






## PRESSURE INJURY DEVELOPMENT AND CARE COMPLEXITY IN PATIENTS AT AN EMERGENCY SERVICE

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### ABSTRACT

Objective: to assess pressure injury development and its association with care complexity in patients treated at an emergency service. Method: a prospective cohort and observational study conducted from August to October 2020 with patients treated in the emergency unit from a public hospital in southwest Bahia, Brazil. A specific form created for the study, the Braden Scale and the Perroca Classification Instrument were used for data collection. The data were analyzed by means of descriptive analysis and the Pearson's chi-square test. Results: the sample consisted in 225 patients. The incidence of pressure injury was 9.3%. It mainly affected women (61.9%) in the intermediate (57.1%) and semi-intensive (42.9%) care levels. There was an association between care complexity and pressure injury development ( $p < 0.001$ ). Conclusion: the importance of evaluating care complexity in the patients treated at the emergency services is emphasized to provide safe care and reduce adverse events.

**DESCRIPTORS:** Pressure Injury; Emergency Nursing; Patient Safety; Nursing Assessment; Nursing Care.

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## INTRODUCTION

Pressure injuries (PIs) are considered adverse events related to health assistance and represent a significant health problem worldwide with high hospital costs, prolonged hospitalization times and increased morbidity and mortality, in addition to the emotional impact and distress on the patient, these latter perceived as intangible costs<sup>1</sup>.

PI can be defined as localized damage to the skin and/or underlying soft tissues, resulting from intense and/or prolonged pressure in combination with shear or related to a medical device or another artifact, usually located over a bony prominence. They are classified as grade one, two, three, four or unclassifiable, according to involvement of the tissues which can present as intact skin or an open ulcer<sup>2</sup>.

The incidence of PI is highly variable across health units in general and, especially in emergency services, the studies point to increasing incidence levels<sup>3-4</sup>. The care volume and complexity in these units increase proportionally to the rise of urban violence in the country and to population aging<sup>5</sup>.

There are several aggravating factors for PI development in patients entering the emergency services; a number of extrinsic factors can be mentioned, such as overcrowding, that increase the waiting time for care and referral, lack of beds, direct and prolonged contact with rigid surfaces such as stretchers, board, splints and cervical collar, and intrinsic factors such as advanced age, previous comorbidities and the patient's clinical complexity<sup>3</sup>.

The high demand of patients, the reduction in investment in human resources, the consequent overloading of the team<sup>6</sup>, and the focus on stabilizing the clinical condition make Nursing practices such as assessing the risk of developing PI be postponed or directed exclusively to the high-risk group<sup>7-8</sup>.

Given the care complexity faced daily by the Nursing team in emergency rooms (ERs), the importance of classifying the patients' dependence degree stands out as a subsidy for adequate sizing of the team, providing individualized care and minimizing or preventing harms resulting from the assistance provided<sup>9</sup>.

In this perspective, the Federal Council of Nursing (*Conselho Federal de Enfermagem*, COFEN) establishes official parameters for the sizing of Nursing personnel through the use of the Patient Classification System (PCS). The classification tool proposed by Perroca<sup>10</sup> stands out among the instruments referenced for this purpose.

The Perroca Classification Instrument (PCI) resorts to a scale that assesses nine areas scoring from one to four. Each area is scored and added to the others, and its results indicate the increasing intensity of care complexity, with the score intervals established as follows: minimal care (8-11 points); intermediate care (12-18 points); semi-intensive care (19-25 points); and intensive care (26-32 points)<sup>11</sup>.

The patients can present different care complexity degrees in the same hospitalization unit. In this sense, classification of the patients and the subsequent identification of the assistance profile are a fundamental strategy for resource allocation, for staffing, and for strategies that aim at a more adequate care planning and, consequently, the reduction of adverse events, with PIs among them<sup>9</sup>.

The objective of this study is to assess pressure injury development and its association with care complexity in patients treated at an emergency service.

## METHOD

This is a prospective cohort study of and observational nature and with quantitative approach carried out in an Emergency Unit of a public hospital in the Southwest of Bahia, considered a macroregional reference for high and medium complexity, currently a reference for COVID-19 cases and exclusively serving patients referred by state regulation.

