v. 2, n. 19, 2022

International Journal of Health Science

PRESSURE INJURY DUE TO PRONE POSITION IN TIMES OF COVID-19: AN INTEGRATIVE REVIEW

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Abstract: Deals with a study related to the fundamentals related to Pressure Injury (PPL) due to the long stay in the prone position in patients with respiratory pattern compromised by the Sars-cov 2 virus, in the severe evolution of the disease, hospitalized for a long period in the Therapy Unit intensive care unit (ICU). **Goal:** to gather evidence for the prevention and treatment of pressure injuries in times of a pandemic due to Covid-19. **Method:** This is an integrative review (IR), with searches carried out on the Health portal VHL, CAPES, SciELO databases, and complementary studies in the form of scientific articles, with combinations between the descriptors: pressure injury "AND" Covid-19 "OR" "sars cov-2", prone "AND" burned; pressure injury "AND" prone; covid "AND" adult ICU. **Results:** The approach of the studies mostly consisted of studies and case reports, aiming at the prevention and care of patients affected by Sars-Cov 2 who needed the prone position for a positive response to acute respiratory syndrome. serious (SARG). **Conclusion:** This study corroborates the synthesis of the knowledge confirmed by the literature on the results obtained. The importance of prophylactic measures to prevent these injuries in prone patients is perceived, namely: daily skin assessment with identification of risk factors, humidity control, pressure redistribution with the help of cushions, pillows, skin hydration, rotation of the head and upper limbs every two hours, as well as the use of an informative banner and list to check the procedure, the latter being a step by step of the steps to be followed in order to minimize possible risks and as a guarantee to remedy possible failures in the service provided.

Keywords: Pressure Injury, Covid-19, prone, adult intensive care unit.

INTRODUCTION

The new coronavirus (SARS-COV-2) emerged in December 2019, bringing a pandemic of extreme impact, and its high capacity for contamination through contact and droplets promoted a systemic infection of considerable implication in the body, which has reflected in all of humanity. COVID-19 has different clinical forms, variations in the manifestation and evolution of the clinical picture of the disease. High incidence related to severe acute respiratory syndrome (SARS), generally with inconclusive prognosis, which may evolve from a picture of flu-like syndrome with clinical treatment without major complications, to hospital admission, with the need for intervention in an intensive care unit (ICU), and the sick person can rapidly progress to death (RAMALHO, 2021).

The ICU has special characteristics due to the clinical severity and hemodynamic instability of the patient. These conditions require immediate intervention mechanisms, such as the use of mechanical ventilation, continuous sedation, vasoactive drugs, multiparameter monitoring, elaborate laboratory tests and indispensable devices to support the treatment (GONZÁLEZ; RAMALHO, 2021).

The risk of damage to the integrity of the skin is one of the nursing diagnoses performed when there is a risk of adverse skin changes. It is a finding considered common in ICU patients, so it is important to take appropriate measures so that this risk does not evolve into an injury. Hemodynamic changes, such as decreased tissue perfusion, age, use of vasoactive drugs, sepsis and length of stay in the ICU can lead to the appearance of PPL in critically ill patients. (MOURA, 2017; RRAPI, 2021).

LPP significantly affect the quality of life of patients in the hospital environment, also associated with increased mortality

and increased health costs (MOURA, 2017; RRAPI, 2021).

In the current situation involving the Covid-19 pandemic, the prone position has been applied as an adjunct in the treatment related to mechanical ventilation in patients with acute respiratory distress syndrome (ARDS) with improved oxygenation and reduced mortality (PERRILLAT). ; 2020).

Studies show that 29% of patients developed acute respiratory failure as a result of Covid-19 and require intensive care. To improve the breathing pattern of these patients, specific interventions are necessary, including the prone position to improve ventilation efficiency. Avoiding compression of the lungs, thus improving blood perfusion and gas exchange. If indicated, patients with SARS-Cov 2 and severe deterioration of gas exchange must begin pronation as soon as possible. However, a potentially serious complication of pronation is PPL, which occurs in an anatomical area different from the anatomical areas common in bedridden patients. It is not uncommon for the cheekbones, nasal cavity and frontal area, as well as the jaw, lips, sternum area and iliac crest to be affected, because these hemodynamically unstable patients are kept in fixed posture for up to 20 hours. ; ARAÚJO, 2020).

This study aims to raise evidence for the treatment of LPP due to the long stay in the prone position in patients with Covid-19.

