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PRESSURE ULCER IN CRITICAL PATIENTS AFFECTED BY COVID-19: PRONE POSITION PROTOCOL

Lesão por pressão em pacientes críticos acometidos pela Covid-19: protocolo de prona

Úlcera por presión en pacientes críticos afectados por Covid-19: protocolo de decúbito prono

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ABSTRACT

Objective: to evaluate the incidence of pressure injury, by location, the risk of development by the Braden scale and the use of protectors, in critical patients in a prone protocol with Covid-19, in a hospital in Belo Horizonte. **Method:** this is an observational, quantitative, descriptive and prospective study. Data were collected through electronic medical records, in the MV system, and in the AGEIS Nutrition system, during the period between April 12 and August 13, 2021. **Results:** in the total of 251 analyzed medical records of adult patients, it was evidenced 42.2% had pressure injuries, the most frequent location being zygomatic with 50.9%. Most patients used multilayer foam (92%) and 51.4% of patients were at high risk of injury. **Conclusion:** the incidence of pressure injuries was 42.2%. The presence of comorbidities and the high risk on the Braden scale may have contributed to the considerable percentage.

DESCRIPTORS: Pressure ulcer; Prone position; Intensive care units; Critical care; Coronavirus.

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RESUMO

Objetivo: avaliar a incidência de lesão por pressão, por localização, o risco de desenvolvimento pela escala de Braden e o uso de protetores, em pacientes críticos em protocolo de prona com Covid-19, em um hospital em Belo Horizonte. **Método:** trata-se de um estudo observacional, quantitativo, descritivo e prospectivo. Os dados foram coletados através de prontuário eletrônico, no sistema MV, e no sistema AGEIS Nutrition, durante o período entre 12 de abril de 2021 e 13 de agosto de 2021. **Resultados:** no total de 251 prontuários analisados de pacientes adultos, evidenciou-se 42,2% apresentaram lesão por pressão, sendo a localização mais frequente em zigomático com 50,9%. A maioria dos pacientes utilizaram espuma multicamadas (92%) e 51,4% de pacientes apresentaram risco elevado de lesão. **Conclusão:** a incidência de lesão por pressão foi de 42,2%. A presença de comorbidades e o risco elevado na escala de Braden podem ter contribuído para a considerável porcentagem.

DESCRITORES: Lesão por pressão; Decúbito ventral; Unidades de terapia intensiva; Cuidados críticos; Coronavirus.

RESUMEN

Objetivo: evaluar la incidencia de lesión por presión, por localización, el riesgo de desarrollo por la escala de Braden y el uso de protectores, en pacientes críticos en protocolo prono con Covid-19, en un hospital de Belo Horizonte. **Método:** se trata de un estudio observacional, cuantitativo, descriptivo y prospectivo. Los datos fueron recolectados a través de historias clínicas electrónicas, en el sistema MV y en el sistema AGEIS Nutrición, durante el período comprendido entre el 12 de abril de 2021 y el 13 de agosto de 2021. **Resultados:** en un total de 251 historias clínicas analizadas de pacientes adultos, se evidenció que el 42,2% presentaba lesiones por presión, siendo la localización más frecuente la cigomática con un 50,9%. La mayoría de los pacientes usaban espuma multicapa (92 %) y el 51,4 % de los pacientes tenían un alto riesgo de lesión. **Conclusión:** la incidencia de lesiones por presión fue del 42,2%. La presencia de comorbilidades y el alto riesgo en la escala de Braden pueden haber contribuido al considerable porcentaje.

DESCRIPTORES: Úlcera por presión; Posición prona; Unidades de cuidados intensivos; Cuidados críticos; Coronavirus.

INTRODUCTION

Pressure ulcer (PU) is defined as "localized injury to the skin and/or underlying soft tissue, usually over a bony prominence or related to the use of a medical device or other artifact".[1] The injury occurs due to intense and/or prolonged pressure in combination with shear.[1] Tissue tolerance to pressure and shear may be affected by microclimate, nutrition, perfusion, whether the individual has comorbidities, and by their type/condition of frailty or not.[1]

It constitutes a common phenomenon for people hospitalized all over the world, in different healthcare settings, especially among patients diagnosed with Severe Acute Respiratory Syndrome (SARSg) hospitalized in Intensive Care Unit (ICU) in which it is an additional threat in already physiologically compromised patients.[2] As observed in a study conducted in a hospital in Barcelona, between 2012 and 2013, which found the risk of pressure injury incidence to be 25.7% in a multipurpose ICU with patients in prone decubitus.[2]

