Cogitare Enfermagem

ORIGINAL ARTICLE

PRESSURE ULCERS IN PEDIATRIC PATIENTS: CAUSAL FACTORS AND THERAPEUTIC MANAGEMENT

HIGHLIGHTS

1. Children in intensive care have a higher risk of developing PU.
2. Limited mobility and medical devices favor the onset of PU.
3. Nursing consultation has a resolutive role in PU.
4. Safety strategies to avoidable incidents should be a practice.

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ABSTRACT

Objective: to trace the sociodemographic and clinical profile, causal factors, and therapeutic management provided to children with pressure ulcers during hospitalization. **Method:** cross-sectional study; retrospective. Sample of 64 medical records of children with PU, admitted to a hospital in southern Brazil, from January/2016 to July/2021. Data analyzed by descriptive and inferential statistics. **Results:** Profile of children in intensive care (62.5%); stage 1 pressure ulcers (35.9%); and use of simple cover (37.5%). Of the total cases, 25% by medical device use. Consultations were related to stage 3 injury (p=0.027). Nursing diagnosis risk of pressure ulcer was identified in 48.4% of cases, while the Braden/Braden Q scale was identified in 78.1%. Patients classified as high risk (46%) had limited mobility (p=0.000). **Conclusions:** Pressure ulcers in children in intensive care with limited mobility require everything from simple intervention to consulting according to the classification of the injury.

DESCRIPTORS: Pressure Ulcer; Child; Hospitalization; Nursing Diagnosis; Patient Safety.

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INTRODUCTION

In 2016, the National Pressure Ulcer Advisory Panel (NPUAP) changed the term 'pressure ulcer' to 'pressure ulcer injury' (PUI), to clarify the etiology and the anatomical particularities present or absent in each stage of the injury and started to be referred to as the National Pressure Injury Advisory Panel (NPIAP)[1]. PU is an injury located in the skin and/or soft tissues, in bony prominences due to positioning or derived from the use of devices, because of constant pressure and/or shear, also influenced by internal factors[2]. This type of injury is classified according to the extent of tissue damage: stage 1 (intact skin with non-blanchable erythema); stage 2 (partial thickness skin loss with dermal exposure); stage 3 (full thickness skin loss); stage 4 (full thickness skin loss associated with tissue loss); unclassifiable (full thickness skin loss and non-measurable tissue loss); and deep tissue (persistent purple, brown or dark red, non-blanchable color)[2].

PU led to several consequences, such as prolonged hospitalization, risk of infection, psychological distress, pain, and other complications[3,4]. Moreover, PU prevention is one of the axes of the National Patient Safety Program (PNSP- in Portuguese), which aims to qualify the care provided, aiming to reduce unnecessary risk damage resulting from health care actions to the minimum necessary[5].

In the context of patient safety, when the development of PU occurs in the hospital setting, they are classified as avoidable incidents with damage (adverse events). Thus, they are also considered an indicator of care quality, showing the need for a more careful and qualified attention to the assistance offered[6,7,8].

Pediatric patients are indicated as a population at risk for the emergence of PU when undergoing routine hospital care[9,10]. This occurs due to the clinical profile of hemodynamic instability, respiratory difficulties, poor perfusion, among other highly complex conditions that require potentially invasive technological assistance, added to the physiological immaturity of the skin4. Internationally, a 2017 study identified a 1.1% prevalence of hospital-acquired PU, of which 3.7% were in pediatric intensive care units, 4.6% in pediatric rehabilitation units, and 0.57% in pediatric clinical units[6].

On the other hand, the Brazilian panorama of PU in pediatrics has higher rates than those described in the international context, as found in a survey conducted in the state of Maranhão, showing a prevalence of 6.93%. In this study, the main comorbidities identified were the presence of heart diseases, need for mechanical ventilation and neurogenic bladder[7]. For the proper management of PU, aiming at its prevention or resolution, an updated and accurate knowledge base is required, which describes the panorama of this event in the pediatric population, to support an effective and evidence-based health action[4].

