

## Is the hydrocolloid patch for prone pressure injury prevention effective? Analysis of a retrospective cohort

*¿Es efectivo el parche hidrocoloide para la prevención de lesiones por presión en decúbito prono?  
Análisis de una cohorte retrospectiva*

*A placa de hidrocoloide para prevenção de lesão por pressão na prona é efetiva?  
Análise de uma coorte retrospectiva*

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### How to cite this article:

Giaqueto GC, Paula MF, Batista ACR, Paula LLRJ. Is the hydrocolloid patch for prone pressure injury prevention effective? Analysis of a retrospective cohort. Glob Acad Nurs. 2022;3(5):e326.

2022;3(5):e326.

<https://dx.doi.org/10.5935/2675-5602.20200326>

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Chief Editor: Caroliny dos Santos

Guimarães da Fonseca

Executive Editor: Kátia dos Santos

Armada de Oliveira

Submission: 11-01-2022

Approval: 12-14-2022

### Abstract

The aim of this study was to evaluate the presence of pressure injuries and their association with the use of hydrocolloid plaque in patients admitted to the ICU-COVID, submitted to pronation. This is a retrospective cohort performed with patients admitted to two COVID-ICUs who pronated during hospitalization. Patients who did not have data regarding pronation or injury were excluded. Eighty patients were included, who performed an average of three pronations with an average stay of 19:48 hours. The hydrocolloid patch was used in 47.5% of the participants, with 43.8% applied in an extended area. Regarding the development of pressure injuries, 42.5% developed from one to six wounds on the prone, stage I or II (35.0%). A significant difference was observed between those who were female, had altered hemoglobin, presence of edema or fever in pronation ( $p<0.05$ ). There was no significant difference between those who used or did not use a hydrocolloid patch. In logistic regression analyses, it was observed that, with each new pronation, patients have 1.3 times more chance of developing injury ( $p<0.05$ ). The effectiveness of using a hydrocolloid patch in preventing pressure injuries in the prone position is still controversial. It is suggested that randomized controlled trials be carried out to verify its efficacy and cost-effectiveness.

**Descriptors:** Pronation; Pressure Ulcer; Disease Prevention; Nursing; COVID-19.

### Resumen

El objetivo de este estudio fue evaluar la presencia de lesiones por presión y su asociación con el uso de placa hidrocoloide en pacientes ingresados en la UCI-COVID, sometidos a pronación. Se trata de una cohorte retrospectiva realizada con pacientes ingresados en dos UCI-COVID que pronaron durante la hospitalización. Se excluyeron los pacientes que no tenían datos sobre pronación o lesión. Se incluyeron 80 pacientes, quienes realizaron un promedio de tres pronaciones con una estadía promedio de 19:48 horas. El parche de hidrocoloide se utilizó en el 47,5% de los participantes, con un 43,8% aplicado en un área extendida. En cuanto al desarrollo de lesiones por presión, el 42,5% desarrolló de una a seis heridas en decúbito prono, estadio I o II (35,0%). Se observó diferencia significativa entre quienes eran del sexo femenino, tenían hemoglobina alterada, presencia de edema o fiebre en pronación ( $p<0,05$ ). No hubo diferencia significativa entre los que usaron o no un parche hidrocoloide. En análisis de regresión logística, se observó que, con cada nueva pronación, los pacientes tienen 1,3 veces más posibilidades de desarrollar lesión ( $p<0,05$ ). La eficacia del uso de un parche de hidrocoloide para prevenir las lesiones por presión en decúbito prono sigue siendo controvertida. Se sugiere que se realicen ensayos controlados aleatorios para verificar su eficacia y rentabilidad.

**Descriptores:** Pronación; Úlcera por Presión; Prevención de Enfermedades; Enfermería; COVID-19.

### Resumo

O objetivo deste estudo foi avaliar a presença de lesões por pressão e sua associação com o uso de placa hidrocoloide em pacientes internados em UTI-COVID, submetidos à pronação. Trata-se de uma coorte retrospectiva realizada com pacientes internados em duas UTI-COVID que fizeram pronação durante a internação. Excluiu-se pacientes que não tinham dados referentes à pronação ou lesão. Foram incluídos 80 pacientes, que realizaram em média três pronações com permanência média de 19:48 horas. A placa de hidrocoloide foi utilizada em 47,5% dos participantes, sendo 43,8% aplicada em área estendida. Em relação ao desenvolvimento de lesão por pressão, 42,5% desenvolveram de uma a seis feridas na prona, de estadiamento I ou II (35,0%). Observou-se diferença significativa entre quem era do sexo feminino, tinha hemoglobina alterada, presença de edema ou febre na pronação ( $p<0,05$ ). Não houve diferença significativa entre quem usou ou não placa de hidrocoloide. Nas análises de regressão logística, observou-se que, a cada nova pronação, os pacientes têm 1,3 vezes mais chance de desenvolver lesão ( $p<0,05$ ). A efetividade do uso de placa de hidrocoloide na prevenção de lesão por pressão na posição prona ainda é controversa. Sugere-se a realização de ensaios randomizados controlados para verificar sua eficácia e custo-efetividade.