Patients admitted to an ICU with a diagnosis of SARS are identified by critical health status, usually under fragile clinical conditions such as the need for the use of deep sedation.[3] Neuromusculature, as well as the cardiorespiratory issue directly interfere with the mortality rate.[3] In addition, skin integrity can be shown to be impaired as a result of neuromuscular competence, sedation, and prone position, making them at greater risk of complications and development of pressure injury, thus adding to longer hospital stays.[4]

In 2019, a new form of SARS emerged, the Covid-19.[5] The high lethality rate and severity of this disease generated a pandemic context of significant increase in the need for intensive care beds.[5] For treatment, the pronation position was considered successful, bringing benefits regarding the respiratory issue.[6-10] Another study conducted in the year 2020 in a Madrid hospital with Sars-Cov-2 patients submitted to prone position in an ICU, found an incidence of 77% of PU, which may have been caused by the pandemic condition of the analyzed period.[11] Thus, the multiprofessional team must ensure safety in the maneuver and also adapt the routine to prevent PU.[8]

It is known that PUs are considered an avoidable adverse event.[12] This is related to quality of care, especially in the hospital environment.[12] It should be considered a health problem involving the entire multiprofessional team, especially the nursing team, which provides continuous care to patients 24 hours a day, having as one of the care management to prevent these injuries.[12]

Thus, PU prevention is an important task in this context, as it may cause complications such as pain, facilitate the entry of infectious microorganisms, resulting in sepsis, increasing mortality and/or length of stay of individuals, whether infected or not.[13] Thus, consequently, there is an increase in hospital costs and also in nursing work.[13]

Due to this burden and the impact of the development of these injuries on the patient, risk assessment is common practice in the ICU, being performed with the objective of identifying the risks the patient is exposed to, in order to plan and start individualized preventive interventions.[14]

There is a need to criticize the presence of PUs in Covid-19 patients in the ICU and in prone protocol, as this is a recently emerged SARS with characteristics such as high case fatality and severity. Unlike other SARS, this one is still little addressed in the literature among this problem.

Therefore, this study aimed to evaluate the incidence of PUs by location, the risk of development by the Braden scale, and the release/use of protectors in critically ill patients on Covid-19 prone protocol in a hospital in Belo Horizonte. In addition, we aimed to quantify the length of stay in the respiratory ICU and analyze the outcome of these patients.

METHOD

This is an observational, quantitative, descriptive, and prospective study that was carried out through research in electronic medical records. It was carried out in a large philanthropic hospital located in Belo Horizonte, Minas Gerais.

The study population was the patients admitted to the Adult Respiratory ICU, under treatment for Covid-19. Inclusion criteria for the study were: (1) patients diagnosed positive for Covid-19; (2) aged 18 years or older; (3) admitted to the ICU on the date of data collection; (4) who started the prone protocol during the period April 12 to August 13, 2021; (5) and who had an informed consent form authorized. The exclusion criteria were: patients with an indeterminate diagnosis for Covid-19 during the collection period (the institution's protocol calls for repeating the test when this result occurs, so the result may be positive or negative in a new test) and no Braden scale during the data collection period.

Data were collected through electronic medical records, which were in the MV system, and in the AGEIS Nutrition system, on the dates when the researchers were available for collection: 12, 14, 19, 22, 26 and 30/04/2021; 03, 07, 17, 21/05/2021; 01, 08, 15, 22, 29/06/2021; 06 and 13/07/2021. And the period of follow-up/analysis of the medical records was from April 12 to August 13, 2021.

The research was carried out as follows: first a search was made in the MV system, on the dates when the researchers were available for the collection, in order to find participants within the inclusion and exclusion criteria; of the patients found they were approached about the research, regarding its objective, risk, benefits, as well as free participation; The patients were asked to sign the free and informed consent form; for those who were not in physical, mental, and psychological conditions to sign/approach the participant, these were done with the responsible/family member; contact with the responsible/family member was made by phone, which was in the electronic medical record (MV system). The term was done in virtual format on the Google Forms platform. A link was sent by e-mail and/or WhatsApp to the guardian/family member, from which it would be necessary to log into their own e-mail to access the acceptance form. For conscious patients, bedside consent was requested. In cases where the patient died, the consent form was waived.

