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RESEARCH

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INCIDENCE OF PRESSURE ULCER IN SPINAL CORD INJURED PATIENTS ADMITTED TO INTENSIVE CARE UNITS

Incidência de lesão por pressão em lesados medulares internados em unidades de terapia intensiva

Incidencia de lesión por presión en lesionados medulares internados en unidades de terapia intensiva

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ABSTRACT

Objective: To verify the incidence of pressure ulcer in patients with spinal cord injury admitted to intensive care units immediately after trauma and the risk factors for its development. **Method:** epidemiological and retrospective study through analysis of medical records from July 2013 to July 2014. Descriptive analysis was performed and the proportions were compared by nonparametric test. **Results:** we analyzed 98 medical records of clients with spinal cord injury and 64 developed pressure ulcer, overall incidence coefficient of 65.3%. The incidence was higher in females and the higher the average age the higher its incidence. Passive bed mobility and length of stay were positively correlated with the onset of pressure ulcer. **Conclusion:** spinal cord injuries are susceptible to the emergence of pressure ulcer in the first hospitalization after trauma and its impact is significant because it is a barrier to social reintegration.

Descriptors: Pressure ulcer, Spinal Cord injuries, Incidence, Nursing care, Intensive care units.

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RESUMO

Objetivo: Verificar incidência de lesão por pressão em clientes com lesão medular internados em Unidades Intensivas logo após o trauma e os fatores de risco para seu desenvolvimento. **Método:** estudo epidemiológico e retrospectivo através de análise dos prontuários período de julho de 2013 a julho de 2014. Foi realizada análise descritiva e comparou-se as proporções por meio de teste não paramétrico. **Resultados:** analisou-se 98 prontuários de clientes com lesão medular e 64 desenvolveram lesão por pressão, coeficiente global de incidência de 65,3%. A incidência foi maior no sexo feminino e quanto maior a média de idade maior a sua incidência. A mobilidade no leito passiva e o tempo de internação teve correlação positiva com o surgimento de lesão por pressão. **Conclusão:** lesados medulares apresentam-se susceptíveis ao surgimento de lesão por pressão na primeira internação após o trauma e o seu impacto é significativo pois configura-se como barreira à reintegração social.

Descritores: Lesão por pressão, Traumatismos da medula espinhal, Incidência, Cuidado de enfermagem, Unidades de terapia intensiva.

RESUMEN

Objetivo: Verificar la incidencia de lesión por presión en pacientes con lesión de la médula espinal ingresados en unidades de cuidados intensivos inmediatamente después del trauma y los factores de riesgo para su desarrollo. **Método:** estudio epidemiológico y retrospectivo a través del análisis de registros médicos de julio de 2013 a julio de 2014. Se realizó un análisis descriptivo y las proporciones se compararon mediante una prueba no paramétrica. **Resultados:** analizamos 98 registros médicos de clientes con lesión de la médula espinal y 64 lesiones por presión desarrolladas, coeficiente de incidencia general del 65,3%. La incidencia fue mayor en las mujeres y cuanto mayor es la edad promedio, mayor es su incidencia. La movilidad pasiva en cama y la duración de la estadía se correlacionaron positivamente con el inicio de la lesión por presión. **Conclusión:** las lesiones de la médula espinal son susceptibles a la aparición de lesiones por presión en la primera hospitalización después del trauma y su impacto es significativo porque es una barrera para la reintegración social.

Descriptores: Úlcera por presión, Traumatismos de la médula espinal, Incidencia, Atención de enfermería, Unidades de cuidados intensivos.

INTRODUCTION

Spinal cord injuries (SCI) are considered a major public health problem in Brazil¹ and have different etiologies, most often due to external causes such as traffic accidents, gunshot wounds or stabbing, falls, diving, acts of violence and sports injuries². This is an attack to the spinal cord that causes neurological damage, such as changes in motor, sensory and autonomic function implying partial or total loss of voluntary movements or sensitivity (tactile, painful and deep) below the level of the traumatic injury. Urinary and fecal sphincter control is also lost¹⁻².