METHODS

In the construction of the integrative review, it is necessary to go through different steps, such as: identification of the theme and selection of the hypothesis or research question (ERCOLE, 2014).

For this study, through the PICo mnemonic, where: P (Participants) patients with LPP, I (Phenomenon of Interest) prevention of LPP due to prone position and Co (Context) in an adult ICU, the following guiding question was obtained: how prevent or minimize LPP in adult ICU patients in covid-19?

Inclusion criteria were studies that addressed ways of preventing and treating pressure ulcers. The selected languages were Portuguese, English and Spanish, from the last five years. Combined methods and theoretical research were used. The searches were carried out in the health portal VHL (Virtual Health Library), CAPES (Portal de Periódicos-MEC) and in the SciELO database (Online Electronic Library of Science), as well as complementary scientific studies. The selected articles were organized using an Excel spreadsheet. The evaluation was performed by two (2) independent reviewers (PFSC and EMGG) represented by: reading the title, reading the abstract and reading the full text. The extraction was completed by one reviewer and verified by a second reviewer (PFSC and EMGG).

Exclusion criteria were: LPP outside the context of prone position and/or Covid-19 and duplicate articles. After evaluating the results, the prism flowchart was constructed and the results were displayed in a table. The assumed theoretical framework was analyzed; a synthesis of structured evidence was elaborated through tables and in narrative form. The search equations of the sources used are presented in Table 1. The search in the databases was carried out from June to October 2021.

Data were extracted from studies and included specifically for the development of this IR, composed of the following elements: Title; Author; Year of publication; Study type and design; Data collection methodology; Goals; Health problems involving LPP due to Prona; Health team involved; Covid-19 pandemic; Adult Intensive Care Unit;

Prevention; Prevention suggestions; Author's conclusions.

The review took into consideration, the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA), in particular for the duplicity of reviewers in the various phases of selection and presentation of the study selection/inclusion flowchart. Data from the included studies were mapped by the first reviewer, the extraction was performed independently and in conjunction with a second reviewer. There was no disagreement in the studies found. In the synthesis of evidence, studies and case reports, mixed review studies were found. Studies were excluded based on the year of publication and the lack of a direct approach to the topic involved in this study.

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Source	Search equation	Number of studies
CAPES	(Nursing "AND" Pressure Injury; Nursing "OR" Pandemic)	07
SciELO	("pandemic" OR "covid-19" OR "pressure injury") AND ("pressure injury" OR "adult ICU" OR "covid-19" OR "pandemic") AND ("coronavirus pandemic in the world" OR "pandemic in Brazil" OR "nursing" OR "adult uti pressure injury") OR ("prone position" OR "covid-19 pandemic times")	04
BVS	("covid-19" AND "prone"; "covid" AND "adult ICU"; "covid" OR "Public policies" AND "pressure injury" AND ("Covid-19" OR "sars cov-2"), ("prone" AND "pressure injury" AND "prone"; "covid" AND " adult util")	142

Table 1. Search strategies according to the data source. Tatui, 2021.

Source: Prepared by the authors, 2021.

