

# Nursing care: patient with pressure ulcers secondary to the prone position due to covid-19

## Abstract

**Introduction:** The application of the scientific method with the Nursing Care Process in nursing is essential to implement professional care in daily practice. Under this scenario, it is necessary to have care plans that allow optimizing care for patients with a condition such as COVID-19, as well as the complications derived from it; such as pressure ulcers.

**Objective:** Develop a Nursing Care plan for the patient with IP: UPP, secondary to prone position in patients with covid-19.

**Method:** An electronic information search regarding interdependent pressure ulcers secondary to the prone position was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology.

**Results:** The analysis of the NIC 3520 was carried out, finding 7 specific activities applicable to the management of pressure ulcers. Likewise, bibliography on the subject was reviewed, finding current activities used in the management of the patient in a prone position, which are listed in this work.

**Conclusions:** Due to the impact generated by pressure ulcers and their rapid development in the patient who is placed in the prone position, it is of vital importance that the nursing staff in the intensive care area have the knowledge on how to provide a quality care for this type of patients by applying the pertinent risk assessment and management scales in the case of ulcers that are already present.

**Keywords:** dyspnea, covid-19, prone position, diarrhea

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## Introduction

The application of the scientific method with the Nursing Care Process in nursing work is essential to implement professional care in daily practice. Under this scenario, it is necessary to have care plans that optimize the care of patients with COVID-19 conditions.<sup>1</sup> Every pandemic poses enormous health, social and economic challenges, so in order to respond to this urgency caused by the SARS-CoV-2 virus, it is essential to have tools that help nurses in the planning, execution and decision-making to provide care to critically ill patients with COVID-19 and also avoid complications such as pressure ulcers secondary to the prone position in a relevant and appropriate way, effective.<sup>2</sup> The pandemic derived from Sars-COV-2 caused serious health havoc in many people, especially in those who are in risk groups, such as chronic degenerative diseases and who reach the state of health in which they require intubation and the use of prone position, which predisposes them to the development of pressure ulcers.<sup>2,3</sup> Pressure ulcers are not directly related to the pathophysiology of covid-19, however, they are closely linked to the prolonged time of intubation, the patient's comorbidities, the biomedical material that was used according to hospital reconversion and due to the lack of personnel that contributed to the increase in this type of patient. In addition, the use of some specific maneuvers that must be implemented in these patients was used, such as the prone position, in which the development of skin rashes was observed more quickly.<sup>4-6</sup>

## COVID-19 acute respiratory distress syndrome

It is currently known that the Sars-Cov-2 virus is transmitted by air, such as droplets of flugge that mainly affect the respiratory system, triggering an inflammatory response in the host, which causes tissue lung injury. Consequently, the hematosis process is affected, triggering

severe hypoxemia, respiratory distress and therefore mechanical ventilation.<sup>7,8</sup> The initial symptoms were commonly described as: fever, fatigue, anorexia, myalgias and diarrhea. The severity of the disease occurs approximately one week after the onset of symptoms. Dyspnea is the most frequent symptom of severe disease and is almost always accompanied by hypoxemia.<sup>7-10</sup>

The speed of progression to respiratory failure is the most relevant aspect after dyspnea and hypoxemia. Most patients with severe COVID-19 develop criteria for acute respiratory distress syndrome, which is defined as the acute onset of bilateral infiltrates in ground glass, severe hypoxemia with oxygen saturation less than 93%, pulmonary edema due to heart failure or fluid overload. Studies show that most critically ill covid-19 patients receive prolonged mechanical ventilation. The presence of refractory hypoxemia is the most common feature in patients with acute respiratory distress syndrome (ARDS), due to the existence of a shunt, requiring assistance with mechanical ventilation in the prone position in most cases. At the pulmonary level, the patient with ARDS has normal alveoli and collapsed alveoli that are recruitable, along with other areas that are not. "There is an increase in lung weight due to edema, generating a pressure on the ventilator imposed by the ventilator 4-5 times greater than normal, which creates collapse of more dependent lung regions (compression atelectasis) and greater distension of non-dependent regions due to traction." This means that the movement of gases to and from the lungs is determined by a pressure gradient. The prone position varies the structure of the pressure gradient in relation to the order of the infiltrates, the weight of the cardiac mass (supine compresses the left lower lobe of the lung) which produces variations in pulmonary compliance and the displacement of the abdomen, which allows alveolar ventilation to be more balanced.<sup>11-14</sup> (Figure 1)