SCI can be analyzed from the level of impairment and the *American Spinal Injury Association* (ASIA) rating scale. As for the level, it can be complete resulting in quadriplegia or paraplegia; or it may be incomplete, causing tetraparesis or paraparesis².

Pressure ulcer (PU) is one of the most frequent

complications among people with SCI¹⁻³, as they are clinically susceptible to the development of these wounds due to several factors, such as: skin moisture resulting from urinary and fecal incontinence; average length of stay and, above all, the high degree of dependence, reduced bed mobility and loss of sensation⁴.

It is localized damage to the skin and/or underlying soft tissue that originates over an area of bony prominence or is related to the use of a medical device or other artifact as a result of intense and/or prolonged pressure in combination with the shear. SCI are classified as stage 1, stage 2, stage 3, stage 4¹, non-classifiable, deep tissue, medical device-related³ and SCI in mucous membranes^{1,4}.

Studies conducted by Brazilian nurses in teaching and research hospitals^{1,4}, aiming at the incidence of PU in clients with SCI admitted to the Intensive Care Unit (ICU), reveal worrying data, considering that they are units for high complexity treatment, the level of knowledge of nursing about its risks, the increased costs of hospitalization⁵⁻⁷ and the delay in entering these clients in physical rehabilitation programs^{2,4,7}.

OBJECTIVE

To verify the incidence of pressure ulcer (PU) in clients with spinal cord injury (SCI) admitted to intensive care units immediately after trauma and the risk factors for its development.

METHODS

Design, location and period

This is an epidemiological, retrospective (documentary) study that evaluated the incidence of PU by analyzing medical records of people diagnosed with SCI who were admitted shortly after trauma in the ICU of two large hospitals of the Rio de Janeiro State Public Network between July 2013 and July 2014. The survey and analysis of the medical records was conducted from November 2014 to March 2015.

Population, inclusion and exclusion criteria

The studied population consisted of those from the medical records of patients with SCI who were admitted to the ICU after trauma (without the presence of PU at admission) during the period of study. The search was made through an electronic listing provided by the ICU department of the hospital¹ with all clients hospitalized in the period and their referred diagnosis and active manual search in the Book of ICU². From this, people with diagnosis of SCI were selected for structured analysis of medical records.

The inclusion criterion was for medical records of clients diagnosed with SCI admitted from July 2013 to July 2014 in ICU after trauma in the two collection hospitals. Medical

records of occurrences recorded outside the demarcated period for this study were excluded.

Study Protocol

The first stage of data collection was by requesting the listing to the responsible sector of all hospitalizations in the ICU during the study period with the referred diagnoses of clients. Then, the number of medical records of individuals with SCI were identified and selected.

The second stage occurred by requesting the medical records listed by the number of the Medical and Statistical Archives (Serviço de Arquivo Médico e Estatística - SAME) hospitalization bulletin. Initially, 347 medical records were selected with the various diagnoses suggestive of SCI. After analysis of the definitive diagnosis, cases of diagnoses that did not include SCI were excluded. The final sample consisted of 98 records of people with SCI analyzed.

Through a structured script, clients were identified regarding sociodemographic variables such as gender, date of birth (age) and marital status; identification of variables related to SCI, such as the client's clinical characteristics including etiology of SCI, date of occurrence and length of stay, ASIA classification, spinal cord impairment, neurological level, surgery after admission; identification of predisposing factors for PU such as bed mobility (active and passive), nutritional status, intubation (yes, no), sedation (yes, no), comorbidities (yes, no), urinary and fecal incontinence; and variables regarding the presence of PU, such as classification, PU location, PU number, application of risk assessment scale at admission and applied risk assessment scale.

Results analysis and statistics

Data analysis was performed after database creation through spreadsheet typing in Microsoft Office Excel program (2010 version). The statistical program R (R version 3.0.2 Copyright (C) 2013) was used for the statistical analysis of the data.