In the second step, the following data were collected from the participants' medical records Identification number (participants had their names identified by order number per collection); Date of data collection (period the researcher was on site); Skin-related variables: in the AGEIS Nutrition system – Branden scale at the time of collection (date the researcher was on site), date of onset of PUs per prone protocol and also preventive care before prone maneuver; in the MV system – Sociodemographic data: gender, age, ICU floor and bed, date of ICU admission; Patient profile: comorbidities; prone protocol start date; ICU Outcome: (death, improved discharge, transfer another ICU or inpatient unit) and reason, and length of stay. For participants with an outcome other than death, the medical record was followed up until the date defined by the author as the end of the collection, which was August 13, 2021, regarding the change in the outcome. The participants who died, this date was considered the date of death in order to conclude the length of hospital stay.

Information regarding socio-demographic data, death outcome, and transfers were mandatory in the medical chart. The length of stay was obtained by the MV system. However, feeding the Ágeis Nutrition system (Braden scale, PU evolution and coverage request) was at the nurses' discretion.

Thus, the absence of data such as Braden scale value on the day of collection was evaluated as follows: date closest to the collection date, within the hospitalization period, and preferably earlier date when proximity equivalence. If there was no date on the day of collection, or no earlier date, the participant was followed up to the closest later date (if hospitalization still due to Covid-19 and complications).

The Ágeis Nutrition system allows the "no PU" evolution. It was considered by the researchers that the patient had no PU when there was no positive or negative evolution within this system. In the institution, to request treatment of lesions, the individual evolution of the patient in the system was mandatory for the provision of coverage by the pharmacy.

The data were tabulated in Excel spreadsheet and the absolute frequency analysis was performed in SPSS software version 25. The analysis period was defined by convenience. However, the totality of the electronic medical records was analyzed, from those among the criteria.

The execution of this study was approved by the Research Ethics Committee and followed the guidelines and standards regulating research involving human beings.[15] CAAE number 43177421.4.0000.5138.

RESULTS

There were 251 electronic medical records analyzed; there were no exclusions or patients with undetermined diagnosis for Covid-19 in prone protocol during the data collection period. Table 1 shows the sociodemographic data of the patients, who were mostly male (n= 134; 53.4%). The mean age of the patients was 56 years (minimum: 18 years / maximum: 85 years), with the great majority of patients in the 18 to 59 years range (n=138; 55.2%). The ICU with the largest number of inpatients was the 10th (tenth) floor (n= 148; 58.9%). Regarding comorbidities, systemic arterial hypertension (SAH) (63.7%) was the most frequent, followed by obesity (37.1%) and diabetes mellitus (DM) (30.7%).

As for the Braden scale (Table 2), 129 (51.4%) patients presented high risk (score equal to ten through twelve), and 108

Table 1 – Sociodemographic data. Belo Horizonte, MG, Brazil, 2022

Feature	n (%)
Gender	
Male	134 (53,4)
Female	117 (46,6)
Age (complete years)	
18 to 59	138 (55,2)
≥ 60	113 (44,8)
ICU floor / corresponding beds	
10° / 41 – 90	148 (58,9)
4° / 01 – 30	101 (40,3)
2° / 31 – 40	2 (0,8)
Comorbidities	
SAH	160 (63,7)
Obesity	93 (37,1)
DM	77 (30,7)
Smoker	28 (11,2)

Source: Research data

Table 2 – Braden Scale. Belo Horizonte, MG, Brazil, 2022

Score	n (%)
Very high risk (6 – 9)	108 (43,1)
High risk (10 – 12)	129 (51,4)
Moderate risk (13 – 14)	6 (2,4)
Low risk (15 – 18)	4 (1,6)
No risk (19 ≥)	4 (1,6)

Source: Research data

(43.1%) patients presented very high risk (score equal to six through nine). The least part of the patients had moderate risk, low risk to no risk (n=14; 9.2%).

Regarding the application of the protective device, it was evidenced that 231 (92%) patients used the multi-layer foam, provided by the hospital, as a protocol established by the Skin Integrity Service (SIS). The flow to release the multilayer foam consists of some steps such as: patient with a confirmed prone proposal; open inter-consultation and communicate via telephone to the SIS nurse; request in the MV system, referring to the pharmacy, which is responsible for dispensing this material, using the foam code; perform evolution in the Ágeis Nutrition system; wait for release by the SIS. A total of six foams are released, being: two foams for the zygomatic, two for the anterior shoulders, two for the iliac crests and two for the knees. For patients with humidity at the site where the foam would be inserted, a product such as barrier cream or areosol sealing film was released.