In hospitals, nursing professionals are primarily responsible for daily care, working in activities with direct contact with patients[11], which makes them the central figure in preserving skin integrity[12]. Care actions vary according to institutional protocols and age group, comprising several strategies. Among them, risk stratification and skin protection, aiming at early assessment and action to prevent the appearance of lesions, as well as curative strategies for the resolution of the lesion already established, aiming at preventing infection and relieving pain[11,12]. Some institutions have the support of specialized professionals, such as nurses, physicians, pharmacists, physical therapists, and nutritionists, who constitute specialized committees to perform consultations[12]. Such committees help define the conducts to be implemented in skin care, qualifying health professionals through training and lectures, and conducting research around wound treatment[12].

As a technological innovation, the development of mobile applications can support nurses' assistance in the management of PU. An example is a prototype developed at the Nossa Senhora das Graças Nursing School of the University of Pernambuco (FENSG/UPE),

Recife-PE/Brazil, which includes several functionalities relevant to the care of patients in intensive care, ranging from prevention, assessment, monitoring and treatment of PU[13]. Given this scenario, the aim of this study was to describe the sociodemographic and clinical profile, causal factors and therapeutic management given to children with PU during hospitalization.

METHOD

Observational, cross-sectional, and retrospective research with data collected from medical records of children clinically diagnosed with PU, admitted to clinical/surgical and intensive care units of a university hospital in southern Brazil. The research followed the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline.

Children aged 28 days to 11 years, 11 months, and 29 days, according to the age recommended by the Statute of Children and Adolescents (ECA- in Portuguese)[14] with PU notification at any time of hospitalization and admitted in the last five years were included in the study, excluding cases in which there was PU of community origin. The temporal cut-off was defined considering the year 2016, the period in which the indicators of PU were hosted in electronic medical records in the institution where the data originated. The computerization of medical records for the Braden/Braden Q Scale occurred in 2019.

Considering the inclusion and exclusion criteria, the sample was composed of all medical records made available by means of a list provided by the information technology sector of that hospital, totaling 64 medical records of children admitted during the period from January 1, 2016, to July 31, 2021. Data collection was performed in August 2021.

For the collection of data in the medical records, the date of notification of the first lesion identified during hospitalization was considered. The variables listed for the study were a) characteristics of the injury (anatomical site; number of PUs/patient/inpatient; etiology of the PU - medical device, type of medical device; classification of the PU; request for institutional consultation; pre-consultation care; guided care according to consultation; post-consultation care; and surgical treatment); b) patient data (age; c) current clinical condition data (main clinical diagnosis; nursing diagnosis for PU risk; risk for PU identified by the Braden/Braden Q scale; degree of mobility; nutritional status; and level of consciousness).

The nutritional status was based on the calculation of the Body Mass Index (BMI), which corresponds to the ratio of weight (grams) to height (centimeters) squared, interpreted according to the World Health Organization growth curve[15,16]. The level of consciousness was depicted according to the care team's record in the electronic medical record.

As for the request for institutional consulting, it was made through notification by the care team to the specialized committee of the hospital.

The data collected were organized in the Statistical Package for Social Sciences (SPSS) software version 22.0 and analyzed by estimating the mean and standard deviation, relative and absolute frequency. Pearson's Chi-square test was used to investigate the association between categorical variables and intragroup differences, and, when any variable had a frequency lower than five, Fisher's exact test was used. A p value of <0.05 was considered statistically significant. For missing data, the analysis was performed with pairwise exclusion.

The present research received a favorable opinion from the Research Ethics Committee of the responsible institution on September 22, 2021, under approval number 4,989,461.

RESULTS

The sample had a mean age of 43.2 (SD=40.5) months (ranging from one to 144 months). Table 1 presents the sociodemographic and clinical profile of the sample studied.

Table 1 - Sociodemographic and clinical characteristics of children with PU (n=64) Porto Alegre, RS, Brazil, 2021

Variables	n	%	*p*
Age Group			**0.003***
< 1 year old	17	26.6	
1 to 4 years old	26	40.6	
5 to 9 years old	16	25	
10 to 12 years old	5	7.8	
Gender			0.000*
Male	46	71.9	
Female	18	28.1	
Race/color			0.000**
White	58	90.6	
Brown	3	4.7	
Indigenous	3	4.7	
Pediatric admission unit			0.000**
Intensive Care Unit	40	62.5	
Clinical/surgical admission	23	35.9	
Oncology	1	1.6	
Reason for hospitalization			0.036**
Congenital malformation	16	25	
Genetic syndrome	16	25	
Infectious disorder	13	20.3	
Nervous system disorder	8	12.5	
Neoplasia	7	10.9	
Autoimmune disorder	4	6.3	
Level of consciousness			0.001*
Conscience Preserved	35	54.7	
Unawareness	18	28.1	
Alternates awareness/unawareness	11	17.2	
Mobility			0.000*
Limited	33	51.6	
Slightly limited	17	26.6	
Slightly limited	9	14.1	
No limitations	5	7.8	
Nutritional status			0.045*
Thinness	29	45.3	