To describe and present sociodemographic and clinical data, a descriptive analysis was performed. The sample does not come from a normal distribution, so the conditions for performing parametric exams were not satisfactory. To verify the level of significance between associations of sociodemographic and clinical aspects with the SCI and PU, the proportions were compared using the non-parametric Chi-squared test, *Wilcoxon*, *Kruskall-Wallis*, and *Spearman's Rank correlation coefficient*. Variables with cells lower than 01 were not tested for associations. The level of statistical significance considered was $p \leq 0.05$.

Logistic regression was used to analyze the association between the presence of PU (dichotomous variable: developed or not developed PU) and the response variable (length of stay; mobility in bed), estimating an unexpected conditional value. For the interpretation of the estimated coefficients it was necessary to apply the exponential

transformation for practical interpretation.

Ethical aspects

The project was submitted to the Research Ethics Committee (REC) of the Federal University of Rio de Janeiro and approved to accomplish with the ethical requirements of research involving human subjects, Presentation Certificate for Ethics Appreciation number 34037214.8.0000.5285.

RESULTS

The survey of medical records in SAME with confirmed diagnosis of SCI identified 98 clients who met the search criteria.

Most of the patients with SCI in the study are single, male and had a ratio of 4.4 men to each woman. The age of people with SCI admitted to the ICU after trauma ranged from 13 to 88 years, with a mean age of 40 and standard deviation (SD) of 19.6, with 39 (39.8%) young adults aged 21 and 40 years old. It is important to highlight that there were 16 people over 61 years old.

Table 1 - Distribution of clients with SCI admitted to the ICU according to sociodemographic and clinical variables. *Rio de Janeiro*, RJ, Brazil, 2015

Variables	No.	%
GENDER		
Female	18	18.4
Male	80	81.6
AGE		
< 20	16	16.3
21 - 40	39	39.8
41 - 60	27	27.6
> 61	16	16.3
MARITAL STATUS		
Married	30	30.6
Single	52	53.1
Divorced	1	1
Common-law married	8	8.2
Widowed	7	7.1
SCI ETIOLOGY		
Fall	34	34.7
Car accident	22	22.5
Fire guns	21	21.4
Motorcycle accident	10	10.2
Run over	5	5.1
Diving	3	3.1
Cold steel	1	1
NEUROLOGICAL LEVEL		
Cervical Trauma	51	44.7
Chest Trauma	44	38.6
Lumbar Injury	18	15.8
Sacral Trauma	1	0.9
MEDULAR DAMAGE		
Paraplegia	36	36.7
Quadriplegia	27	27.6
Paraparesis	20	20.4
Tetraparesis	15	15.3

Table 2 - Distribution of clients with SCI according to the presence of PU and sociodemographic and clinical variables. *Rio de Janeiro*, RJ, Brazil, 2015

Variables	INJURY BY PRESSURE				Total	P
	Yes		Não			
	No.	%	No.	%		
GENDER						
Female	13	72.2	5	27.8	18	0.495
Male	51	63.8	29	36.2	80	
AGE						
< 20	6	37.5	10	62.5	16	0.000
21 - 40	28	71.8	11	28.2	39	
41 - 60	17	63	10	37	27	
MEDULAR DAMAGE						
Paraplegia	27	75	9	25	36	0.254
Tetraplegia	18	66.7	9	33.3	27	
Paraparesis	12	60	8	40	20	
Tetraparesis	7	46.7	8	53.3	15	
COMORBIDITIES						
						0.963

Yes	21	65.6	11	34.4	32	
No	43	65.2	23	34.8	66	
REASON FOR LEAVING						0.554
Estabilization and transfer	41	62.1	25	37.9	66	
Death	23	71.9	9	28.1	32	
SURGICAL PROCEDURE						0.390
Yes	45	68.1	21	31.8	66	
No	19	59.4	13	40.6	32	

Table 3 - Distribution of clients with SCI according to the presence of PU and length of stay in the ICU. *Rio de Janeiro*, RJ, Brazil, 2015

