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REVIEW ARTICLE

Pressure injury prevention in the prone position COVID-19 patient: scoping review

Prevención de lesiones por presión en pacientes con COVID-19 en decúbito prono: revisión del alcance

Prevenção de lesão por pressão no paciente com COVID-19 em posição prona: revisão de escopo

Talison Joseph Gonçalves Leitão[1]
ORCID: 0000-0003-0515-2970
Antonio Dean Barbosa Marques[1]
ORCID: 0000-0001-8969-1546
Anne Kayline Soares Teixeira[1]
ORCID: 0000-0002-7751-0047
Amelina de Brito Belchior[1]
ORCID: 0000-0002-3420-594X
Luana Feitosa Mourão[1]
ORCID: 0000-0002-5711-0978
Isabelle Barros Sousa[2]
ORCID: 0000-0001-9019-3341
Guilherme Alves da Silva[3]
ORCID: 0000-0003-1823-2507

[1]Universidade Estadual do Ceará. Ceará, Brazil.
[2]Universidade Federal do Ceará. Ceará, Brazil.
[3]Centro Universitário Metropolitano da Amazônia. Pará, Brazil.

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Corresponding author:
Antonio Dean Barbosa Marques
E-mail: antonio-dean@hotmail.com

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Abstract

The aim was to map preventive measures of PI in the patient with COVID-19 in the prone position. This is a study developed through a scope review based on the Joanne Briggs Institute guidelines and the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Review checklist. The guiding question was elaborated based on the PCC's strategy. The search took place during the month of December 2021 in 5 databases. Fifteen articles were included. The PI preventive measures for the patient with COVID-19 in prone position include risk assessment activities, skin assessment, early repositioning and mobilization of support surfaces, PI classification, PI assessment and healing monitoring health professional education, preventive skin care, dressings and coverings and PI related to medical devices. Mapping and understanding the unfolding of PI in the prognosis of the COVID-19 patient allows for the elaboration of real preventive strategies based on the patient's needs.

Descriptors: Pronation; Pressure Injury; COVID-19; Stomatherapy; Nursing.

Resumén

El objetivo fue mapear medidas preventivas de IP en el paciente con COVID-19 en decúbito prono. Este es un estudio desarrollado a través de una revisión de alcance basada en las pautas del Instituto Joanne Briggs y las recomendaciones de la lista de verificación Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Review. La pregunta guía fue elaborada con base en la estrategia del PCC. La búsqueda se realizó durante el mes de diciembre de 2021 en 5 bases de datos. Se incluyeron 15 artículos. Las medidas preventivas de PL para el paciente con COVID-19 en decúbito prono incluyen actividades de evaluación de riesgos, evaluación de la piel, reposicionamiento temprano y movilización de superficies de apoyo, clasificación de PL, evaluación de PL y seguimiento de la curación, educación de profesionales de la salud, cuidado preventivo de la piel, apósitos y cubiertas y PL relacionados con dispositivos médicos. Mapear y comprender el desenvolvimiento de la PL en el pronóstico del paciente con COVID-19 permite elaborar estrategias preventivas reales en función de las necesidades del paciente.

Descriptores: Pronación; Lesión por Presión; COVID-19; Estomaterapia; Enfermería.

Resumo

Objetivou-se mapear medidas preventivas de LP no paciente com COVID-19 em posição de prona. Trata-se de um estudo desenvolvido por meio de uma revisão de escopo fundamentado nas diretrizes da Joanne Briggs Institute e as recomendações do checklist Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Review. A questão norteadora foi elaborada com base na estratégia do PCC. A busca ocorreu durante o mês de dezembro de 2021 em 5 bases de dados. Foram inclusos 15 artigos. As medidas preventivas de LP ao paciente com COVID-19 em pronação englobam atividades de avaliação de risco, avaliação da pele, reposicionamento e mobilização precoce de superfícies de suporte, classificação de LP, avaliação de LP e monitoramento de cicatrização educação do profissional de saúde, cuidados preventivos da pele, curativos e coberturas e LP relacionadas a dispositivos médicos. Mapear e compreender o desdobramento da LP no prognóstico do paciente COVID-19, permite elaborar estratégias preventivas reais com base nas necessidades do paciente.