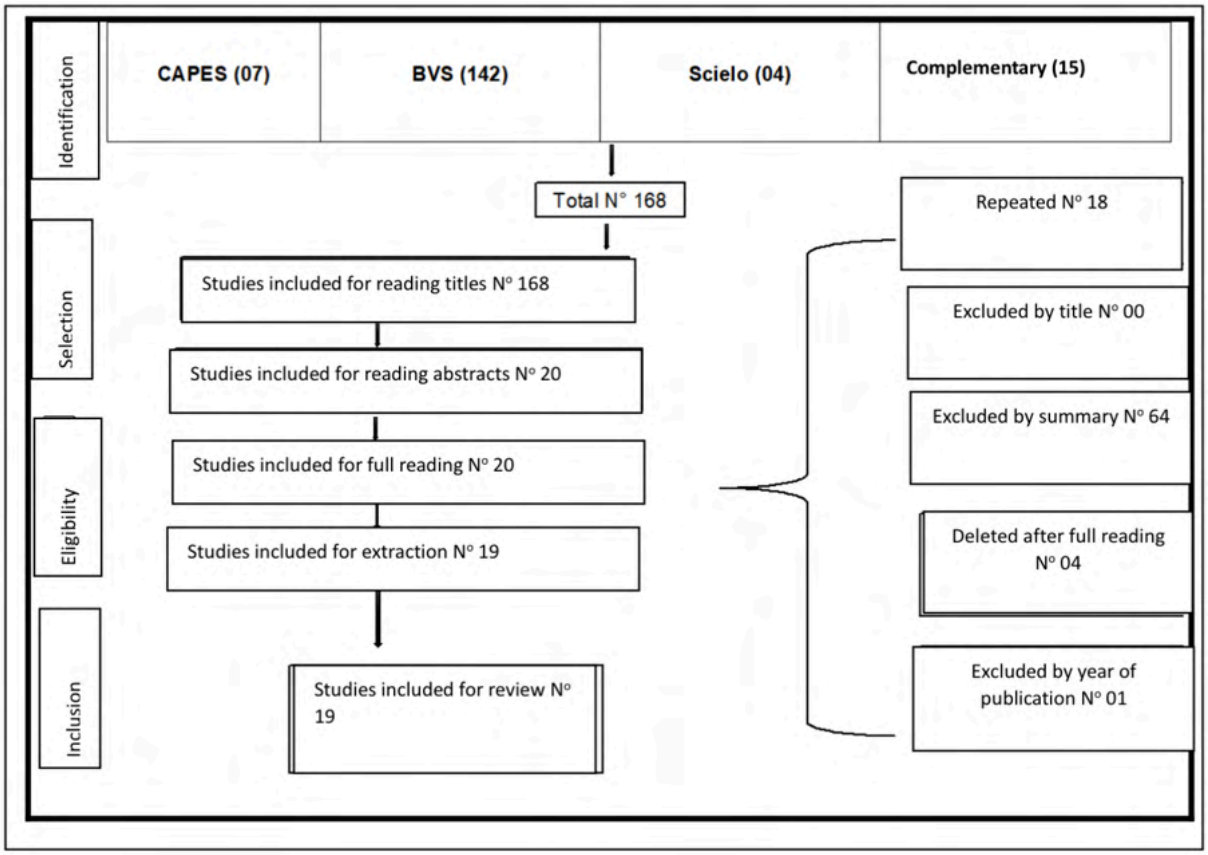

Figure 1. Flowchart of the study selection process for the integrative review, Tatuí, São Paulo, 2021.

Source: Prepared by the authors as recommended by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA), 2021.

RESULTS

From the exclusion criteria and after reading, 168 underwent the selection process through the evaluation of titles and abstracts, with 21 articles retrieved for full reading. The articles were published between 2017 and 2020, with the majority concentrated between 2020. The studies analyzed in English, Spanish and Portuguese, consistent with the inclusion criteria, were written in Portuguese, with some exceptions, which were in English. After reading, 19 publications were assigned to this study (Figure 1).

The majority of the studies approach consisted of studies and case reports, aiming at the prevention and care of patients affected by Sars-Cov 2 who needed the prone position for a positive response to SARG. In view of the parameters of the evaluation instruments, all the studies included were considered highly qualified with regard to the study methodology (Chart 1).

Several studies have concomitantly addressed the actions and conduct of health professionals working in the Covid-19 pandemic. Regarding the approach to patients in the studies, the multidisciplinary teams were in greater evidence, given their importance in the quality of treatment of sick people, nursing in particular in its broad aspect focused on care and direct actions to patients.

DISCUSSION

Studies point to a very relevant data regarding the profile of patients affected by Sars-Cov 2, due to the high transmission capacity and systemic infection in the body, the high morbidity associated with severe acute respiratory syndrome (SARS) and the uncertain general prognosis, which may rapidly progress to severe complications and hospitalization, requiring ICU intervention. In this context, this review is necessary, because in the current context of the pandemic, pronation was present with a fundamental role in improving the respiratory pattern, but it can lead to LPP as a consequence.

The findings have contributed in different ways to the understanding of the skin lesions of people affected by Sars-Cov 2, which over a long period of time must become prone to ARDS cases. Articles E 8, E 9, E 10, E 11 and E 12 refer to care interventions, injuries resulting from the practice conducted and aim to promote and care for critically ill patients, as well as the use of equipment, checking through a list, specifications and preparation and conference for promotion and care of patient safety in the face of injuries, preparing teams in intensive care units. The prone position is a postural therapy that aims to improve ventilation in patients with acute respiratory distress syndrome, widely used in the treatment of SARS-CoV-2 pneumonia complicated by this syndrome (MOORE, 2020; GONZALEZ, 2021 ROCHA, 2017 et al).

