



WHITE PAPER

GUIDELINE PUPRO

Pressure Ulcers Prevention on PROne Position and in Patients with ECMO and other medical devices within Intensive Care (Intensive Care - Critical Patients)

PRODUCED BY:

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Until 1st March 2020, the new pandemic of COVID-19, a disease caused by SARS-CoV2, already accounted 79,968 confirmed cases, including 14,475 (18.15%) of critical ill people. Complications include acute respiratory distress syndrome (ARDS), arrhythmia, shock, acute kidney failure, acute cardiac injury, liver dysfunction and secondary infection (1). ARDS occurs more frequently in adults and the elderly, with immune dysfunction and comorbidities. This severe form of infection is indicated for treatment in intensive care, due to acute pulmonary inflammation, ARDS, sepsis and shock (2). The use of the prone position in a universal way in adults with hypoxemia under invasive mechanical ventilation, in intensive care units still need robust scientific evidence to support it. However, there is evidence that in patients with ARDS positioned in prone position for long periods, in an initial phase of treatment, mortality is significantly lower when compared to those who only do the supine position (3). The early implementation of prone positioning and its use for long periods, in situations of severe hypoxia, seems to significantly decrease mortality rate (4).

The prone positioning of a critical patient is associated with a higher incidence of pressure ulcers (PUs) (5). The incidence of PU described in the literature associated with the prone position varies between 5% and 15% in critically ill patients or those associated with surgical positioning (6–9). There are also statistically significant differences in the incidence of PU between the groups of patients positioned supine, after 7 days of hospitalization, 79/186 (42.5%) *versus* patients positioned in prone 116/204 (57.1%) (5). As would be expected, the same study revealed that the location of the PUs was different: in patients positioned in prone, the most frequent ones were on the face (29.4%), sacrum (20.4%), anterior face of the chest (17.9%) and other locations (25.3%); for patients positioned in the supine, the most common are sacrum (26.2%), calcaneus (16.7%) and other locations (6.6%) (5). From this work emerged the need for preventive measures to avoid PUs in critically ill patients who are in prone position. In the context of the operating room, the occurrence of PUs caused by the patient in prone position is higher comparatively with other surgical positions (10), which proves the greater risk of ulceration in situations where this positioning is necessary. In addition to all the problems associated with the occurrence of PU acquired in the hospital, as most of those associated with the prone position are on the face, these can have a very significant physical and emotional impact (11).

INTRODUCTION

EMERGENCE OF THE PROBLEM

Based on available epidemiological data, about 5% of patients with symptomatic disease due to COVID-19 will need intensive care treatment and about 40% of these develop ARDS. The treatment of this clinical condition involves invasive mechanical ventilation and supportive therapies in cases of septicemia and / or shock. The use of ventilation in a patient in prone position seems to have good results, when the patient doesn't respond to the supine ventilation positions. It is recommended to keep the patient in prone position for more than 12 hours / day, avoiding the disconnection of the ventilator (2). Another technique used is extracorporeal membrane oxygenation (ECMO), the guidelines of the World Health Organization considers its use relatively positive, however, this is limited to specialized centers. Its application is limited to a small number of cases of COVID-19, as there is still no evidence of its usefulness in this disease specifically (2).

The impact of the high number of patients admitted to intensive care with ARDS by COVID -19 will lead to an added burden of stress for these health teams. Due to the severity of the clinical situations that develop, associated with techniques that put them at greater risk of development PUs (invasive mechanical ventilation with positive pressures, prone positions, ECMO, use of vasoconstrictive therapy to treat sepsis and shock, etc.), greater stress by intensive care teams (fear of contagion, work overload, rapid integration of new elements with little experience, adaptation of new spaces, etc.), an increase in the incidence of PUs in patients admitted to intensive care due to clinical conditions associated with SARS-CoV2 will be expected.

The incidence of PUs is an indicator of the quality and safety of health care and, according to Dispatch 1400-A / 2015 (National Plan for Patient Safety), the institutions of the National Health Service and all that have an agreement with it shall implement practices to assess, prevent and treat PUs (12).

PU is defined as a localized lesion of the skin and / or underlying tissue, due to pressure or in combination with shear forces. PUs usually occurs over bony prominences, but can be related to medical devices or other objects (8). The PU can develop due to forces caused by the patient's own weight or due to external forces, resulting from the application of a medical device or other object, or even from the combination of both. The lesion can present with intact skin or an open wound and can be painful. Tissue injury occurs due to intense or prolonged compression deformation (perpendicular forces to the tissue surface), tension and torsion / shear forces (parallel forces to the tissue surface), or the combination of both. Tissue tolerance for sustained deformation differs from the type of tissue, it can be influenced by microclimate, perfusion, age, health status (chronic or acute), comorbidities and soft tissue conditions (8). By this summary can be understood the enormous susceptibility of the patient in a critical situation to the occurrence of PU, due to the immobility that leads to a prolonged exposure to pressure and shear forces, the presence of medical devices, many of them life-saving, bad perfusion by effect vasoconstrictor therapies and shock, multiorgan failure, among others.