**Descritores:** Pronação; Lesão por Pressão; Prevenção de Doenças; Enfermagem; COVID-19.



**Introduction**

First isolated in 1937, the coronaviridae family arrived in Wuhan, China, in December 2019, causing an easily spread pneumonia. From the beginning of 2020, the pandemic period was installed, caused by the SARS-CoV-2 viral mutation. More than 446 million people became infected with the new viral strain and about 6 million people died<sup>1</sup>.

The prone position (PP), in this context, has been used as an additional therapy for patients with severe hypoxemia and difficult respiratory stabilization. In addition to effectively improving the ventilation/perfusion ratio, PP provides a better prognosis for the patient<sup>2-4</sup>.

However, an abrupt increase in the risk of developing pressure injuries (PU) has been observed in PP, since the hematogenous and lymphatic distributions become heterogeneous, leading to tissue ischemia and local necrosis. Its incidence can vary from 0.9% to 41.2% in Intensive Care Units due to the greater fragility of the patient, intrinsic and environmental factors. Among the methods of preventing these injuries, the hydrocolloid patch has been used all over the world<sup>5-7</sup>.

Studies have shown that this coverage redistributes pressure, shear and friction and is effective in preventing these wounds. In addition, it has also been employed in the prevention of pressure injuries caused by the use of personal protective face equipment for COVID-19, and devices used during non-invasive ventilation<sup>6-9</sup>.

However, there are still few studies available in the literature on its use in prevention during PP. Thus, the objective of this study was to evaluate the effectiveness of the use of hydrocolloid plaque in the prevention of PI in prone patients in the Intensive Care Unit (ICU) of COVID-19.

**Methodology**

This is a retrospective cohort, developed in two ICUs in the State of São Paulo, between March 19 and July 31, 2021. Patients who were prone at least once during this period were included. Patients who did not have data regarding pronation or the presence of pressure injuries in the Electronic Medical Record were excluded from the study.

Data were obtained from the history of hospitalizations in these units, prospectively recorded. Sociodemographic, clinical and pronation information was collected from electronic medical records. The primary outcome was the rate of development of pressure injuries.

For analysis of sociodemographic and clinical characterization, descriptive statistics were used, such as measures of central tendency (mean and median), dispersion measures (standard deviation, maximum and minimum), absolute and relative frequencies.

To verify the association between clinical variables, presence of lesions and their staging, Fisher's Exact test, Student's t test and Mann-Whitney test were used. In order to verify the joint (multivariate) association, Binary Logistic Regression was used, with the presence of injury as the outcome, through which the Odds Ratio (OR) was estimated. The regression was adjusted for age, gender, Body Mass Index (BMI), blood glucose, albumin, hemoglobin, urea, edema, fever, use of splint, time of use and number of pronations using the Backward logistic regression model. All data were collected using the Research Electronic Data Capture (REDCap)<sup>10</sup> platform and analyzes were performed using SPSS software, version 27, adopting a significance level of 5%. The study was approved by the Research Ethics Committee of Fundação Pio XII (48166021.1.0000.5437 - approved on 06/25/2021).

**Results**

The main characteristics of the patients are shown in Table 1.

Eighty patients were included, most of whom were female (n=52, 52.5%), mean age 53 years (±13 years) and obese (n=47, 58.8%). The most frequently reported previous comorbidities were high blood pressure (n=38, 47.5%), diabetes mellitus (n=16, 20.0%) and kidney disease (n=5, 6.2%).

**Table 1.** Sociodemographic and clinical characteristics of study participants (n=80). Barretos, SP, Brazil, 2021

VARIABLE	N
Sex	Feminine 42 (52,5%)
	Masculine 38 (47,5%)
Age (years)	53 ± 13 (20-84)
BMI	Underweight (<18.5) 1 (1,3%)
	Normal weight (18.5-24.9) 5 (6,3%)
	Overweight (25-29.9) 27 (33,8%)
	Obesity (>30) 47 (58,8%)
Nutritional status	Malnourished 4 (5,0%)
	Nurtured 35 (43,8%)
	No information 41 (51,3%)
Previous comorbidities	Arterial hypertension 38 (47,5%)
	Diabetes Mellitus 16 (20,0%)
	Dyslipidemia 2 (2,5%)
	Hypothyroidism 3 (3,8%)
Changes during pronation	Others 40 (50,0%)
	Glycemia 59 (73,8%)



	Albumin	40(50,0%)
	Hemoglobin	54 (67,5%)
	Urea	66 (82,5%)
	Edema	33 (41,3%)
	Fever	20 (25,0%)
	Hemodialysis	21 (26,3%)
<b>Number of pronations during hospitalization</b>		3±3 (1-12)
	Face and neck	27 (33,8%)
	Skull	2 (2,5%)
	Abdomen	12 (15,0%)
	Chest	11 (13,8%)
	Elbow	3 (3,8%)
<b>Injury site</b>	Shoulder	1(1,3%)
	Arm/Forearm	1 (1,3%)
	Hip	7 (8,8%)
	Knee	2 (2,5%)
	Hand	2 (2,5%)
	Leg	11 (13,8%)
<b>Maximum pronation time</b>		17h48 ± 3h29 (3h30-28h00)
<b>They used Cushions</b>	Yes	58 (72,5%)
	No	22 (27,5%)

The median and mean number of pronations were 3 (±3), with a mean length of stay of 19:48 hours (±3:29 hours). Most patients used cushions (n=58, 72.5%) and hydrocolloid plaque (n=38, 47.5%) placed in an extended area (n=35, 43.8%). Most had changes in blood glucose (n=59, 73.8%), albumin (n=40, 50.0%) and urea (n=66, 82.5%) in the prone position, but did not have edema (n=45, 56.3%), fever (n=59, 73.8%) and did not even need hemodialysis (n=57, 71.3%).