Eutrophic	17	26.6	
Overweight/obesity	10	15.6	
No record	8	12.5	

*Pearson's Chi-square test - in bold p<0.05.
**Fisher's Exact test - in bold p<0.05.
Source: The authors (2021).

A total of 35.9% of the sample developed stage 1 lesions. Table 2 shows the classification, evaluation, and evolution data of the PU. Considering the request for evaluation and advice, in 14 cases there was clinical resolution of the lesion at discharge. As for the PU stage, only for stage 3 lesions there was a correlation between staging and higher consulting request (p=0.027). Furthermore, there was a significant association between stage 3 lesions and age range above five years (p=0.037).

Table 2 - Classification of PU, request for consultancy and resolution of the lesion at hospital discharge (n=64). Porto Alegre, RS, Brazil, 2021

Variables	n	%	*p**
Staging of the lesion			**0.000**
Stage 1	23	35.9	
Stage 2	21	32.8	
Stage 3	7	10.9	
Not classifiable	6	9.4	
Unregistered	7	10.9	
Consulting Request			0.617
No	34	53.1	
Yes	30	46.9	
Lesion resolution at hospital discharge			
Yes	30	46.9	0.720
No	29	45.3	
No record	5	7.8	

*Pearson's Chi-square test - in bold p<0.05.
Source: The authors (2021)

Regarding the etiology of PU, 16 (25%) were caused by the use of a medical device, of which eight (50%) were related to ventilatory support; three (18.8%) were caused by a vital sign monitoring device; two (12.5%) by a venous vascular access; one (6.25%) by a nasogastric tube; one (6.25%) by an ostomy bag; and one (6.25%) by a thermal blanket.

Regarding the anatomical site of PU, 34 (53.1%) were described in the head/face/neck region, 12 (18.8%) in the dorsal region, and nine (14.1%) in the lower limbs, with no correlation with the stage of the lesion or patient age (p>0.05). Other anatomical sites included: thorax, ventral region, genitalia, and upper limbs.

As for the assistance provided in PU care, the use of simple dressing (hydrocolloid or film) was the main procedure instituted by the nursing team, identified in 24 (37.5%)

medical records. From the total of cases followed by the specialized committee, the main care oriented was the association of non-adherent dressings with secondary dressings, which was used in eight (26.7%) cases. Surgical debridement was indicated for two (6.7%) cases. The procedures prescribed by the consultant were fully adopted by the care team in 28 (93.3%) cases. For the course of the PU (interval between consultancy evaluation and resolution until hospital discharge), there was a mean of 58.2 (SD=23.0) days.

The nursing diagnosis "risk of PU" was identified in 31 (48.4%) cases, while the Braden/Braden Q Scale score was identified in 50 (78.1%) records. Between 2016 and 2018, there were 22 notifications of PU, and in six (27.2%) of the medical records there was a record of the nursing diagnosis "pressure injury risk," and in eight (36.3%), the Braden/Braden Scale Q score (p=0.0322). Between 2019 and 2021 of the 42 PU notifications, 25 (59.5%) had the nursing diagnosis "risk of PU" recorded in their medical records, and 42 (100%) had the Braden/Braden Scale Q score (p=0.0650).

Regarding the assessment of the risk of developing PU, according to the Braden/Braden Q scale, 23 (46.0%) cases were classified as high risk, 16 (69.6%) in the age range between one and nine years. Considering the items mobility, nutritional status, and level of consciousness, scored on the Braden/Braden Q scale, only mobility was significantly associated (p=0.000) with risk classification.

Table 3 shows the classification for mobility according to the degree of mobility.