The prone position, in patients with ARDS, may be necessary for more than 12 hours in the most critical situations (2, 13), which enhances the development of PU on the face, anterior chest, genitals, elbows and knees. The presence of multiple medical devices makes the teams' attention focus on the development of PU associated with them. A PU associated with medical devices involves interaction with a device or object, which is, directly or indirectly, in contact with

the skin or implanted under the skin, creating localized forces that deform the superficial and deep tissue. The PU associated with a medical device, caused by a device or object, is distinct from a PU that develops primarily by forces caused by body weight. The forces resulting from the device against the skin and underlying tissue make the lesion look like what causes it, mimicking its shape and distribution (there appears to be a decal on the skin and / or deep tissue of the device that gave rise to it) (14).

APT Feridas prepared this recommendation document, in order to meet this emergency and thereby contribute to better health care for the SARS - CoV2 critical patient.

AN INCREASE OF THE INCIDENCE OF PU IN HOSPITALIZED PATIENTS IN INTENSIVE CARE WITH CLINICAL CONDITIONS ASSOCIATED WITH SARS-COV2 WILL BE EXPECTED.

AIMS

This document is intended to:

- Provide recommendations, based on the best available evidence, for preventing PU associated with prone position;
- Provide recommendations for prevention of PU associated with the use of ECMO and other medical devices, in the context of intensive care.

DISCLAIMER: The guidelines issued in this document are general recommendations for clinical practice, which should be implemented, respecting the institutional policies for the prevention of PU, not prevailing over these, but rather serving as a complement and added value. They must be carried out in a culturally conscious and respectful manner, in accordance with the principles of protection, participation and collaboration.

RECOMMENDATIONS

The following PU prevention recommendations are specifically for patients who are in prone position, they are not a substitute for the overall PU risk assessment, skin care, nutritional assessment and intervention and stabilization of the patient's clinical condition. Its implementation should be a decision of the clinical teams who provide care in these contexts, and local and / or institutional PU prevention policies must always be respected.

BEFORE POSITIONING

- Check the position of all medical devices, in order to prevent them from being under the user at the end of the positioning.
- Remove all non-essential devices in order to facilitate the procedure, thereby reducing the possibility of medical devices / objects being under the patient.

Particular attention for the removing of the monitoring electrodes and any devices that may come under the patient causing pressure points.

- Gather the number of professionals needed to perform the technique, choose the "team leader" who will be at the head and ensure the airway (for safety reasons, the patient should not be disconnected from the ventilator; if necessary use local protocol).
- Use a support surface with the ability to redistribute the pressure, according to institutional policies and respecting the manufacturer's instructions.

Support surfaces, such as mattresses and pillows, are essential to reduce the risk of developing PU in prone position (9). Support surfaces may be passive or active. The first one only redistribute the pressure, while the second one alternately relieve pressure points. There is no formal indication of the best support surface, nor evidence of the superiority of one type of support surface in relation to another (8).

DURING POSITIONING AND REPOSITIONING

- Lift the patient to avoid rubbing.
- Take special care, after positioning, to the face, chest, iliac crest, pubic symphysis, penis, scrotum, knees and fingers, taking into account the redistribution of pressure in these areas.
- Use cushions to relieve pressure on the toes, knees and alternate their position during the period when the patient is in prone position.
- Confirm that mechanical forces have been redistributed / relieved on the skin / mucosa where medical devices are present.

The position change of the cushion causes the points of greater pressure to alternate, which helps in prevention.

- If clinically possible, mobilize and alternate the position of the upper limbs along the body with the "freestyle swimmer" position, one arm in front flexed at 90°.

This alternation allows a change of pressure location in the elbow joint, while making some mobilization of the anterior region.

- Consider the use of a multilayer silicone foam dressing, in the areas of greatest pressure (iliac crests, anterior aspect of the chest, knees, among others) (8, 14, 15).
- The points of greatest pressure vary according to the person's anatomical structure and the eventual application of the dressing material should be carried out after evaluation.

FIGURE 1.



Patient positioned in prone - application of a pillow on the anterior thighs, in order to raise the knees (check that there is not too much tension in the lower back); bulky cushion in the tibial region in order to avoid pressure on the fingers. The upper limbs can be positioned along the body or in the cephalic direction, flexed at 90°.

FIGURE 2.



Pressure injury in the breast region (green circle); Grade 2 PU in the abdominal region, after more than 12 hours of prone (yellow circle).

- Check the placement of all medical devices, in order to avoid associated injuries.