The incidence of pressure injuries is related to the clinical context of critically ill patients, considering the risk factors as listed in studies E 13 and E 15 (RAMALHO, 2021; SHEARER, 2021). It is considered the need for usual preventive measures, provided to patients for inspection and pressure relief, listed in studies E 18, E 19 (BUSNARDO; PERRILLAT, 2020). Positioning patients in the prone position has been shown to favor the development of pressure injuries, however it is closely associated with better results in situations of poor respiratory status (BUSNARDO, 2020).

Studies E 14, E 15, E 16 showed a significant increase in pressure injuries to the face related to pronation, highlighting the specific challenges for patients with COVID-19 and the importance of prophylactic measures to

Studies	Author, year	Related objective	Involved Team	Results related to the appearance of lesions*
Related to the Health Team				
E 1	Stephen-Haynes, Jackie ; Maries, Monique; 2020	In order to promote improvement in the respiratory condition, the prone position is defined as the patient lying down (ventral decubitus) in a horizontal position with the front of the body facing downwards. Head and upper limb rotation performed every 2 hours to prevent face and brachial plexus injuries.	Multidisciplinary team	The principle of pressure ulcer prevention must be used systematically and thoroughly. Recording the integrity of the patient's skin is essential to help understand and manage pressure ulcers. The skin changes over time. Although ARDS is recognized as a critical illness with high mortality, reducing the risk of PU injury must still be a fundamental part of nursing patients in the prone position.
E 2	Aline de Oliveira Ramalho et al, 2021	The purpose of this article is to report the case of a critically ill patient with COVID-19 and highlight the main findings related to the lesion classified as ASP, as well as provide its differential diagnosis with preventable LP.	Intensive care unit team applied case study	Often, the occurrence of PI is related to breaks in skin care protocols or the lack of protocols based on scientific evidence, reflecting not only the quality of care, but the excellence of the health system as a whole. In most cases, LP is considered preventable. Although there are some circumstances that inevitably favor the development of PI, it must only be considered as such if it occurs after an adequate assessment of the patient at risk and carrying out all evidence-based prophylactic interventions.
E 3	Jové Ponseti, E; et al, 2017	To determine the level of compliance with the quality standard and recording serious complications, therefore it is essential to record the complications caused during the procedure.	Nursing, multidisciplinary team	Records of PD, accidental extubation, catheter removal, pressure ulcer (PU), tracheal intubation obstruction, surgical urgency, PD hours, nutritional intake, type of feeding tube, reflux, food retention, prokinetics, and use of relaxants muscular.
E 4	Rrapi, Renajd et al, 2021	To investigate the laboratory findings and etymology of the lesions to understand their etiology	Two dermatologist doctors	Prevention regarding predisposing factors in hospitalized patients with COVID-19 are essential to prevent these injuries and improve outcomes, staff training, pre- and post-prone assessment and care.
E 5	Lucchini, Alberto; et al; 2020	The aim of this study was to investigate the incidence of LPP and other complications caused by the use of the prone position in patients with Severe Respiratory Distress Syndrome.	Nursing, multidisciplinary team	To identify the main risk agents for the development of LPP, patients were divided into 2 groups: those with and those without pressure pustules developed in the prone position.
E 6	Moura, Ana Carolina Floriano D; 2017	Comparison of the predictive validity of the Braden, Cubbin & Jackson and Sunderland scales regarding the development of pressure injuries in critically ill patients.	Nurses	The results obtained in this study are confirmed by the literature; Comparative studies between the scales the importance of their applicability.
E 7	Kim, Ruth S; 2016.	The article summarizes the trial of 4 patients with ARDS. Two did not receive pressure injury preventive.	Nursing, multidisciplinary team	These results encouraged intensive care nurses to implement therapy.