Table 3 - Classification of the Braden/Braden Q Scale according to the mobility item (n=50). Porto Alegre, RS, Brazil, 2021

	Risk Classification					
Mobility						
	Low	**Moderate**	**High**	**Very high**	**n (%)**	**p***
Limited	1	5	20	1	27 (54)	0.000
Moderately limited	0	4	2	0	6 (12)	>0.05
Slightly limited	2	11	1	0	14 (28)	>0.05
No limitations	2	1	0	0	3 (6)	>0.05

*Fisher's Exact Test - in bold p<0.05.
Source: The authors (2021)

DISCUSSION

The analysis of the results allowed the composition of a profile of children with PU and the identification of associations between the outcome studied and the clinical characteristics presented by patients over a five-year period. The age range with the highest prevalence of PU, from one to four years old, can be explained by its physiological risk arising from the immaturity in the formation of skin layers, related to the lower tolerance to pressure presented by the tissue and the lower capacity to move independently[9,17].

As for the race/color found in the analysis, the prevalence of white corroborates previous studies carried out in North American centers[17,18]. These studies show that the non-blanchable erythema, characteristic of the initial staging of PU, is less observable in skin of different shades, which requires more training of professionals[17,18].

Clinical diagnoses related to congenital malformations and genetic diseases were the most prevalent in the sample studied. The hospital under study is a national reference for such clinical diagnoses and has a technological park that supports high-complexity care.

Children diagnosed with congenital malformations and genetic diseases may present pulmonary, neurological, musculoskeletal, or gastrointestinal disorders, requiring more complex management, translated into a high number of invasive procedures, use of medical devices, decreased level of consciousness and intensive care[4,9,19]. In this sense, pediatric intensive care units (ICU) usually originate the highest rates of PU notifications[9,17,20].

Interventions related to more complex care factors, such as ventilatory support, enteral feeding, among others[4,9], can, when combined, result in some level of patient mobility limitation. This finding was also found in the present study, where a significant percentage of the sample had some level of mobility impairment.

However, in pediatric oncology units, which do not have the technological support that ICUs require, the emergence of PU represented only one notification, although the clinical diagnosis of neoplasia represented 10.9% of all diagnoses in the sample. Most patients admitted for therapeutic management of cancer usually have reduced body mass, but many maintain mobility and consciousness preserved, and have fewer attached devices[21] when compared to patients in intensive care, resulting in less pressure and friction on the skin, which may contribute to a lower chance of developing PU.

The limited mobility as a risk factor for the development of positioning PU, as found in this study, contrasts with data from previous studies, which show a significant prevalence of PU resulting from the use of medical devices[17,18,22.] However, the use of care support equipment, such as ventilation masks, enteral feeding, among others, indicated by international studies as the main factors involved in the development of PU[18,19,23] are concentrated especially in head, face, and neck regions, a finding similar to the present study, which identified these regions as the most affected. In addition, in children at an earlier age, this anatomical location has an innate fragility, due to the proportion between the head and the rest of the body, causing greater pressure on these points in periods of limited mobility in bed[23].

As for the identification of the risk of developing PU, the Braden scale is one of the main instruments used in Brazil for this purpose[24], and its use has international coverage[18,19]. However, no association was identified in this study between the risk assessed by the Braden scale and nutritional status or level of consciousness, items assessed by the scale. Meanwhile, mobility was strongly associated with high risk for PU, a finding that, when analyzed together with the characteristics of the identified inpatient units, points to limited mobility as an expressive risk factor.

An association (p=0.0322) was identified between the records of the nursing diagnosis "risk of PU" and the Braden/Braden Q scale in the years preceding data collection. Furthermore, the Braden/Braden Q scale was identified in 78.1% of the medical records. Because it is considered an effective screening tool, its application is recommended by the data collection institution for 100% of admitted patients. However, we observed a gradual increase in the recording of the scale, which can be explained by its computerization via a system in 2019 in the institution of data origin, to encourage its applicability and recording by nurses, aiming at the early identification of PU. The higher frequency of records observed over the years demonstrates a possible role of technology as a factor that enhances the nurses' work process and may contribute to the adherence of professionals to the application of the instrument[25].