Descritores: Pronação; Lesão por Pressão; COVID-19; Estomaterapia; Enfermagem.

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Introduction

In December 2019, COVID-19 was detected in Wuhan, China. With the number of cases, deaths and countries affected increasing, the World Health Organization (WHO) declared the event to constitute a Public Health Emergency of International Concern on January 30, 2020[1]. The WHO in March 2020 characterized the outbreak of COVID-19 as a pandemic after reporting about 118,000 cases in 114 countries and 4,291 people dead[2].

COVID-19 is an acute respiratory infection caused by the potentially serious SARS-CoV-2 coronavirus, with high transmissibility and global distribution. The infection can range from asymptomatic cases and mild clinical manifestations, to cases of respiratory failure, such as Respiratory Distress Syndrome (ARDS), shock and multiple organ dysfunction, requiring special attention to signs and symptoms that indicate worsening of the clinical condition that require the patient's hospitalization[3] and in severe cases in the Intensive Care Unit (ICU).

One of the interventions to improve the clinical condition of patients with ARDS/acute lung injury and other lung conditions is the prone or prone position, which improves arterial oxygenation and should only be used in situations where high fractions of inspired oxygen are required. , to achieve adequate oxygenation. However, if the main objective is to reduce the lung injury induced by mechanical ventilation, the prone position should be used as soon as possible, soon after diagnosis[4].

It is a resource added to the therapy of patients with COVID-19, to improve oxygenation, drastically reducing the severity of cases of acute respiratory failure, in the first 48 hours of the disease, in patients ventilated with low tidal volume and with severe hypoxia. . It is recommended to run for at least 12 hours a day for 3 to 5 days. However, each case must be evaluated individually because each person's response to this change in position is different, in addition to some necessary care and associated side effects[5].

It is recommended as special care for the prone patient: changes in body position and reposition the head every 2-4 hours or as required by the patient. Displacement of the endotracheal tube, pressure injuries (PI) and loss of venous access stand out as the main complications of pronation in ARDS. If pronation in combination with ECMO, the ECMO must be carefully secured[6].

However, despite its advantages regarding respiratory function, several complications of prone ventilation such as medical device-related PI arise, usually in the face area and in other areas of the body as a frequent complication in patients. International data suggest that up to 57% of patients in the prone position develop PI[7].

The COVID-19 pandemic has introduced a large population of patients at risk of developing PI due to prolonged intubation, use of respiratory support equipment, and prolonged prone positioning[8].

Based on this context, it is important to emphasize that the training of the multidisciplinary team in the face of these new demands is extremely important for better patient management in maneuvers such as the prone position. More studies and reviews are needed on the subject, since more is being discovered every day about COVID-19 and, along with it, new techniques and methods, seeking the best performance of the team and consequent significant benefits to patients[9].

The magnitude of the new coronavirus (SARS-CoV-2) pandemic is noted as a serious global health problem and its effects on critically ill patients hospitalized with ARDS associated with COVID-19, as well as the difficulties faced by the multidisciplinary team in the mobilization and care of the prone patient. This fact aroused the interest in identifying strategies for the prevention of PI in adult patients submitted to the prone position. Therefore, the scoping review was conducted to map PI preventive measures in the patient with COVID-19 in the prone position.

Methodology

This is a study developed through a scoping review based on the Joanne Briggs Institute guidelines (JBI)[10] and recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Review checklist (PRISMA-ScR).

This review is in the process of being registered on the Open Science Framework platform for registering scientific papers.

The review was carried out in five stages: (1) identification of the research question; (2) survey of relevant studies, which would enable the breadth and scope of the review; (3) selection of studies, according to predefined criteria; (4) data mapping; and (5) presentation of results[10].