The study was carried out in the Women's and Men's Wards, which receive patients who enter the hospital's emergency service every day for treatments of various etiologies and remain under follow-up in these sectors, awaiting referral to inpatient units or Intensive Care Units (ICUs), with the possibility of presenting other outcomes such as discharge or death.

Data collection was conducted for 60 consecutive days between August and October 2020. The inclusion criteria were as follows: not presenting any PI at admission to the units under study and being aged at least 18 years old. The patients excluded were those that were discharged from the units before 48 hours from having been included in the research.

The instrument used for data collection was adapted from previous studies<sup>12-13</sup> and consists of two stages: the first, to be applied within the first 24 hours since the patient's admission to the units, contains sociodemographic information, clinical characteristics, the Perroca Classification Instrument (PCI) and the Braden scale, adapted for Brazil by Paranhos and Santos in 1999<sup>14</sup>.

The second stage consists in the subsequent reevaluations performed every 48 hours with application of the Braden and PCI scales, observation of the adoption of measures recommended for PI prevention, such as decubitus change, support structures, keeping the sheets taut and the skin moisturized and sanitized, and inspection of the skin, where, in the presence of PI, data such as the staging and anatomical location of the injury are collected. The instrument was evaluated by three nurses with experience in the emergency service and was submitted to a pre-test to verify its applicability.

The data were incorporated to an electronic *Microsoft Excel* 2010® spreadsheet. The dichotomous variables were coded as "one-yes" and "two-no" and the others were categorized with Arabic numerals. Subsequently, the data were transferred for analysis to the *Statistical Package for the Social Sciences*® (SPSS) software, version 23 for Windows®. All the sociodemographic information and the clinical characteristics were submitted to descriptive statistical analysis.

The association analysis between PI development and care complexity was verified by means of Pearson's chi-square test, adopting  $p$ -value  $< 0.05$  and a 95% confidence interval. There was recategorization of the staging and number of injuries developed and, with the grouping of grades one and two and grades three and four, the number of injuries was recategorized into one injury and two or more injuries.

The study was submitted to the Research Ethics Committee (*Comitê de Ética em Pesquisa*, CEP) of *Universidade Federal da Bahia* (CEP-IMS-CAT-UFBA) and was approved under opinion No. 4,122,093.

## RESULTS

The sample consisted of 225 patients, with predominance of the male gender 147 (65.3%), brown race/skin color 144 (64%) and age group over 60 years old 116 (51.5%). Of these, 136 (60.4%) were hypertensive, 64 (28.4%) were diabetic and 144 (64%) were under

continuous medication use. The main medical diagnoses corresponded to diseases of the circulatory system with 76 (36.8%) and to external causes with 31 (13.8%). Most of the participants 139 (61.8%) had impaired physical mobility and 114 (50.7%) used diapers. In relation to the risk classification according to the Braden Scale, 95 (42.2%) presented low risk, 74 (32.9%) moderate risk, 51 (22.2%) high risk, and 5 (2.2%) were not at risk. The main outcome was hospital discharge 117 (52%), followed by transfer 97 (43.1%) and death 11 (4.95%).

In this study, the incidence of PI was 9.3%. The data referring to the patients who developed PIs show that incidence was mostly in women 13 (61.9%), aged at least 80 years old 10 (47.6%), with impaired physical mobility 19 (90.48%), and diaper use 20 (95.2%). In relation to the Braden Scale, high risk was the most observed with 15 (71.43%) cases, and the main outcome was transfer to another unit in 16 (76.2%) patients (Table 1).

