17	19	89
Number of comorbidities	101	1	1	-	3
SAPS III	101	53	22	21	105
Number of doses of medication for <i>delirium</i>	49	1	2	-	13
Length of stay (days)	101	7	6	2	30

Source: Created by the authors

Note: Conventional signal used:

- Numerical data equal to zero not resulting from rounding.

The variables Number of doses of medication for *delirium* ($p=0.000$) and Length of stay in the ICU ($p=0.007$) showed a statistically significant

positive correlation with the presence of *delirium* (Table 4).

Table 4 – Correlation between patients' quantitative variables and the presence of *delirium*. Presidente Prudente, São Paulo, Brazil – 2017 (N=101)

Variables	Rho	p*
Age (years)	0.169	0.091
Number of comorbidities	0.068	0.500
Number of doses of medication for <i>delirium</i>	0.377	0.000
Length of stay in the ICU (days)	0.266	0.007

Source: Created by the authors.

* Spearman's correlation test.

Table 5 shows an increase of almost 10% of chance of *delirium* ($p=0.011$) for each day added to the length of stay in the ICU. The adjustment

of the model held by the Hosmer-Lemeshow test confirmed the quality of the results ($p=0.541$).

Table 5 – Association between length of stay and *delirium*. Presidente Prudente, São Paulo, Brazil – 2017 (N=101)

Variable	Estimate	Standard error	Odds ration	95% confidence interval	p*
Constant	-0.685	0.309	0.504		0.027
Length of stay	0.094	0.037	1.099	1.022 - 1.182	0.011

Source: Created by the authors.

* Logistic regression.

Discussion

The importance of identifying the incidence of *delirium* and its association with the length of stay in the ICU allows investigating strategies for care promotion through early assessment and treatment of clinical manifestations of *delirium*, thus reducing the period of hospitalization and the consequent exposure of patients to invasive procedures and interventions that comprise their intensive treatment.

This study found an increase of almost 10% of chances of occurrence of *delirium* for each day added to the length of stay in the ICU. This result can be justified by a statistically significant correlation between the presence of *delirium* and the length of stay in the unit and the number of doses of medications for treating *delirium*. In this study, the haloperidol was the drug of choice for the treatment of *delirium*, also referred to

in the literature as the drug for prophylaxis of high risk for *delirium*^(5,19). However, the results showed that the increased length of stay in the ICU and the use of medicines for the treatment of *delirium* reinforced the increased incidence of this manifestation.

The literature reinforces the occurrence of *delirium* caused by the increased length of stay in the ICU due to the increased time of exposure to *delirium*-triggering factors, such as the use of sedatives, mechanical ventilation, therapeutic interventions⁽¹¹⁻¹³⁾, preexisting cognitive deficit, use of psychoactive drugs, presence of untreated pain, clinical complications, such as heart failure, immobilization, hypertension, anemia, sleep deprivation and sepsis⁽⁷⁾.

The other clinical variables investigated showed no association with the occurrence of *delirium* in this study, but the condition of liberation from the ICU showed statistically

significant difference in relation to the patients with and without *delirium*. The literature reinforces that the incidence of *delirium* can increase from three⁽⁷⁾ to five⁽²⁰⁾ times the odds of death. This result is due to aspects that affect the *delirium* and may lead to clinical complications, such as acute diseases, comorbidities and use of drug therapies, especially benzodiazepines⁽⁷⁾.

Despite the absence of association of *delirium* with sedatives in this sample, the literature identifies that patients who had developed *delirium* made use of benzodiazepines⁽²¹⁾. Alpha2-agonists may be better options, because they have been associated with the decrease of 4 days in the pathology length, in comparison to benzodiazepines⁽⁶⁾, representing benzodiazepines-saving strategies. Thus, they decrease the risk of *delirium* and other aspects that also influence the occurrence of the event, such as mechanical ventilation and length of stay in the ICU⁽⁷⁾. These results reinforce the importance of carefully monitoring the indication of sedatives in the ICU⁽²¹⁾.