Assistance Interventions				
E 8	González-Castro, A; et al, 2021	With this in mind, preventative techniques such as the use of silicone face foams and other head and neck supports are essential to prevent facial injuries, including pressure.	Nursing, multidisciplinary team	We presented two cases of peripheral facial palsy in patients treated in the prone position for adjunctive treatment in SARS-CoV-2 with acute respiratory distress syndrome. Preventive techniques, such as the use of silicone facial foams and other head and neck supports, are essential to prevent facial injuries, including local pressure.
E 9	Moore, Zena; et al; 2020	LPP promote the destruction of the skin and underlying tissue due to prolonged pressure and shear, these injuries are painful and significantly affect the person's quality of life. Long and high-cost treatments for units with a negative indicator related to the care provided and the costs involved.	Nursing, multidisciplinary team	Skin assessment must be performed before pronation and after positioning the patient back to the supine position. While it is the first to keep skin clean and hydrated, using cleansers with a balanced pH, there is inconsistency in evidence of evidence to support the type of moisturizer. The use of positioning strategies, from a repositioning perspective, is advised to relieve pressure stations on the face and body. Also, using bandages like hydrocolloids, clear bandage, and silicone can be advantageous in reducing facial skin breakdown.
E 10	Carlos, Talita Rocha, 2017	Evaluation of the applicability of hydrogel membranes with silver nanoparticles in the treatment of pressure injuries in SUS users through a clinical protocol.	Nurses	Over a seven-week period between March and May 2020, 67 patients with confirmed SARS-CoV-2 pneumonia, with a mean age of 59 years, were admitted to the COVID intensive care unit. The treatment with the hydrogel membrane developed by the Institute of Energy and Nuclear Research (IPEN) with metallic silver nanoparticles (NPAg) proved to be efficient in all patients tested, as it has the advantage of keeping the area around the lesion moist and facilitate the breakdown of non-viable tissue by the body's own enzymes and cell regeneration. This was observed by measuring the variables amount of devitalized tissue, size, pain, odor and amount of exudate in the wound.
E 11	Santos, Vinicius Batista; et al; 2021	Execution of content and face validation of checklist and banner for prevention of pressure injuries in patients in prone position.	Nurses	The actions described in a list of items, which must contain preventive actions to avoid and/or minimize possible injuries.
E 12	Wagner Luiz da Silva Monteiro et. al; 2021	To analyze scientific evidence regarding measures for the prevention of pressure injuries (PPL) in connection with the prone position during the COVID-19 pandemic.	Multidisciplinary team	Five studies were analyzed in the search for contextualization to support the objectives proposed in the study. The main preventive recommendations for pressure injuries in prone patients were: daily skin assessment with identification and classification of risks, moisture control, redistribution of skin pressure with the use of cushions, keeping the skin hydrated, promoting head rotation within two hours and use of a preventive field in order to protect the pressed skin for a long period.

Risk factors				
E 13	Aline Oliveira Ramalho et. al; 2021	To report the case of a critically ill patient with COVID-19 and identify the most important findings in relation to the injury as acute skin failure (ASF) and make its differential diagnosis with preventable pressure injury (PI).	Nursing, multidisciplinary team	Patient with complications from COVID-19 developed PI initially defined as pressure injury (PI) and later reclassified as Acute skin failure (ASF). The following findings confirmed the diagnosis: prolonged invasive mechanical ventilation, respiratory, renal and cardiac failure, and respiratory focus sepsis. Added to this are other aggravating factors such as the use of vasoactive drugs, hemodynamic instability with intolerance to minimal reduction, prolonged fasting and disseminated intravascular coagulopathy associated with SARS-Cov 2 infection.
E 14	Conlon, Christopher; et al; 2021	The patient was treated with primary wound closure and pressure relief.	Nursing, multidisciplinary team	The authors report the case of a patient who suffered a PI on tooth 8. The combination of prolonged prone positioning and malnutrition during pressure support is common in ARDS and is now widespread due to the COVID-19 pandemic. This patient had an unusual conception because of compromised dentition, which was considered bad.
E 15	Shearer, Sarah C; et al; 2021	The objective of this study was to demonstrate the incidence of PPL in the face region associated with prone position in patients with COVID-19, as well as to characterize the location of the lesions and the treatments performed.	Nursing,	A total of 143 COVID-19 positive patients required pronation during intubation with an average pronation duration of 5.15 days. Of these patients, 68 (47.6%) developed facial pressure injuries. The most affected region was the cheek, with 57 (84%), followed by the ears (50%). The mean duration of pronation in patients who developed a pressure injury was significantly longer than in patients who did not develop a pressure injury (6.79 days vs. 3.64 days, $P < 0.001$).
E 16	Lucchini, Alberto; et al; 2020	The aim of this study was to investigate the incidence of LPP and other complications caused by the use of the prone position in patients with Severe Respiratory Distress Syndrome.	Nursing and multidisciplinary	To identify the main risk agents for the development of LPP, patients were divided into 2 groups: those with and those without pressure pustules developed in the prone position.
E 17	Weller, Dulce Ines; et al; 2019	The objective of this study is to review the incidence of Pressure Injury and other serious adverse events in patients admitted to the intensive care unit in the prone position.	Nursing, multidisciplinary team	37 patients were evaluated. The incidence of PI after prone position was 8 (21.6%). The incidence of adverse events during the prone position was 1 (2.7%), 3 (8%) when changing the swimmer's position and none when returning to the supine position.