Table 1- Characterization of the patients that developed pressure injuries in the emergency service of the General Hospital of Vitória da Conquista, Bahia, Brazil, 2020

Variables	n	%
Gender		
Male	8	38.1
Female	13	61.9
Age		
Less than 60 years old	5	23.8
60-79 years old	6	28.6
80+ years	10	47.6
Race/Skin color		
White	3	14.3
Black	4	19
Brown	14	66.7
Systemic Arterial Hypertension		
Yes	15	71.4
No	6	28.6
Diabetes Mellitus		
Yes	6	28.6
No	15	71.4
Diagnostic classification		
Diseases of the circulatory system	8	38.1
Diseases of the digestive system	5	23.8
*Other diagnoses	8	38.1
Use of diapers		
Yes	20	95.2
No	1	4.8
Impaired physical mobility		

Yes	19	90.48
No	2	9.52
Difficulty communicating		
Yes	10	47.6
No	11	52.4
Continuous medication use		
Yes	16	76.2
No	5	23.8
Braden Scale		
Low risk	1	4.76
Moderate risk	5	23.81
High risk	15	71.43
Outcome		
Transfer	16	76.2
High	4	19
Death	1	4.8

\*External causes of morbidity and mortality; Diseases of the genitourinary system; Diseases of the respiratory system; Neoplasms; Diseases of the musculoskeletal system.

Source: The authors (2020).

Concerning care complexity, as evaluated by the Perroca Classification Instrument, 75 (33.3%) patients were classified as minimal care, 126 (56%) as intermediate care, and 24 (10.7%) as semi-intensive care with no records of patients in intensive care at the time of the evaluations. The distribution of PI incidence as per PCI was 12 (57.1%) in intermediate care and nine (42.9%) in semi-intensive care, with an association between care complexity and pressure injury incidence with  $p$ -value $<0.001$ .

Among all 21 patients who developed PIs, 30 pressure injuries were recorded: 10 (33.4%) in the heels and 9 (30%) in the sacral region. Most of the injuries were staged in grades I and II: 19 (63.3%).

There was no association between the number of PIs and the staging of the injuries or the patients' care complexity (Table 2).

Table 2- Association between the number of PIs, staging and care complexity in the emergency service of the General Hospital of Vitória da Conquista, Bahia, Brazil, 2020

Variable	InC n (%)	SIC n (%)	Total	p
Number of PIs per patient				0.604
One injury	8 (66.7)	4 (33.3)	12 (57.1)	
Two or more injuries	5 (55.6)	4 (44.4)	9 (42.9)	

Staging of the injury				0.055
Grades 1 and 2	12 (63.2)	7 (36.8)	19 (57.1)	
Grade 3 and unclassifiable	-	2 (100)	2 (42.9)	

Reference: InC-Intermediate Care; SIC-Semi-Intensive Care

Source: The authors (2020).

## DISCUSSION

The PI incidence found in this research was lower to the values detected in critical care and medical clinic units of the same institution, where 47% and 24% incidence was identified, respectively<sup>12-13</sup>. On the other hand, the result found was higher than in a study conducted in the Emergency Department of a French hospital, with 4.9% incidence<sup>4</sup>.

The studies addressing PI incidence in emergency services are still incipient, as well as analyzing the relationship between incidence of pressure injures and care complexity measured by means of classification instruments. It is worth noting the importance of encouraging studies that address the theme focused on early prevention and on patient safety in general terms<sup>15</sup>.

PIs stand out among the indicators of the quality of the assistance provided to the patients, and their incidence is closely related to Nursing care. PIs impose various negative consequences on individuals, families, institutions and the society in general. Their development leads to physical and psychological distress in the patients, in addition to extending the hospitalization time, worsening the clinical condition, and even leading to death<sup>15</sup>.

The predominance of males among the research participants can be explained by their low demand in terms of prevention services, leading to future complications such as stroke<sup>16</sup>, as well as by being the largest population segment involving external causes such as traffic accidents and assaults<sup>17</sup>, allied to the fact that the hospital unit researched is a reference for trauma care.

Despite not being a majority in the sample, women were the most affected by PI development. A number of studies show that women present higher life expectancy than men, which makes them a population group frequently present in hospital units. This profile consists mainly in women over 80 years old with a gradual increase of functional disability that hinder self-care, requiring more assistance from the family and health professionals<sup>18-19</sup>.

The predominance of older adults in the sample, and especially among the patients who developed PI, can be justified by the growth of the aged population and, consequently, by changes in the health profile with the increase of chronic degenerative diseases of low lethality but high disability<sup>4</sup> which, associated with nutritional status, previous comorbidities, capillary fragility and cognitive deficit, contribute to PI development in the hospital environment<sup>20</sup>.