In order to achieve a level of sedation beneficial to the patient's clinical conditions, current recommendations suggest a method based on daily interruption of sedation, which indicates the suspension of the drug on a daily basis and, if necessary, restarting with half the dose prior to suspension, assessing the patient's needs. This measure reduces the length of mechanical ventilation and hospitalization, with consequent reduced risk of *delirium* and increased survival at the end of a year⁽²²⁾. The relationship between mechanical ventilation and *delirium* in the ICU is justified by the increased length of stay and use of sedation⁽⁷⁾.

Despite the absence of association in the present study, the literature presents results of the incidence of *delirium* in greater proportion among men, corresponding to 78% of the analyzed sample⁽²³⁾. In relation to age, the world population aging and changes in hospital practice identify an increasing number of elderly patients with this condition⁽²⁴⁻²⁵⁾. Furthermore, the severity of acute pathologies negatively affects the functionality of base lines and cognitive impairment⁽²⁾.

Among the patients with *delirium*, 37.6% feature some type of comorbidity and 10.9% of those without any prior pathology are young people with a diagnosis of ICU hospitalization caused by trauma.

Concerning infection, only 14.9% of the patients in this study with *delirium* had sepsis. Nevertheless, the literature shows higher risk by neuronal dysfunction caused by the presence of pro-inflammatory oxytocin and microglial activation that leads to neuronal loss⁽²⁵⁾, indicating the importance of applying the CAM-ICU for the identification of the clinical condition⁽¹⁶⁻¹⁷⁾.

The prior impairment of mental functions, such as the presence of depression, can act as a triggering factor and increase the risk for the occurrence of *delirium* in ICU patients, resulting from the use of drugs and lack of prevention⁽²³⁾.

The study shows that the application of the CAM-ICU instrument to identify the clinical signs of *delirium* allows early deploying therapeutic measures to reduce the risks of increasing the length of stay and death, besides promoting interventions on aspects that may influence the occurrence of this manifestation. In this way, this instrument represents a measure of effective therapeutic intervention for clinical practices of nursing care and patient safety.

The performance of nursing professionals, especially nurses, is essential to deploy the instrument in the control of *delirium*. Non-pharmacological measures can also be implemented aiming to prevent the clinical manifestations of this dysfunction, such as noise reduction and decreased nocturnal illumination, promoting the perception of the environment, windows and clocks to improve the time orientation⁽⁵⁾ and malleability of the schedule of visits, which allows greater interaction with family and communication^(6,11). Other measures include early mobilization to avoid body immobilization, use of goggles and hearing devices, promotion of sleep, prevention of hypovolemia, guidance and implementation of therapeutic activities to stimulate cognitive functions⁽¹¹⁾. Physical restraint is another non-pharmacological measure applied to prevent unplanned loss of oxygen, tubes, venous catheters, but can precipitate new

occurrences of *delirium* and cause injury to the patient. Therefore, it should be indicated with specific criteria, through medical prescription⁽⁵⁾.

This study, developed in only one ICU with follow-up of few months, has as a limitation the reduced sample size. The results can promote safe nursing practices and influence the best outcomes of patients in the institution, but do not represent measures that can be generalized.

Conclusion

The length of hospitalization increased by almost 10.0% the chance of *delirium* in the ICU, which may have been influenced by the number of doses of haloperidol, a drug used to treat erectile dysfunction, and by the increased length of stay.

Collaborations:

1 – conception, design, analysis and interpretation of data: Ana Carolina Fácio Azevedo, Ana Maria Silva Camargo and Elaine Machado de Oliveira;

2 – writing of the article and relevant critical review of the intellectual content: Ana Carolina Fácio Azevedo, Ana Maria Silva Camargo and Elaine Machado de Oliveira;

3 – final approval of the version to be published: Ana Maria Silva Camargo and Elaine Machado de Oliveira.

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