

Epidemiological and Clinical Characterization of Children with Pressure Injuries

Caracterização Epidemiológica e Clínica de Crianças com Lesões por Pressão

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Abstract

This study aims to describe the epidemiological and clinical characterization of children with pressure injury in a university hospital, using sociodemographic and clinical data and pressure injuries classification. This is a descriptive, cross-sectional, quantitative study conducted in a pediatric unit. The pressure injury prevalence was 6.93%. The majority were female, the mean age being 6.32 years old. They declared themselves white, coming from the interior of Maranhão, attending elementary school, had income of one minimum wage. They were cardiopathic and had as comorbidities the use of mechanical ventilation and neurogenic bladder, were using antibiotics and gastric protectors. The mean length of hospital stay was 130.2 days. Ten pressure lesions with localization in the sacrococcygeal region and stage 2 were identified. It is concluded that there is a need for the early identification of children at risk of pressure injury to adopt preventive measures to avoid their development.

Keywords: Pressure Ulcer; Pediatrics; Prevalence.

Resumo

Este estudo objetiva descrever a caracterização epidemiológica e clínica de crianças com lesão por pressão em um hospital universitário, através de dados sociodemográficos e clínicos e classificação das lesões por pressão. Trata-se de um estudo descritivo, transversal e de abordagem quantitativa, realizado em uma unidade pediátrica. A prevalência de lesão por pressão foi de 6,93%. A maioria era do sexo feminino, a média de idade de 6,32 anos. Declararam-se brancas, procedentes do interior do Maranhão, frequentavam o ensino fundamental, tinham renda de um salário mínimo. Eram cardiopatas e tinham como comorbidades o uso de ventilação mecânica e bexiga neurogênica, estavam em uso de antibióticos e protetores gástricos. A média do tempo de internação foi de 130,2 dias. Foram identificadas 10 lesões por pressão com localização na região sacrococcígea e estágio 2. Conclui-se que há a necessidade da identificação precoce de crianças com risco de lesão por pressão para adoção de medidas preventivas a fim de evitar seu desenvolvimento.

Palavras-chave: Úlcera por Pressão; Pediatria; Prevalência.

Introduction

The child has peculiar physiological and anatomical characteristics that, during hospitalization and according to the disease severity, can lead to complications that prolong its treatment or hinder its clinical improvement, including the pressure injury - PI⁽¹⁾.

The fragility of the skin and its structures provide a more exacerbated response to infectious processes or the external agents' action, and may occlude the circulation when there is prolonged external pressure combined with shear, leading to the development of this lesion type. Children with perception impairment who remain bedridden or seated, or are not old enough to wander, preventing relief of pressure on tissues, are more susceptible to PIs⁽²⁻³⁾.

These lesions could be avoided by identifying patients at risk and implementing reliable prevention strategies. The identification of children at PI risk can be done by the evaluation through the Braden Q Scale, which considers: intensity and pressure duration through the mobility evaluation, activity and sensory perception; tissues tolerance by assessment of moisture, shear, nutrition, perfusion and oxygenation of tissues⁽⁴⁻⁵⁾.

Once the risk is identified, daily skin reassessment and prevention strategies adoption are required, which should ensure repositioning of the patient, which alternates or relieves pressure on susceptible areas, placement on pressure redistribution surfaces such as mattresses, beds and cushions, which distribute the pressure that the patient's body exerts on the skin and the subcutaneous tissues⁽⁴⁻⁶⁾.

Despite the knowledge that the PI occurrence could be avoided, there is still a need to know the circumstances related to the development of this injury type in the pediatric population. The objective of this study was to characterize the epidemiological and clinical characteristics of children with pressure injury in a university hospital, using sociodemographic and clinical data and pressure injuries classification according to the National Pressure Ulcer Advisory Panel (NPUAP) of 2016⁽⁷⁾.

Method

This is an epidemiological, descriptive, cross-sectional study of a quantitative approach performed with children with PI at a university hospital in the city of São Luís - MA.

The study was carried out in Pediatrics, 4th floor of the Maternal and Child Unit of the University Hospital of the Federal University of Maranhão (HUUFMA), a school hospital of high complexity and reference to the children care, above 28 days of life up to 16 years old, in the State of Maranhão.

The population was composed of 101 children hospitalized during the study period. Seven children who developed a pressure injury were included in the sample. As inclusion criteria, the children whose companion/responsible person accepted to participate in the study were considered eligible, and subsequently signed the Free and Informed Consent Term (FICT). Exclusion criteria were children under 48 hours of hospitalization and individuals over 16 years old.