Variable	INJURY BY PRESSURE				Total
	Yes		No		
	No.	%	No.	%	
ICU HOSPITALIZATION TIME					
< 7 days	11	30.5	25	69.5	36
8 - 15 days	16	80	4	20	20
16 - 21 days	11	73.3	4	26.7	15
22 - 35 days	9	100	0	0	9
36 - 51 days	6	85.7	1	14.3	7
> 52 days	11	100	0	0	11

Table 4 - Distribution of clients with SCI according to the presence of PU and clinical variables predisposing to the onset of LP. *Rio de Janeiro*, RJ, Brazil, 2015

Variables	INJURY BY PRESSURE				Total	P
	Yes		No			
	No.	%	No.	%		
MOBILIDADE NO LEITO						0.001
Active	5	31.3	11	68.7	16	
Passive	59	72	23	28	82	
INTUBATION AND SEDATION						0.000
Yes	50	79.4	13	20.6	63	
No	14	40	21	60	35	
NUTRITION						
Appropriate	6	50	6	50	12	
Obese	0	0	1	100	1	
Slim	10	100	0	0	10	
No record	48	64	27	36	75	
URINARY INCONTINENCE						0.068
Yes	44	72.1	17	27.9	61	
No	20	54	17	46	37	

DISCUSSION

Most of the clients with SCI studied are male. This fact corroborates with what is mentioned in the Brazilian medical literature in research conducted in different states, as well as in the world^{2,5,7-8}. Marital status has its importance in this research, justified by the fact that after SCI the individual may need a daily caregiver to assist with activities, even if the presence of a partner is not directly related to the presence of a caregiver⁶.

According to the data in **Table 1**, it is observed that of the 98 clients with SCI, 64 developed PU, showing an incidence of (65.3%). The 64 customers had a total of 161 PUs in varying locations and different stages, with an average of 2.5 PU per customer. Distribution ranged from one to 11 PU per customer. The most frequent site of appearance was calcaneus (36.7%) followed by the sacral region (31.7%) and trochanter (5.6%). The most frequently documented stage in the medical record was Stage II, (56.5%) of the PIs were in this classification until discharge from the ICU. Just (2.5%) of the injuries are classified as Stage I, results compatible with those identified in studies conducted in São Paulo² and Vitória, Espírito Santo⁸, whose systematic evaluation process of nurses needs encouragement of

health education programs, such as detected in a study conducted in Manaus⁹.

The risk of a person with SCI admitted to the ICU to develop PU soon after trauma is high, which corroborates with data found in a study conducted in Rio de Janeiro¹⁰. It is important that PU prevention measures are already in place since the acute phase of the trauma and the systematic change of decubitus implemented and performed¹¹.

Regarding the incidence of PU in age-related SCI, a study conducted from 2006 to 2010, with 352 people treated at a trauma center in Germany¹², showed predominance among those older, as in this study. As can be seen in Table 2, regarding the association of age with the presence of PU, it was verified by the *Wilcoxon* test that there is dependence between the variables ($p = 0.000$). The highest incidence of PU was older than 61 years (81.3%). It was observed that the average age of clients with PU (42 years old, $dp = 20$) was higher than the average age of clients who did not develop PU (36 years old, $dp = 18$).

In addition, it is important to highlight data from Table 2 related to the impairment of the SCI, considering that clients with complete lesion (paraplegia and quadriplegia) presented a higher number of PU than individuals with incomplete lesion. However, the *Kruskal-Wallis* test was performed and a $p > 0.05$ value was obtained. Thus, it appears that there are no significant differences among distributions. It was also observed that calcaneal PI (49.1%) were more frequent in individuals with paraplegia than sacral PU (43.1%). In individuals with quadriplegia, PU in the sacral region was more frequent (33.3%) than in the calcaneus (27.1%). Of the 32 people with SCI who died, 71.9% had PU. Findings similar to those of a study conducted in Rio Grande do Norte¹³, aiming to evaluate the life trajectory of 31 fishermen after spinal cord injury, and found a higher incidence of PU in individuals with complete ML.