The nursing diagnosis "risk of pressure injury" was present in only 48.4% of the sample. This fact may have been influenced using alternative diagnoses, such as risk of impaired skin integrity and risk of impaired tissue integrity, which were identified in medical records during the data collection stage. However, it is necessary to consider that the Nursing Care

Systematization (SAE-in Portuguese) at the data origin institution, implemented through continuing education strategies, recommends the use of diagnoses to define interventions to be implemented in nursing care, and corresponding interventions may be different for each of the cited diagnoses[26]. Another central aspect is the importance of valuing the daily detailed assessment of the skin and its structures by the nurse as an essential measure for the early identification of pressure points and risk factors for the development of PU.

In relation to the treatment of PU, the use of dressings for this purpose is a constantly evolving technology and their use is the main treatment compatible with the most updated recommendations according to scientific evidence[12]. There are currently several options of dressings on the market, which are chosen according to the type of injury and the outcome that is desired, ranging from wound bed protection, exudate removal, thermal insulation, among other specificities[27].

For the treatment plan of stage 1 PU, the main finding of this study was simple dressings, which include hydrocolloid and clear film. These dressings have similar purposes, being used to relieve pressure on the skin exerted by a bony prominence or device, to prevent progression of stage 1. In general, they can be used alone, when the skin is intact, or in association with other dressings as a protective strategy for the perilesional skin[28]. The use of these dressings is supported by evidence, as pointed out by the Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline, published in 2019, which reports their use in reducing injuries resulting from the use of tracheostomy, positive pressure ventilation masks, nasal cannulas, among other medical devices[28].

According to the assessment of the stage of the PU, non-adherent dressings are used, such as gauze with petrolatum, silicone mesh, alginate, among others, whose main feature is non-adherence to the wound bed, allowing the association of dressings according to clinical need. The use of this type of dressing is indicated for management of exudative lesions, maintenance of adequate tissue moisture and greater tissue granulation, benefiting healing[28]. Still, surgical management techniques tend to be reserved for lesions with necrosis or that require debridement for tissue revitalization[29]. The definition of therapeutic management implemented for the sample participants was compatible with the institutional protocol of the hospital of origin and the existing literature for staging the identified PU.

Due to the diversity of coverage options, there are committees focused on skin care, which guide the best Intervention plan in view of consulting requests. In this sense, the association ($p=0.027$) between higher consultancy requests and stage 3 lesions refers to the difficulty in defining the treatment for more complex lesions due to the wide range of technologies and the need for specialized guidance to define the therapeutic approach[12].

The PU is characterized as a safety incident with avoidable damage (adverse event) from the perspective of patient safety, and that entails consequences to the patient's health condition and increased financial costs to the system, such as prolonged hospitalization, increased risk of infection, pain treatment, increased technology coverage, among other therapies[3,4]. In this sense, we emphasize the importance of reporting adverse events to build indicators that are essential for monitoring and evaluating the quality of care. However, the underreporting of these events remains an issue to be faced in the daily life of hospitals, such as the findings of a study in 2019 in which, after analysis of notifications and active search in medical records, underreporting was identified in 96.7% of PU included in the sample[30]. From this perspective, there is a need to more widely disseminate the culture of patient safety in hospital settings.

The low occurrence of PU in the pediatric population generates a small sample size, which causes data variability. This limitation of the study reduces the options of statistical analysis that could be performed, without, however, inferring that there could be losses in the quality of the results obtained.

CONCLUSION

Children in intensive care have a higher risk of developing PU, even in the early stages. Limited bed mobility and the use of medical devices appeared as contributing factors to the development of PU. Simple dressings were the main ones implemented by nurses, and according to the complexity of the PU development, the availability of consulting represented an expressive role in the resolution of this preventable incident. The data also indicate a loss in the use of the nursing diagnosis "risk for PU", as well as progressive improvement in the applicability of the Braden/Braden Q scale. Thus, preventive interventions such as training for health professionals on bed mobilization strategies and appropriate handling of medical devices, as well as more appropriate use of nursing diagnosis and assessment of risk stratification tools for PU need to be encouraged to support assertive care to the pediatric population in complex care situations.

Prospective research should be encouraged and disseminated so that health professionals can monitor and know the therapies used and their effectiveness during hospitalization, to enhance patient safety in institutional settings. Finally, the possibility of underreporting of this adverse event should not be disregarded, thus, it is suggested that continuing education actions be carried out in hospitals to reinforce the importance of reporting the emergence of PU or related risks.

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