The number of patients in prone protocol who developed PUs and their location are described in Table 3. Of the 251 patients, 106 (42.2%) developed PUs, the most frequent location being in the zygomatic (n=54; 50.9%), followed by the menton (n=21, 19.8%) and tibia (n=20, 18.9%)..

In Table 4, data regarding hospitalization and discharge of patients are presented. Regarding the length of stay, 133 (53.2%) stayed between eleven and twenty days, followed by 50 (20%) patients with a length of stay of 21 to 30 days. The shortest length of stay was more than 30 days and the maximum 65 days.

About the reasons for discharge (Table 5), most patients (166, 66.1%) died, 55 (21.9%) were transferred from the ICU to the inpatient unit, and 30 (12.0%) were referred to another ICU during the analyzed period.

DISCUSSION

The presence of PU found was higher in males (53.4%). A research with Covid-19 positive patients found in its sample 56.3% of male participants.[16] This shows a similar value to that evidenced in this study.

In addition, a mean age of 56 years was found, with a minimum age of 18 and a maximum of 85 years. Kastoris and collaborators observed in their study a mean age of 64 years (29 to 78 years).[17] The literature discusses that age is one of the risk factors for Covid-19 infection.[17,18] It is also a risk factor for pressure injury, being that the older the patient, the more fragile he/she is and consequently the risk of PU.[12]

Regarding comorbidities, a study conducted with patients diagnosed with Covid-19, intubated and in prone protocol, showed in the demographic characteristics, the high presence of

Table 3 – Pressure Injury and its location. Belo Horizonte, MG, Brazil, 2022

Pressure Injury	n (%)
Developed PU	
Patients	106 (42,2)
PU Location	
Zygomatic	54 (50,9)
Mento	21 (19,8)
Tibia	20 (18,9)
Trochanter	15 (14,2)
Mouth	14 (13,2)
Ear	13 (12,3)
Nose	12 (11,3)
Fibula	7 (6,6)
Knee	7 (6,6)
Frontal bone	5 (4,7)
Shoulder	4 (3,8)
Elbow	3 (2,8)
Penis	2 (1,9)
Temporal	1 (0,9)

Source: Research data

Table 4 – Length of hospitalization. Belo Horizonte, MG, Brazil, 2022

Hospitalization time	n (%)
Less than 10 days	47 (18,8)
11 to 20 days	133 (53,2)
21 to 30 days	50 (20)
More than 31 days	21 (8,0)

Source: Research data

Table 5 – Outcome. Belo Horizonte, MG, Brazil, 2022

Outcome	n (%)
Death	166 (66,1)
Transfer/Inpatient Unit	55 (21,9)
Transfer/another ICU	30 (12,0)
Improved (hospital) discharge	0

Source: Research data

comorbidities, with 73% of participants with at least one, among them: cardiovascular diseases, diabetes mellitus, respiratory diseases.[6] This also justifies the data found in this study as 63.7% of patients diagnosed with SAH, and 30.7% DM. Obesity is also discussed in the literature as a risk factor.6,19 These results suggest that comorbidities are present factors in critically ill patients with Covid-19.[6,17,18]

Due to the severity of patients in an ICU, nurses use the tool known as the Braden scale during the patient's stay.[20] The tool has an easy applicability and may be performed at the bedside during physical examination.[20] Its usefulness is mainly to evaluate the skin and the means capable of making it fragile to the point of developing a PU.[20] Data found in the survey show that the risk was high, a score of ten to twelve points, was 51.4%; regarding the very high risk, a score of six to nine points, it was 43.1%. A Braden scale score equal or lower than 15 may be associated to a higher mortality risk.[20] It is essential that the nurse performs a strict control during the days the patient is in the ICU.[7,20,21] It is also necessary to record the appearance of PUs and train the professionals involved to act in prevention.[20]

Regarding the foam device, used as protection, it was evidenced that 92% of the patients used it. Although this is a high number, it is still not 100%, and its use is defined in the hospital's protocol. The hospital's Skin Integrity Service is a service conducted only by nurses, specialized in stomal therapy, who provide care for lesions, stomas and wounds, throughout the hospital environment. They also provide health education to the nurses of the sector, helping and guiding them about the best care management. One study reported on the recommendations of a nurse technically responsible for wound prevention and treatment in a hospital, one of these being the use of foam covering between the tube fixation and the patient's skin.[16]