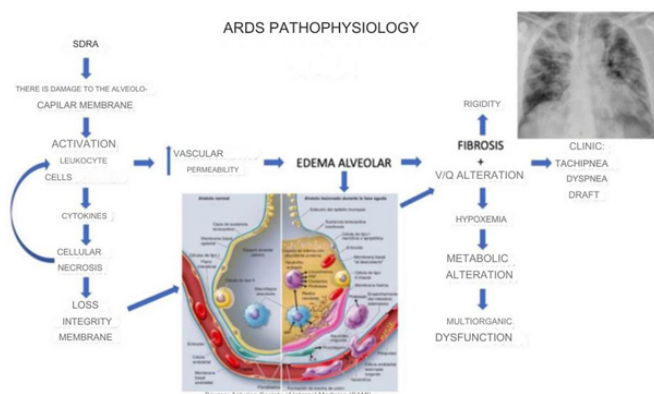


Figure 1 Validation of instructional materials for pressure injury prevention.

### Incidence of prone pressure injuries

In the ICU there is a high rate of PUs, simply because they are patients in critical condition, who are sedated, with mechanical ventilation assistance, monitored with biomedical equipment, with vascular and risk access; all of the above makes it difficult to comply with nursing care for the patient, mobility for example; even more so, if the patient is delicate Pressure ulcers that arise due to biomedical equipment are considered iatrogenic, these are produced by the contact of the equipment with the patient’s skin, causing damage to the epidermis caused by friction and pressure when using materials or devices in the primary and/or emergency care process. On the other hand, during the covid-19 pandemic, PUs associated with the prone position turned out to be the most frequently encountered adverse event with (34%), this because it has been shown that the prone position improves oxygenation in this type of patients compared to the supine position, in addition, in various studies in both animals and humans, it has been found that the prone position can reduce ventilation-associated lung injury.<sup>13-16</sup>

In the development of PU, the time that patients submitted to this position lasted was mainly identified, since, for it to be effective, its duration must be at least 12 to 16 continuous hours. Certain characteristics were found that condition and make the patient more susceptible to developing pressure ulcers in this position and in various studies it was concluded that the most frequent complication associated with this position are ulcers, due to this, the interest arises in analyzing the activities that are available to provide support to this type of patient and identify the activities that are beneficial for this problem and that have been evidenced in other entities.<sup>16-19</sup>

### Prone position in patients with sars cov-2 in the ICU

Prone decubitus is a maneuver used in the Intensive Care Unit (ICU) in patients with Acute Respiratory Distress Syndrome (ARDS) when hypoxemia is severe (PaO<sub>2</sub>/FiO<sub>2</sub> less than 150). The literature is solid for the application of this maneuver and randomized clinical trials show improved oxygenation and increased survival in these patients.<sup>18-20</sup>

### Description of the prone position

It is an anatomical position of the human body, also known as ventral decubitus, which is characterized by the body position lying face down and the head on the side, neck in a neutral position; extended upper limbs close to the trunk and with the palms of the hands facing upwards; lower limbs also extended with the feet in neutral flexion and the thumbs down.<sup>18-20</sup> 46% (7 articles) were published

in PUBMED in English; 40% (6 articles) belong to publications of guides, IMSS magazine and others. 7% (1 article) corresponds to Elsevier. And finally another 7% (1 article) belongs to Scielo, with articles published in Spanish. Subsequently, the analysis of the CIN “3520 care of pressure ulcers” was carried out, based on nursing and collaboration activities, 7 specific activities were found that can be applied to pressure ulcers, which are listed and substantiated. (Figure 2)

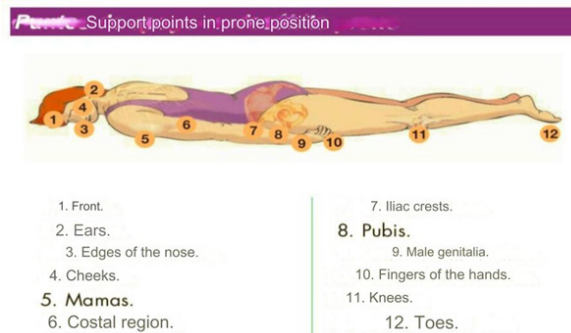


Figure 2 European pressure ulcer advisory panel and national pressure ulcer advisory panel.