The survey form was carried out twice a week from October to December 2016. The research form, developed by the researchers, contains socio-demographic data (age, sex, skin color, origin, family income and education), followed by clinical data (diagnosis, morbidities and medications in use). The lesions were then evaluated according to the quantity, anatomical location and staging.

The data were organized in the Microsoft Excel[®] program and later exported to the Statistical Package for Social Sciences[®] (SPSS), version 20.0. For statistical associations between the number of PIs and sociodemographic and clinical data, were used the normality test and the non-parametric Mann Whitney test and Spearman's correlation, with a significance level of 0.05. The descriptive statistics were made by means of simple frequency and percentage, and presented in the tables' form.

The research follows the ethical principles established in Resolution No. 466/12 of the National Health Council of the Ministry of Health (NHC/MH). Having received a favorable opinion from the Scientific Committee of the University Hospital (COMIC/HUUFMA) under No. 73/2016, and the Research Ethics Committee (CEP) under

No. 1,731,709. The researchers forwarded the approval document to the institution to begin collecting data.

Results

In this study, the PI prevalence in children was 6.93%. Of the 101 children hospitalized during data collection, seven developed a total of 10 PIs. Of the seven children, five were admitted to an Intensive Care Unit (ICU), one in a surgical clinic and one inpatient with PI whose appearance occurred in another hospital institution.

Regarding the sociodemographic data presented in Table 1, the majority of the children were female

(57.1%) while 42.9% were male, the age ranged from 0.27 to 12 years old, with a mean of 6.32 years. About the color, 57.1% were white and 42.9% were brown, 57.1% were from the interior of Maranhão, while 42.9% were from the capital São Luís. The majority were in elementary school, 57.1% %, and 42.9% did not attend school or daycare. The family income was a minimum wage (85.7%) and two wages (14.3%).

Table 1. Sociodemographic characterization of children with PI. São Luís, MA, Brazil, 2016.

Characteristics	X	Min–Max	F	%	P-Value
Sex					0,8571
Masculine			3	42,9	
Feminine			4	57,1	
Age	6,32	0,27-12			0,3212
Color					0,8571
White			4	57,1	
Brown			3	42,9	
Origin					0,4001
São Luís			3	42,9	
Interior of Maranhão			4	57,1	
Education					0,4001
Elementary School Incomplete			4	57,1	
Not applicable			3	42,9	
Family Income (R\$)					0,5711
1 minimum wage			6	85,7	
2 minimum wages			1	14,3	
Total			7	100	

Note: X - Mean; 1 - Mann-Whitney test; 2 - Spearman correlation.

Source: survey data.

Regarding the clinical characteristics presented in Table 2, the main medical diagnoses found were heart diseases (42.9%) and myelomeningocele (28.6%). With regard to comorbidities, mechanical ventilation and neurogenic bladder were observed, each affecting 28.6% of the patients. As for medications, antibiotics and gastric protectors (85.7%) were more frequently used followed by diuretics and analgesics (71.4%). The length of stay varied from 19 to 226 days and the mean was 130.2 days.

Table 2. Clinical characterization of children with PI. São Luís, MA, Brazil, 2016.

Characteristics	X	Min–Max	F	%	P-Value
Medical Diagnostic			8*	100,0	

Cardiac disorders (postoperative)	3	42,9	0,4001
Myelomeningocele	2	28,6	0,3811
Tumors	1	14,3	0,5711
Deep Vein Thrombosis	1	14,3	0,5711
Down's Syndrome	1	14,3	0,5711
Comorbidities	10**	100,0	
In mechanical ventilation	2	28,6	0,8571
Neurogenic Bladder	2	28,6	0,3811
Urinary Tract Infection	1	14,3	0,5711
Hypocalcemia	1	14,3	0,5711
Acute Renal Failure	1	14,3	0,5711
Pneumonia	1	14,3	0,5711
Hypothyroidism	1	14,3	0,5711
Dehydration	1	14,3	0,5711
Medications in Use	29***	100,0	
Antibiotics	6	85,7	0,5711
Gastric Mucosa Protectors	6	85,7	0,5711
Diuretics	5	71,4	0,3811
Analgesics	5	71,4	0,3811
Anticonvulsant	2	28,6	0,8571
Antihypertensive	2	28,6	0,8571
Corticosteroid	2	28,6	0,8571
Anticoagulant	1	14,3	0,5711
Length of stay	130,2	19-266	0,2052

Note: X - Mean; 1 - Mann-Whitney test; 2 - Spearman correlation.

* Sum more than 100%, a patient may present more than one diagnosis.