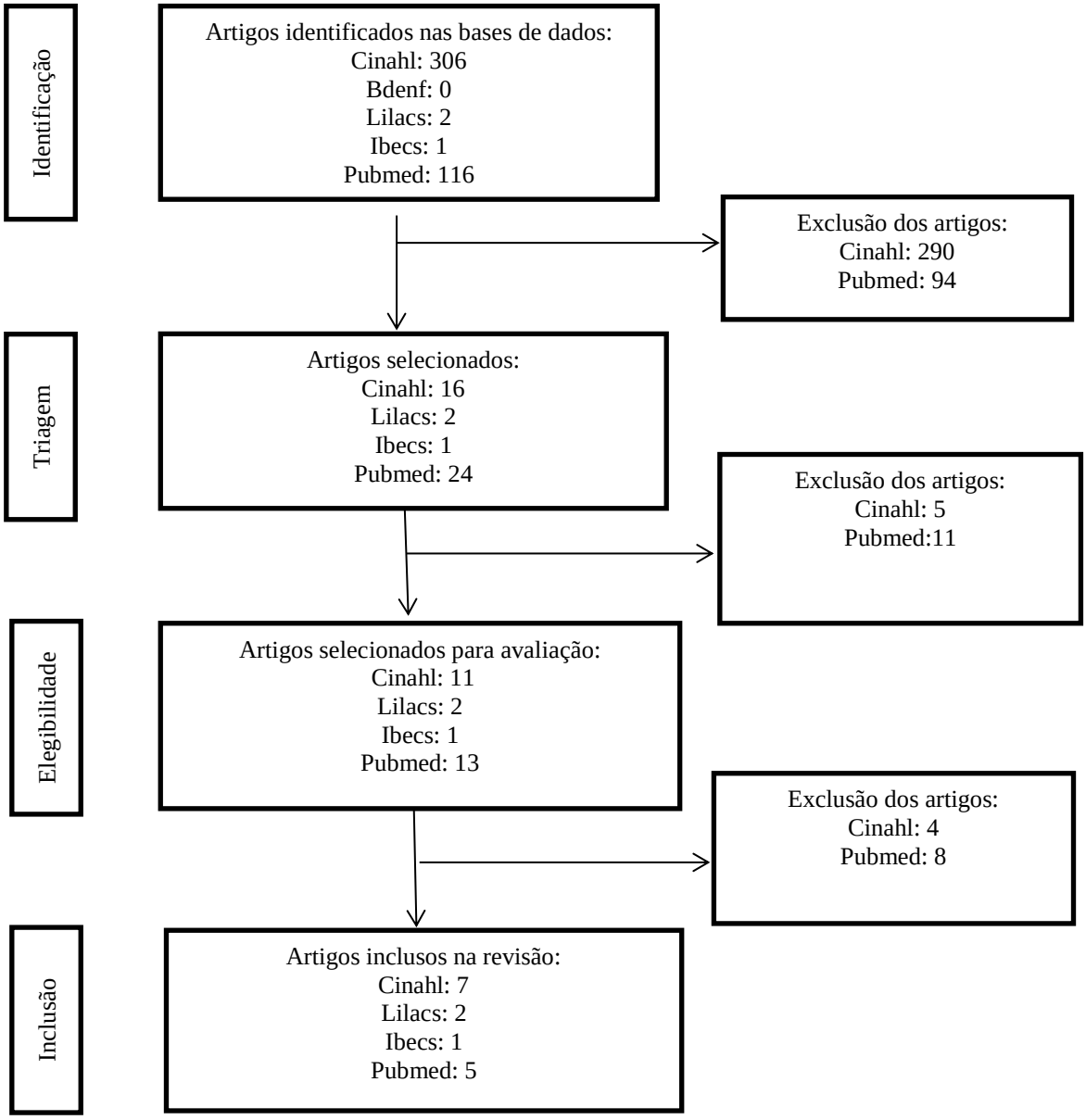
The guiding question was elaborated based on the PCC's strategy. In which, P= population/problem, hospitalized patient with COVID-19 in prone position; C= concept, strategies and actions for the prevention of PI; C= context, pressure injury. In this way, the following question was obtained: What are the preventive actions of PI applied in patients with COVID-19 prone?