Thirty-four patients (42.5%) developed one to six pressure injuries during PP, stage I or II (n=28, 35.0%). The

most frequent sites of injuries were the face (31.3%), abdomen (15.0%), chest (13.8%), hip (8.8%) and leg (13.8%). There was no significant difference in the development, number and degree of PI (Table 2).

When univariate and multivariate logistic regression analysis was performed, the only variable that proved to be significant, at the 5% level, was the number of pronations, considering that with each new pronation, patients have 1.3 times more chance of developing injury by pressure.

**Table 2.** Pressure injury data and differences between groups that used or did not use the hydrocolloid patch (n = 80). Barretos, SP, Brazil, 2021

Variable	With Plate (n)	Without Plate (n)	p*
PI development	16 (43,2%)	16 (45,7%)	0,83
PI number	1,1 ±1,2 (0-6)	1,0± 1,2 (0-6)	0,77
Level of injury	1	8 (50,0%)	5 (31,3%)
	2	6 (37,5%)	7 (43,8%)
	3	2 (12,5%)	2 (12,5%)
	4	0 (0,0%)	2 (12,5%)

Note: \*p<0,05.

## Discussion

In this study, we retrospectively evaluated the effectiveness of using a hydrocolloid patch in the prevention of pressure injuries in prone ICU patients hospitalized for COVID-19. The results showed that there was no significant difference between patients who used or did not use the hydrocolloid patch. In addition, in the regression analysis, it was found that with each new prone position, the patient may be up to 1.3 times more likely to develop them.

The use of prone positioning has been vital during the COVID-19 pandemic. However, it has been shown to be a significant cause of previous pressure injuries. A study carried out with patients hospitalized in intensive care showed that, from one day in the prone position, 88.7%

developed PI and each day in this position, patients were 3.11 times more likely to have them<sup>11,12</sup>.

In addition, previous research has emphasized that PI is more likely to occur when patients are in the prone position than in the supine position, with incidence rates varying between 14% and 57%, with the face region being the most frequent<sup>13-15</sup>. In this study, 42.5% of the patients developed one to six lesions, with staging from I to II (35.0%) and 31.3% in the face region, corroborating the literature.

Protocols with evidence-based prevention strategies are essential to reduce these injuries, team overload and hospital costs. In the meantime, three types of preventive interventions can be used with patients treated in the prone position: assessment and management of the skin, use of pressure redistribution support surfaces or



positioning devices, and use of dressings for prevention, including the prevention of related injuries. to medical devices<sup>16,17</sup>.

A quasi-experimental study carried out by Weng<sup>18</sup> found a lower incidence of PI when hydrocolloid plaque or film dressing was used in the facial region, compared to the control group ( $p < 0.001$ ). Another study was performed to compare the use of cushioning materials (hydrocolloid plate combined with a liner made of conformable composite material) in one nostril versus no protection in the contralateral nostril. Both in animal models and in clinical application, the authors found protective efficacy of cushioning materials. The PI were avoided on the protected sides, with severe tissue necrosis documented on the control side<sup>19</sup>.

However, in our study, there was no significant difference between the use or not of the hydrocolloid patch for the prevention of PI in PP, in opposition to international findings. This finding can perhaps be explained by the use of cushions for most patients during positioning, but cultural, financial and public differences between institutions should also be considered, in addition to technical variations of the manufacturers of these devices.

In addition, there was a significant difference in the development of lesions for female participants, who had altered hemoglobin, presence of edema or fever in

pronation, which are already considered independent risk factors for the onset of PI<sup>20-22</sup>.

This study has several limitations. First, as this is a retrospective study, there was more than one professional recording data on PP and the appearance of lesions in the medical records, without institutional standardization, which made it difficult for researchers to organize and collect information. Second, there was not enough clear information about problems that occurred during the insertion or removal of the hydrocolloid plate (such as the presence of folds or injury caused by its poor positioning or removal), which may have generated a confounding bias to the injury assessor.

## Conclusion

The effectiveness of using a hydrocolloid patch in preventing pressure injuries in the prone position is still controversial, as no significant differences were identified between patients who used it or not. However, a statistically significant difference was observed in those who were female, had altered hemoglobin, presence of edema or fever in pronation. In addition, in the regression analysis, it was found that with each new prone position, the patient may be up to 1.3 times more likely to develop them. In the meantime, the absence of randomized and controlled studies and the contradiction of the results of this study with the literature reinforce the need for further research.

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