** Sum more than 100%, one patient may present more than one comorbidity.

*** Sum more than 100%, a patient can make use of more than one medication.

Source: survey data.

No statistically significant associations were found between sociodemographic, clinical variables and number of PIs, using the Mann Whitney test and Spearman correlation.

A total of 10 PIs were identified in the seven patients who participated in the sample, since some presented more than one lesion at the evaluation time. The most frequent location (Table 4) was the sacrococcygeal region (71.4%) followed by trochanter, occipital, scapular, patellar and frontal, all with 14.3%. Regarding staging, shown in Table 5, 42.9% of the lesions were in stage 2, 28.6% were in stage 3 and the same percentage in stage 1.

Table 3. PIs' localization. São Luís, MA, Brazil, 2016.

Localizaton	F	%
Sacroccocygeal	5	71,4
Trochanter	1	14,3
Occipital	1	14,3
Scapular	1	14,3
Patellar	1	14,3
Front	1	14,3

Total	10*	100,0
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Note: * Sum more than 100%, a patient may present more than one anatomical location.

Source: survey data.

Table 4. Pls' classification. São Luís, MA, Brazil, 2016.

Staging	F	%
Stage 1	2	28,6
Stage 2	3	42,9
Stage 3	2	28,6
Stage 4	1	14,3
Device Injury	1	14,3
Unclassifiable injury	1	14,3
Total	10*	100,0

Note: * Sum more than 100%, a patient can present more than one stage.

Source: survey data.

Discussion

National⁽¹⁻⁸⁾ and international studies⁽⁹⁻¹⁰⁾ corroborate the results found. A study conducted in pediatric units in the city of São Paulo, with a similar age group, presented a PI's prevalence of 7.1%. Other search⁽⁸⁾ developed with neonates/children hospitalized in a hospital in the South of Brazil, a prevalence of 8.06% was identified. A research⁽⁹⁾ developed in Jordan with newborns, children and individuals up to 18 years old, had a 6.6% prevalence of injuries. And in Switzerland, with children of similar age, presented a prevalence of 7%⁽¹⁰⁾.

In a systematic review⁽¹¹⁾, the PI prevalence in the pediatric population varies widely, from 2 to 28%. Such variation can be explained by the methodological differences of the studies, such as number of research sites or sample size. In addition, there may be differences in the environments where these studies were conducted and the age groups evaluated, which could lead to the findings generalization.

The predominance of female children was also identified in other studies⁽¹⁻⁸⁾. In studies⁽⁹⁻¹²⁾ performed in adults, have shown that women are twice as likely to develop PI, probably due to their longer longevity and their anatomical differences in relation to men. There were no reports of significance in the distribution by gender in the prevalence studies of pressure injury in pediatrics.

Regarding the age characterization, it is observed that the data corroborate with values described by Schluer⁽¹³⁾, with a mean age of 5.8 years, and Pellegrino⁽¹⁾, with an average of 5.23 years. Crozetta's report⁽⁸⁾ with neonates and children differed from the present study, in which the mean age was 2.25 years. The child has peculiar characteristics that increase the probability of developing PI. The skin and differentiated structures can occlude the circulation easily when there is external pressure, leading to the development of this injury type. In young children, the absence of thermoregulation mechanisms and the difference between the size of the head and the rest of the body are observed. As they grow, increasing their weight and depending on the morbidities that affect them, certain anatomical sites are more susceptible to greater pressure and PI occurrence⁽¹⁻³⁾.

Pellegrino⁽¹⁾ and Crozetta⁽⁸⁾, in studies carried out in the Southeast and South of Brazil, respectively, also identified the predominant white color, however, there was no significant difference between the skin color and the PI occurrence in both. There is some evidence that suggests the association between skin color and its development, however, there is no solid explanation that describes how this relationship occurs. The importance of observing the skin color in the research on the PIs occurrence lies in the difficulty of diagnosing stage 1 of the lesion in patients with dark skin color (black or brown), and

may lead to an underreporting and incorrect diagnosis of this type of injury⁽¹⁴⁾.

Of the children hospitalized in the city of São Paulo, who attended school, had a mean of 4.7 years of study⁽¹⁾. In Brandão's research⁽¹⁴⁾, the most frequent schooling was the illiterate/non-educated category with 86%, which can be explained by the children's age, since the majority of the sample was in the pre-school age group. In relation to income, the findings differ⁽¹⁵⁾ from those surveyed in southern Brazil, with children aged zero to eleven years old who were hospitalized, had a family income below a minimum wage.