The search took place during the month of December 2021 in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS); Nursing Databases (BDENF); Bibliographic Index Español in Ciencias de la Salud (IBECS); in the National Library of Medicine and National Institutes of Health (PUBMED) and Cumulative Index to Nursing and Allied Health Literature (CINAHL) portal, using the controlled descriptors in the following search equation: Prone Position OR Pronation "AND" Pressure Ulcer "AND" COVID -19, according to DeCS (Health Science Descriptors) and MeSH (Medical Subject Headings). We chose to carry out the search with descriptors in English, as the equation allowed the identification of a greater number of articles, when compared to searches with descriptors in Portuguese and Spanish.

For MEDLINE/PUBMED, the search equation was used: ("prone position"[MeSH Terms] OR ("prone"[All Fields] AND "position"[All Fields]) OR "prone position"[All Fields]) OR ("pronation"[MeSH Terms] OR "pronation"[All Fields]) AND ("pressure ulcer"[MeSH Terms] OR ("pressure"[All Fields] AND "ulcer"[All Fields]) OR "pressure ulcer"[All Fields]) AND ("COVID-19"[All Fields] OR "COVID-19"[MeSH Terms] OR "COVID-19 Vaccines"[All Fields] OR "COVID-19

Vaccines"[MeSH Terms] OR "COVID-19 serotherapy"[All Fields] OR "COVID-19 Nucleic Acid Testing"[All Fields] OR "COVID-19 nucleic acid testing"[MeSH Terms] OR "COVID-19 Serological Testing"[All Fields] OR "COVID-19 serological testing"[MeSH Terms] OR "COVID-19 Testing"[All Fields] OR "COVID-19 testing"[MeSH Terms] OR "SARS-CoV-2"[All Fields] OR "sars-cov -2"[MeSH Terms] OR "Severe Acute Respiratory Syndrome Coronavirus 2"[All Fields] OR "NCOV"[All Fields] OR "2019 NCOV"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus "[All Fields] OR "VOC"[All Fields]) AND 2019/11/01[PubDate] : 3000/12/31[PubDate])) AND ("2020/12/01"[PubDate] : "2021/12/31"[PubDate]).

Figure 1. Flowchart, according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRSMA-ScR) criteria. Fortaleza, CE, Brazil, 2021



The following inclusion criteria were adopted: articles without language restrictions, available in full in the selected databases, published from December 2019, beginning of the coronavirus pandemic[2]. Exclusion criteria: Opinion articles, editorial, conference notes, expert opinions, dissertations, monographs, theses, manuals and consensus were excluded from the study.

The study selection process was based by two independent researchers through the checklist qualification strategy Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for Scoping Review - PRISMA-ScR[11]. In the presence of controversy among the researchers, there was critical discussion to promote consensus.

Data were organized in a Microsoft Excel® spreadsheet. For each type of study, it was coded with the letter "A", followed by an Hindu-Arabic numeral referring to the selected article.

For data extraction, the JBI instrument was adapted (2009)[10] considering: identification (title, authors, language, country, location, journal, year of publication);

methodological aspects (objectives, research design, framework, sampling, data processing); and critical analysis (themes covered, resources, strengths and weaknesses and main conclusions). It is noteworthy that the results were confronted with the national and international literature, establishing divergent and convergent points between the ideas\ hypotheses.

In addition, the process of refining the articles took place through the accuracy of the title and abstract, later reading the article in full to compose the final selection, summarizing the evidence (Figure 1).

Results

In the first stage, for the choice of articles, an analysis of the title and abstract was carried out, followed by reading in full for the final selection. Searches in the databases made it possible to identify 425 articles, of which 15 were included in the final sample, seven from the CINAHL database, two from LILACS, one from IBECS and five from PUMED.

In Chart 1, the characteristics of the studies included in the analysis are described.