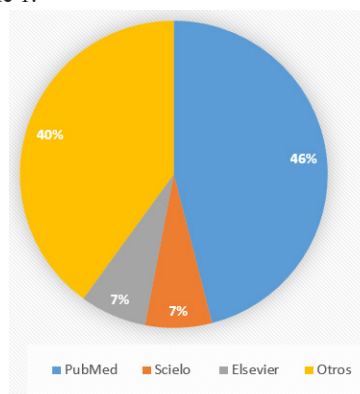
### Methodology

A documentary research was carried out from April 2021 to February 2022. The search for information was electronic referring to the chosen topic: interdependent problem pressure ulcers secondary to prone position using the Preferred Reporting Items For Systematic reviews and Meta-Analyses (PRISMA) methodology, the words used as a basis were ulcers, pressure ulcers, prone position, prone position and covid-19. For this bibliographic review, the search for information was carried out in electronic and printed documents. The research articles were both national and international, mainly in English and Spanish. Of all the articles found, only the most important according to the level of evidence were included and those with less relevance to the topic were excluded. During the bibliographic review, the information was analyzed and classified, then the general outline of the work was developed for the integration of the theoretical framework, as well as the elaboration of the chosen nursing plan.

### Results

A purification of articles from the bibliography consulted was carried out, where the following were taken as

It shows only articles related to pressure ulcers generated by prone position in patients suffering from COVID-19 and nursing care. Graph 1& Table 1.



Graph 1 Purified bibliography.

**Table 1** CIN Analysis: pressure ulcer care

IAS:3520: Pressure ulcer care

DOMAIN: 2 Physiological: Complex

CLASS: L Skin Control/ Wounds

1. Describe the characteristics of the ulcer at regular intervals, including size (length, width, depth), stage (I-IV), position, exudation, granulation or necrotic tissue, and epithelialization.

2. Assess the color, temperature, edema, humidity and appearance of the surrounding skin.

3. Keep the ulcer moistened to promote healing.

4. Debridement the ulcer, if necessary.

5. Watch for signs and symptoms of wound infection.

6. Change position every 1-2 hours to avoid prolonged pressure.

7. Ensure adequate dietary intake.

### Scientific basis of the activities

**Activity 1.** Describe the characteristics of the ulcer at regular intervals, including size (length × width × depth), stage (I-IV), position, exudation, granulation or necrotic tissue, and epithelialization.

**Rationale:** Performing the assessment of an ulcer, through the use of scales or specific criteria on ulcers, allows us to identify the stage in which it is found and from this to treat it appropriately and thus prevent possible complications.

**Activity 2:** Control the color, temperature, edema, humidity, and appearance of the surrounding skin.

**Rationale:** Thermoregulation is the homeostatic regulation of body temperature. The skin contributes in two ways: the first by releasing sweat through the eccrine sweat glands and by adjusting blood flow in the dermis (vasodilation or constriction). Maintaining this balance keeps the patient in comfortable conditions.

**Rationale:** Perform maintenance debridement on a pressure ulcer until the wound bed is free of devitalized tissue and covered with granulation tissue. Debridement of the pressure ulcer should be performed urgently in the presence of the following symptoms: erythema, softening, edema, purulent exudate, fluctuations, crackles, and/or bad odor.

**Activity 5:** Watch for signs and symptoms of wound infection.

**Rationale:** With each dressing change, watch the pressure ulcer for signs that a change in treatment is needed (e.g., wound improvement, wound deterioration, more or less exudate, signs of infection such as redness, fever, drainage of foul contents, and other complications).

**Activity 6:** Change position every 1-2 hours to avoid prolonged pressure.

**Rationale:** The capillary pressure ranges between 16-32 mm. of Hg. A pressure greater than 17 mm Hg. will occlude capillary blood flow in the soft tissues, causing hypoxia, and if not alleviated, necrosis of the same. The formation of a PU depends on both the pressure and the time it is maintained; Kösiak showed that a pressure of 70 mm Hg for 2 hours can cause ischemic lesions.

**Activity 7:** Ensure adequate dietary intake.

**Background:** Good nutritional support not only favors the healing of PUs but also prevents their appearance (loss of fat and muscle tissue decreases protection on bone prominences) and local complications such as infection.<sup>21-23</sup>

## Treatment

### Cleaning

- A. The pressure ulcer should be cleaned at each dressing change.
- B. Cleaning solutions with surfactants and/or antimicrobials should be considered to clear pressure ulcers with debris, confirmed infection, suspected infection, or suspected high levels of bacterial colonization.