Similar clinical data were found in a study that describes cardiac and neurological complications, prematurity, Down Syndrome, hydrocephalus and myelomeningocele associated with neurogenic bladder as the main diagnoses associated with children with PI⁽⁸⁾.

Cardiopathic children may be in a serious clinical situation and hemodynamic instability, presenting alteration of perfusion and tissue oxygenation due to complex cardiac pathologies. Given this situation, they are constantly subject to invasive procedures and for long periods have to stay in bed, favoring the PI development⁽¹⁶⁾. Pellegrino⁽¹⁾ found association between the use of sedation, mechanical ventilation and the PI presence ($p < 0.05$).

A study⁽¹⁷⁾ in a Teaching Hospital in Curitiba with children from zero to 17 years, different from the present study, presented statistically significant data among children with PI and clinical history related to neurological ($p=0,024$) and musculoskeletal ($p=0,037$) disorders. And when the drugs classes were related, there was no statistical significance, in which analgesics and antibiotics were the most used. Brandão⁽¹⁴⁾ identified the diseases of the nervous and the respiratory systems as the morbidities that most affected children with PIs hospitalized in a pediatric ICU, who also identified the anti-inflammatories/analgesics and antibiotics as the most used.

Some medications used in hospitalization, especially those in continuous use, may contribute to the PI development, as sedatives and analgesics, reduce pain perception but impair mobility. Hypotensive agents can affect blood flow to vital

organs and reduce skin tolerance to injuries. Blood pressure levels may decrease by reducing perfusion of the tissues, helping to close the capillaries, making them more susceptible to the occurrence of this lesion type⁽¹⁸⁾.

Regarding the length of hospital stay, the studies' results showed lower values than those found in this study. Brandão⁽¹⁴⁾ found the mean time of hospital stay of 24.10 days. Authors⁽⁸⁻¹⁹⁾ described the mean length of hospital stay of 21.4 days in their research. It is understood that the hospitalization time may be longer due to the clinical condition severity of the children, which require more days of treatment and/or medical follow-up⁽¹⁴⁾.

In an integrative review of the literature⁽²⁰⁾ on the main anatomical sites affected by PIs in the pediatric population, the most mentioned were the occipital and sacrococcygeal regions. Its development in the sacral region is due to the position in which the child stays for most of the hospital stay, where the area of greatest contact with the bed is often the posterior (dorsal) body region, once which for bedridden patients, constitutes a support area during the movement process.

Disagreeing with these results, study⁽¹⁾ with similar age children, found a higher frequency of lesions on calcaneus, followed by ears, malleoli and vertebrae. Crozeta⁽⁸⁾ found only one PI in each neonate or child, located in the occipital, temporal, nasal, dorsal and thumb regions. It should be noted that, due to their locations, these lesions may have been caused by devices such as: continuous positive airway pressure (CPAP) mask, ventricular valve and oximeter sensor.

Of the 26 lesions identified in a Pediatric ICU, 25 were detected in the head and, of these, 14 lesions were in the occipital region⁽¹⁸⁾. Newborns, infants and young children are at increased risk of developing PI in the occipital region (including atrial and neck pavilions) compared to other anatomical sites. The head weight distribution is proportionally greater than in the adult, increasing the risk of PI in the occipital region. The likelihood of developing this lesion type in the sacral and heel region rises with increasing age and growth⁽²⁰⁾.

A result similar to this one is presented in a research⁽¹⁷⁾ in the Teaching Hospital in Curitiba,

where most of the PIs presented in stage 2. In contrast, Perregrino⁽¹⁾ and Carvalho⁽¹⁸⁾ found in hospitalized children, the predominance of PI stage 1. Children have particular physiological characteristics, accelerated growth and development, functional immaturity of various organs and systems and biological inequalities in the different maturation stages. Postural abnormalities, characteristics of some congenital diseases, use of prostheses and equipment, and the pattern of weight gain are altered by the child's growth, determining which body regions will be subject to increased pressure and PI occurrence⁽¹⁾.

Conclusion

The PI prevalence in children found in this study was 6.93%. National and international studies corroborate with the found data, the variations found can be explained by the different methodologies used. The children majority were female, mean age of 6.32 years, white, from the interior of Maranhão, attended elementary school and family income of a minimum wage.

They had diagnosed the heart diseases and as comorbidities the mechanical ventilation and neurogenic bladder, used antibiotics and the gastric protectors and remained interned in average 130.2 days. Ten pressure injuries were identified, most of the sacrococcygeal region and were in stage 2.

No statistically significant associations were found. It is concluded that there is a need to identify these children at risk for PI as early as possible to prevent their development and to intensify studies with more significant samples that allow to verify new associations between the studied data.

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