Need for prone position as an intervention				
E 18	Perrillat, A; et al; 2020	Analyze its pathophysiology and highlight the importance of adequate prevention measures.	Nursing, multidisciplinary team	The prone position is an adjunctive body position therapy that can improve ventilation of patients with ARDS and is widely used in the treatment of COVID-19 pneumonia complicated by ARDS.
E 19	Busnardo, Fabio de Freitas; et al; 2020	Analyze, prevent and treat patients with Pressure Injury due to prone position for long periods.	Doctors	Intensive care physicians observed significant improvements in the ventilatory parameters of patients in the prone position, but at the cost of a high incidence of PPL, which initially occurs in 80% of patients in the prone position for more than 16 hours a day.

Table 1. Summary of included studies that take as object the conditions related to Pressure Injuries in relation to the prone position in the Covid-19 pandemic, according to author/year, related objective, team involved, results. Tatui, 2021.

prevent these injuries in pronated patients (CONLON, 2020; RRAPI; SHEARER, 2021 et al).

But, studies E 1, E 2, E 3, E 4 and E 5 demonstrated the need for scientific knowledge about measures to prevent pressure injuries in connection with the prone position during the COVID-19 pandemic. Evaluating the main preventive recommendations for injuries in prone patients, the following stand out: daily skin assessment with risk identification, humidity control, pressure redistribution with the aid of cushions, skin hydration, head rotation every two hours and use of preventive field (OLIVEIRA, 2021; MOURA, 2017; RRAPI, 2021 et al).

The severity of adverse events and pressure injuries were lower compared to other related studies E 17, evidencing the use of skin protection devices, the preparation of properly trained professionals, a factor that differs the final result, faithfully investing in prevention (WELLER, 2019).

In E 12, the occurrence of LPP is related to breaks in skin care protocols or the lack of protocols based on scientific evidence, reflecting not only the quality of care, but the excellence of the health system as a whole. In most cases, LPP is considered preventable. Although there are some circumstances that inevitably favor the development of LPP, it must only be considered as such if it occurs after an adequate assessment of the patient at risk and carrying out all evidence-based prophylactic interventions (MONTEIRO, 2021).

With regard to the results found in this research, few studies point out how nursing care is implemented and how it is implemented, as well as proposals for solutions related to its problems. The long and exhausting working hours associated with the precarious conditions offered to the nursing teams, the lack of understanding regarding the new and unknown disease bring indications that corroborate the poor development of the team, severely implying the care provided. The emergence of LPPs are highly relevant indicators in aspects related to the quality of the service provided, however it is known that the patient's hemodynamics and working conditions directly imply this factor. Skin assessment must be performed

before pronation and after positioning the patient back to the supine position. The use of positioning strategies, from a repositioning perspective, is advised to relieve pressure stations on the face and body. Furthermore, using bandages such as hydrocolloids, clear film, and silicone can be advantageous in reducing facial skin breakdown (MOORE, 2020; PONCET, 2017).

CONCLUSION

This study corroborates the synthesis of knowledge related to the emergence of LPPs in patients critically ill by Covid-19, confirmed by the literature on the results obtained. It is necessary to use manuals and Standard Operating Procedure (SOP) and evaluation forms that can reduce possible failures in care, highlighting the importance of prophylactic measures to prevent these injuries in prone patients.

The importance of prophylactic measures to prevent these injuries in prone patients is perceived, namely: daily skin assessment with identification of risk factors, humidity control, pressure redistribution with the help of cushions, pads, skin hydration, rotation of the head and upper limbs every two hours, as well as the use of an informative banner and a list to check the procedure, the latter being a step by step of the steps to be followed in order to minimize possible risks and as a guarantee to remedy possible failures in the service provided.

Some limitations in this study stand out, such as the search carried out in few databases and the lack of evidence-based studies relating the Covid-19 pandemic with the prone position and the LPPs associated with the prone position. In the reviewed studies, there were also few findings regarding the quality offered to teams working in the pandemic and working conditions, relating exhaustive working hours and working conditions.

Even with few studies, it is clear that long and costly treatments for the units imply a negative indicator of the assistance provided and the costs involved.

New studies must be carried out to discuss the dynamics of nurses in intensive care units, carrying out the survey related to the incidence of LPPs and other complications caused by the use of the prone position in patients with Covid-19, associated with acute respiratory distress syndrome. It is evident the need to improve the quality of the service provided and the importance of training the professionals involved in the care of these patients.

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