The average time between admission to the hospital (date of occurrence) and the date of ICU stay, shown in Table 2, was 05 days ($sd=12$), and (53.1%) clients were transferred to the ICU the same day as hospital admission. The length of stay in the ICU ranged from 01 days to 354 days and the average length of stay was 26 days, with standard deviation equal to 44.68. Most clients remained in the ICU for less than 15 days (57.1%). Among clients with a length of stay greater than 52 days, four spent more than 100 days in ICU. The longer the ICU stay, the greater the predisposition of clients with incapacitating neurological injury¹⁰ to acquire PU¹⁴⁻¹⁵.

In the present study, it was not possible to observe the mean time of onset of PU due to its retrospective and documentary nature, since PU was mostly not notified when they appeared as stage I and showed in the medical record for the first time as a more advanced stage^{1,3,15-16}. Category I is difficult to identify, perhaps due to the fact that it has no effective lesions, only an unbleachable erythema

and because of this underreporting of this phase of PU is so frequent. The results of this research corroborate studies conducted in Rio Grande do Sul¹⁷, and in a university hospital in Manaus⁹, revealing the worrying lack of records on the evolution of clients admitted to the ICUs of both hospitals studied, in particular, nursing records related to risks to have PU.

Table 3 shows the relationship between length of stay and presence of PU, showing that the average time in days of clients who developed PU in the ICU was 35 days (sd=53) and the average time of people with SCI who did not develop PU at the ICU was 07 days (sd=8). It is observed that the groups are different and, therefore, there is an association between these variables. Analyzing the number of PU per client with SCI and the length of stay in the ICU after trauma, there is a positive correlation, showing that the longer the length of stay the greater the number of PU developed by the client, verified by the *Spearman's Rank correlation coefficient* ($S = 0.6456$), because the variable has no normal distribution ($p=0.000$).

Likewise, by performing a logistic regression associating the length of stay with the presence of PU, as shown in Table 3, we can state that adding one day at the hospital clients with SCI are approximately twice as likely to develop PU. It is also observed that there is a very strong significant association between the variables ($p=0.0006$).

In this study it was not possible to analyze the effectiveness of risk assessment scales for PU prevention. These scales are important instruments in nursing care, as they highlight vulnerable points, reinforce the importance of continuous assessment and favor prevention mechanisms¹³.

According to Table 4, the presence of PU is a dependent variable for the passive and active bed mobility variables. By performing the Chi-squared test, $p=0.001$ was obtained and, therefore, there is a relationship among the groups. Of the clients with passive mobility, 72% developed PU and, conversely, 68.7% of the individuals with active mobility in bed, that is, who could perform pressure relief or change the position without assistance did not develop the condition. Individuals who were intubated and sedated for some time during ICU stay had an incidence of 79.4% of PU. This association was dependent ($p<0.05$) and, therefore, the association between the variables is not due to chance.

Observing these data, the correlation between passive and active bed mobility is evident. Logistic regression shows that individuals with passive mobility are 6 times more prone to develop PU than those with active mobility. Such association is significant ($p\leq 0.05$).

Excessive pressure contributes to the development of PU by inducing ischemia and tissue necrosis, as emphasized in a study conducted in China¹⁸, between 2010 and 2015, with 334 clients who underwent PU repair surgery. Pressure relief is the primary strategy for PU prevention and most PU can be prevented by using preventive measures and

proper care guidelines as recommended by a 2014 study involving 799 clients admitted to 8 hospitals with more 200 beds from 3 Australian states¹⁹.

The limitation of the study was the character of retrospective research that impeded the evaluation of some factors regarding the client with SCI and PU and the possible occurrence of underreporting in medical records.

CONCLUSION

Clients with SCI were found to be clinically susceptible to the onset of PU at the first hospitalization after trauma. Important risk factors associated with SCI contribute to the onset of this complication. The impact of the onset of PU in spinal cord injured is significant, as it causes the impossibility of access and delays the process of physical rehabilitation, constituting a barrier to social reintegration. Nursing care in PU prevention is important to change this reality.

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