Diseases of the circulatory system were the most frequent medical diagnoses and are consistent with the patients' greater dependence on the Nursing team with emphasis on cerebrovascular diseases<sup>19</sup>. Neurological deficit can affect sensory perception and decrease physical mobility and sphincter control, in addition to loss of sensation on body surfaces which, associated with moisture, friction and pressure, can lead to the development of injuries<sup>21</sup>.

A significant percentage of the patients reported being hypertensive and, to a lesser extent, diabetic; such comorbidities contribute to an increase in the cardiovascular risk, in addition to favoring continuous medication use. Systemic Arterial Hypertension (SAH) favors

a reduction in the blood vessels' strength, as well as in blood flow and in vascular tone. As it leads to a reduction in bloodstream and in tissue oxygenation, Diabetes Mellitus (DM) causes cell death due to lack of glucose, decreasing sensitivity and favoring PI formation<sup>21</sup>.

The injuries were mainly located in the heels and in the sacral region and presented stages one and two, results that are similar to those found in other studies that addressed the same theme<sup>4,22</sup>. Location of the injury can be associated with the patient staying in dorsal decubitus for a longer period of time and with elevation of the headboard, concentrating greater pressure on the sacral region and heels<sup>4,20,23</sup>. In turn, staging can be associated with initial identification of the injury and with the adoption of protective and curative measures, avoiding its deterioration, as well as with the shorter time spent in emergency units when compared to sectors such as clinics and intensive care units.

In relation to care complexity, the patients that developed injuries were classified as Intermediate care and as Semi-intensive care, showing an association between the care level and PI incidence. Patients in more severe conditions have a significantly increased risk of developing PIs due to a complex interaction process between intrinsic and extrinsic factors related to their clinical conditions<sup>23</sup>.

There was no association between the number and staging of the injuries and care complexity, although it is worth mentioning that the Nursing team should systematically assess the risk of developing PI, implement preventive measures early in time and, in the occurrence of injury, seek to minimize the deterioration and complications resulting from it.

The dependence degree and the estimated time for each procedure are important indicators of care and human resources management, as overcrowding in emergency services and an inadequate number of professionals interfere with care management and quality, increasing the risk of potentially preventable adverse events such as PIs<sup>9</sup>.

Although it was not the main scale evaluated in this study, the Braden scale proved to be an important and effective tool to predict the risk<sup>24</sup>. However, with overcrowding in emergency services, it is common in the everyday practice to find low applicability of patient safety assessment scales, with prioritization of administrative activities or measures to stabilize the clinical condition<sup>7-8</sup>.

Most of the patients that developed PIs in the emergency service were transferred to other units, which can lead to the development of new injuries or to progression of the already existing ones. In a study about PIs conducted in an intensive treatment unit, it was observed that many of the patients with PIs already had them at admission<sup>1</sup>.

The importance of multiprofessional work to the detriment of vertical and isolated measures focused on the disease is highlighted. Commitment should be focused on preventing development of injuries from the moment the patient enters the emergency room and be perpetuated throughout the hospitalization period with development of access protocols and continuous training of health care teams<sup>23</sup>.

The main limitations of this study lie in the changes in the routine to admit patients in the men's and women's wards and in the study field during the data collection period. Due to the pandemic, on some occasions the wards were isolated due to the presence of patients with suspected coronavirus infection, which limited admission of other patients to the units, who remained for a longer period of time in the emergency department corridor and, when transferred to the wards, some had already developed PIs and were excluded from the study. These limitations may have contributed to underestimating the incidence of pressure injuries in the emergency service.

## CONCLUSION

The incidence of pressure injury in the emergency service identified in this study was 9.3%. Most of the patients that developed PIs corresponded to aged women, brown race/skin color, hypertensive, with impaired physical mobility and in use of diapers. There was an association between care complexity and PI incidence. A total of 30 injuries were recorded, predominantly located in the sacral region and in the heels, and with staging in grades one and two.

There are also contributions to the practice, as the study highlights the importance of using instruments for risk assessment and care demands of patients entering the emergency services, whose data at admission can contribute to improving care quality, to reducing the occurrence of adverse events and to providing safe care.

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