### Debridement

- a. The wound bed should be debrided when the presence of biofilm is suspected or confirmed
- b. The most appropriate debridement method(s) for the person, wound bed, and clinical setting should be selected: Surgical/Cutting, Preservative Sever, Autolytic, Enzymatic, Larval, and Mechanical (including ultrasound and hydrosurgical).
- c. Surgical/cutting debridement is recommended in the presence of extensive necrosis, advanced cellulitis, crepitus, fluctuation, or sepsis secondary to an ulcer-related infection.
- d. Conservative shear debridement and surgical/shear debridement must be performed by specially trained, competent, qualified, and licensed health care professionals following local laws, and regulatory standards
- e. Mechanical, autolytic, enzymatic and/or biological debridements should be performed when there is no urgent clinical need for drainage or removal of devitalized tissue.
- f. Stable, hard and dry bedsores present in the ischemic limbs should not be debrided
- g. The pressure ulcer should be debrided urgently in the presence of the above symptoms (i.e., erythema, softening, edema, purulent exudate, fluctuations, crackles, and/or bad odor).
- h. Maintenance debridement should be performed on a pressure ulcer until the wound bed is free of devitalized tissue and covered with granulation tissue.<sup>23-25</sup>

### Dressings for the treatment of pressure ulcers

#### A wound dressing should be selected based on:

- i. Ability to keep the wound bed moist
- ii. Need to address bacterial load
- iii. Nature and volume of wound exudate
- iv. Condition of the tissue in the ulcer bed
- v. Periwound skin condition
- vi. Ulcer size, depth and location, presence of tunnels and/or cavitations

### Hydrogel aposites

The use of hydrogel dressings on shallow pressure ulcers, and with minimal exudate, should be considered.

### Alginate apologies

The use of alginate dressings should be considered for the treatment of pressure ulcers with moderate or heavy exudate.

## Foam dressings

Foam dressings should be considered for shallow category/stage II and category/stage III exudative pressure ulcers.

## Plata-impregnated appasites

Silver-impregnated dressings should be considered for pressure ulcers that are clinically infected or heavily colonized.

## Silicone fittings

The use of silicone dressings as a layer in contact with the wound should be considered to promote non-traumatic dressing changes.

## Collagen matrix dressings

Collagen matrix dressings should be considered for non-healing category/Stage III and IV pressure ulcers.

## Negative pressure therapy

Negative pressure therapy (NPWT) should be considered as an early adjuvant for the treatment of category/Stage III and IV deep pressure ulcers.

## Discussion

During the COVID-19 pandemic, the treatment of critically ill patients included great challenges, given that there were no preceding situations that, due to their characteristics, would have prepared us for the challenges that were to come, including some complications such as ulcers developed by the use of the prone position, however, lack of knowledge about the specific care that should be implemented in this type of patient to reduce future complications, as well as limit existing ones, significantly affected the incidence of this problem. The pathophysiology of ulcers caused as a consequence of the prone position became relevant because the Nursing staff who work in the Intensive Care area of hospitals must be updated at all times on this issue that, during the course of the pandemic, caused havoc on the health system given that it was a negative effect on patients who were in a crisis situation during the Covid-19 period. It is relevant to identify and implement care based on scientific knowledge that strengthens the specific activities that all nursing personnel must carry out to contribute to the treatment of patients who may have ulcers. Likewise, it is important to highlight that ultimately this leads to preventing or mitigate complications derived from the presence of pressure ulcers in patients.

## Conclusion

The care and protection of the skin of all patients under mechanical ventilation is essential for the favorable evolution of the course of the disease and it is the responsibility of the nursing staff in charge to have the knowledge to prevent and manage pressure ulcers if they are present, in order to ensure a better quality of nursing care for the patient. During the Covid-19 pandemic, the development of pressure ulcers arose more quickly in patients who were placed in a prone position and who were subjected to mechanical ventilation. Due to the impact this generated, it is considered vitally important that healthcare personnel Nurses who are in the intensive care area acquire knowledge about the proper management of patients with pressure ulcers to increase the quality of nursing care.

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None.

## Conflicts of interest

The authors declare that there is no conflicts of interest.

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