The incidence of PU among respiratory critically ill patients in prone standing protocol found in this study was 42.2% with a sample of 251 patients. The results of this study regarding the incidence of PU in critically ill patients are high. However, a study also mentions the incidence of PU in patients diagnosed

with Covid-19 admitted to a respiratory ICU was 47.6%.[16] The duration of prone is presented as a significant risk factor for PU development.4[6,16,19] Since patients on prone protocol often have medical devices that may increase the likelihood of PU due to positioning.[4,16,19] Moreover, these patients are usually under sedation, i.e., there is a dependence on mobilization of the body and the change of position in prone position only occurs in the movement of the arms and head favoring the increase in moisture loads in the tissue in other regions.[4,6,16,19] Also, the Covid-19 disease itself develops release of cytokines, causing endothelial dysfunction and ischemia.[6,16,19] All these factors increase the likelihood of developing the lesions.[4,16,19]

Regarding location, the zygomatic bone had the highest number, with 50.9%; followed by the chin, with 19.8%; the ear had 12.3%, and the nose had 11.3%, relatively high numbers. Another study of patients diagnosed with Covid-19 which found a 47.6% incidence of PU, mentioned the region of involvement, the head and neck region, of which 57.84% was in the zygomatic, 50% in the ears, and 14.21% in the nose.[16] These data are due to the fact that prone positioning causes facial edema.[16] Another factor is the endotracheal tube fixators, as they produce vertical forces on the face, thus contributing to the development of pressure injury, in addition to problems of poor blood circulation, associated with Covid-19.[16]

Regarding length of stay, it was evidenced that 53.2% stayed between 11 to 20 days, followed by 20% with 21 to 30 days of hospitalization. Prolonged length of stay is recognized as one of the risk factors for PU.[7,12]

In this study, patients were divided among three intensive care units, where 58.9% were on the 10th (tenth) floor, due to the number of beds available in the sector, and defined by the agreement made between the hospital and the state, as a reference in Covid-19 care.

Inside the institution there was a transfer between the intensive care units of Covid-19 care within the transmissibility period and other ICUs, of which, when necessary, the patients outside the transmissibility period, who were in a more stable period, were transferred to the other intensive care units. The objective was the Covid ICU bed rotation, aiming at the availability of vacancies for the bed center and for internal demands. It was observed that most patients died (66.1%), other 21.9% were referred to the inpatient unit and 12.0% were referred to the other intensive care units. Some aspects already mentioned may interfere in the outcome of patients, these being: length of stay, nutrition, presence of comorbidity, hematological issues of the disease and of the individual, also having as a consequence the emergence of PU.[6,7,12,16,19,22]

CONCLUSION

According to the analysis and discussion of the study, the incidence of PU in the intensive care units surveyed was 42.2% and the presence of comorbidities, high risk in the Braden scale may have contributed to the considerable percentage of PU incidence.

These findings are important, as it is possible for nurses to identify which patients require additional care. Furthermore, experience and specific training of the staff is paramount, especially when changing the decubitus, head and arms of prone and intubated patients. Since several other injuries were presented of which the foam prevention strategy in some locations would not be possible, as well as there was no clearance from the institution to adhere to it. This implies the need for future research crossing data between high risk patients and the need for implementation of protective measures in other locations beyond the standardized versus the cost and benefit of such action.

It was evidenced that male gender, presence of comorbidity, high and very high risk on Branden's scale are significant severity factors in Covid-19 as they were admitted to ICU. In addition, the high percentage of death outcome draws attention and reaffirms the lethality of the disease.

This study also contributes to the monitoring and control of occurrences in the institution and mainly to the development of more effective preventive measures, besides the standardization of technologies needed to control the disease. Secondary to the administrators of health institutions, the pressure injury represents a serious problem and a challenge for the nursing team, because it demands resources, longer time of assistance to the patient and an increase in financial expenses during hospitalization, besides the discomfort pro patient and family members. This study also contributes, in relation to informing health professionals about in which situations there is a higher risk of PU, so that there is a more attentive care, as well as for society and the health system that could benefit from a lower incidence of PU when the necessary preventive therapies are applied, with a lower cost in health than with the treatment itself, and fewer sequelae for the population.

Limitations of this study were: lack of routine records in the MV and/or Agéis Nutrition system, which was a difficulty/time burden to find reports on the prone maneuver; lack of data on injury staging; number of collections and days defined by the researcher for convenience and lack of correlational statistical analysis between comorbidities, length of stay and Branden scale score with PU, as well as comparative analysis of foam use and incidence or not of PU at the site of application. Also, the Braden Scale was evaluated on different days for each patient, and it may be that the patients were in different phases of the disease/day after symptom onset, which makes analysis difficult.

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