PU's associated with medical devices are frequent in the context of intensive care units (5, 9). After prone positioning, cardiac monitoring in the dorsal region should be performed, checking the placement of the lines, monitoring probes, arterial and venous catheters, gastric tube, tracheal tube and perfusion systems.

- In cases where there is no possibility of avoiding direct contact of the device with the skin, consider using a silicone interface foam with the smallest thickness.

Many devices cannot be mobilized widely, given the patients' instability and because they are "life-saving", so the dressing material to be used as an interface should be as thin as possible. In addition, they should allow moisture management, allow evaporation, smooth to the skin, atraumatic removal and allow an easy inspection of the skin.

- The use of gel material or silicone plates, or ring-shaped devices **is not recommended**.

Its use is not recommended due to the increase of the local temperature, with the consequent increase of humidity, adding to the limitation of the material not allowing its evaporation. This alteration of the microclimate increases the possibility of skin wrinkles increasing its coefficient of friction and consequently the risk of PU. Ring-shaped devices increase pressure instead of redistributing it (16, 17).

- Consider using polyurethane foams in the face area, in order to moisture management. Aspirate nasal and oral secretions frequently, in order to avoid excessive moisture on the face.

Polyurethane foams are naturally absorbent, but because they are porous and have semipermeable membranes that allows evaporation. The use of alginates or hydrofibers is not recommended, as it maintains the permanent moisture in contact with the skin.

- Switch the head position manually every 2-4 hours, according to the individualized assessment. Use ribbon to fix the tracheal tube, or according to the local procedure.

Head mobilization is important since the face is one of the regions where the most PU appears associated with the prone position. During mobilization, be aware to the position of the tracheal tube and its fixation, NG tube, perfusion lines (if Central Venous Catheter in the jugular or subclavian). The fixation of the tracheal tube can be done with ribbon or tape, specific fixation devices due to its rigid component may increase the risk of skin and mucosa injury. If using ribbon, consider using dressing material to avoid injury from friction or pressure. In the case of adhesive, apply protective film or skin sealant, in order to avoid injury associated with the adhesive.

FIGURE 3.



Positioning the prone head, check all perfusion lines, tracheal tube, gastric tube and fixation.

- Maintain frequent eye care and, if necessary, close horizontally to prevent injury.
- Assess the integrity of the tongue, maintain oral care according to established procedures. Check that the tongue is inside of the oral cavity.

The tongue may swell during the prone position and is more susceptible to injury. Be aware of dental flaws and endotracheal tube fixation devices that can injure the tongue. We recommend mobilizing the endotracheal tube to avoid excessive pressure, if clinically possible. There is no safer tracheal tube location from the point of view of PU prevention (18), so the best form of prevention is alternating its position.

FIGURE 4.



PU category 2 in the malar region by prone positioning, tongue injury associated with the ribbon fixation, injury of the lower lip by the tube and fixation.

SKIN PROTECTION

- Consider using protective film and / or skin sealants in areas with the highest moisture or friction.

The use of film and / or skin sealants may be useful to prevent injuries associated with excess moisture and friction. In certain areas of medical device contact with the skin, the use of dressing material may be complex due to the volume or mobilization of the device (with skin surrounding the insertion ECMO cannula areas, fixation of the endotracheal tube, among others), in these situations, the use of protective films (spray or impregnated towel) may be considered. In case small lesions already exist, skin sealants help to heal them with greater durability and with a bacteriostatic effect preventing infection (19, 20).

FIGURE 5.



Injury in the posterior area of the neck with ribbon.

- Consider additional skin assessment at each position, with special attention to areas at risk (face, chest, iliac crest, pubic symphysis, penis, scrotum, knees and fingers).
- In case of skin injury, consider good practices in wound care.

WE RECOMMEND TO MOBILIZE THE ENDOTRAQUEAL TUBE TO PREVENT EXCESSIVE PRESSURE, IF CLINICALLY POSSIBLE.

FIGURE 6.



ECMO, jugular and femoral cannula insertion areas, which can cause pressure ulcers (blue arrows).

CONCLUSIONS

It is consensual that the prone position increases the survival of the patient with acute respiratory distress syndrome, being performed frequently in the context of intensive care and in some surgical techniques. The current situation of the SARS-CoV2 pandemic has led to a high number of ARDS patients hospitalized in intensive care, thereby increasing the attention of health professionals regarding the PUs that appear associated with long periods in this position. The PUs that appear in this context are particular and in less common locations (lips, nose, tongue, face, genitalia, among others), however they are noble areas, in which an injury can have a huge impact on self-image. The PUs associated with hospitalization are an adverse event in which health teams should strive to prevent them, as they increase the length of stay, the risk of complications and the costs associated with their treatment. The guidelines presented here are based on the available evidence and are intended to contribute to the implementation of good practices, guaranteeing the quality and safety of care.

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