Chart 1. Descriptive synthesis of selected articles (n = 15). Fortaleza, CE, Brazil, 2021

Order	Title	Objective	Country/ Year
A1	Complications of prone positioning in patients with COVID-19: A cross-sectional study	Determine the prevalence of complications in patients with COVID-19 undergoing the prone position, focusing on the development of pressure ulcers related to the prone position.	Italy/ 2021
A2	Nursing Management of Prone Positioning in Patients With COVID-19	Describe respiratory management and extensive use of the prone position in patients with COVID-19 in the intensive care unit center in Lombardy, Italy.	Italy/ 2021
A3	Pressure injury prevention for COVID-19 patients in a prone position	Discuss current practices to minimize skin lesions and other complications when the patient is in the prone position.	Australia/ 2020
A4	Mitigating Pressure Injury Challenges When Placing Patients in a Prone Position	Describe the pressure injury mitigation process and the challenges of placing patients in the prone position.	USA/ 2020
A5	Pressure Injury Prevention Packets for Prone Positioning	Report the experience of creating a pressure injury prevention bundle in prone positioning.	USA/ 2021
A6	Novel technique using surgical scrub sponges to protect the nose and face during prone ventilation for coronavirus disease 2019	Present an approach to the management of these lesions, borrowing from the theory and practice used in the management of patients undergoing rhinological procedures.	UK/ 2020
A7	Medical Device–Related Pressure Injuries During the COVID-19 Pandemic	Report experience with MDRPIs during the 2020 COVID-19 pandemic at an Academic Medical Center.	USA/ 2020
A8	Protecting prone positioned patients from facial pressure ulcers using prophylactic dressings: A timely biomechanical analysis in the context of the COVID-19 pandemic	Evaluate facial soft tissue exposures to mechanical loads sustained in the prone position versus without multilayer silicone foam dressings applied as tissue protectors on the forehead and chin.	Israel/ 2020
A9	Facial pressure ulcers in COVID-19 patients undergoing prone positioning: How to prevent an underestimated epidemic?	Describe two cases with the aim of emphasizing the risk of facial pressure ulcer due to the prone position, in order to discuss their pathophysiology and highlight the importance of adequate preventive measures.	France/ 2020
A10	The risk of pressure ulcers in a proned COVID population	Examine the prevalence of pressure injuries in a prone position population and identify associated risk factors.	UK / 2021
A11	Multidisciplinary team approach in critically ill COVID-19 patients reduced pronation-related complications rate: A retrospective cohort study	Analyze the rate-related complications for pronation within critically ill COVID-19 patients.	Switzerland / 2021
A12	Nursing care and prevalence of adverse events in prone position: Characteristics of mechanically ventilated patients with severe SARS-CoV-2 pulmonary infection	Describe the frequency and duration of placement during the COVID-19 pandemic.	Spain/ 2020

A13	A multidisciplinary approach to prevent and treat pressure sores in proned COVID-19 patients at a quaternary university hospital.	Describe a multidisciplinary approach to prevent and treat pressure ulcers in patients with COVID-19 prone in a quaternary teaching hospital.	Brazil/ 2020
A14	Plan de cuidados de enfermería para la prevención de úlceras por presión secundarias a la posición prono en pacientes COVID-19	Propose a nursing care plan based on the standardized language NANDA-I, NIC, NOC for the prevention of PU secondary to PP in COVID-19 disease.	Colombia/ 2021
A15	Prone position pressure sores in the COVID-19 pandemic: The Madrid experience	Describe the prevalence and characteristics of prone positioning pressure ulcers (PPPS) and analyze related risk factors.	Spain/ 2020

Subsequently, the articles were categorized according to the type of intervention based on the axes proposed by the European Pressure Ulcer Advisory Panel (EPUAP), National Pressure Injury Advisory Panel (NPIAP) and Pan Pacific Pressure Injury Alliance (PPPIA), for prevention and treatment of PI[6] as can be seen in Chart 2, just below.

Chart 2. Measures adopted to prevent PI and selected articles. Fortaleza, CE, Brazil, 2021

Measure for prevention	Articles
Risk assessment	A1, A3,A4, A9, A10, A14, A15
Skin and Tissue Assessment	A1, A2, A13, A14
Repositioning and Early Mobilization	A13, A2, A3,A5, A7, A9, A10, A11 A12, A14, A15
Support Surfaces	A1,A2, A3, A4, A6 , A12 , A13, A14, A15
Classification of Pressure Injuries	A15
Pressure Injury Assessment and Healing Monitoring	A15, A9
Health Professional Education	A4, A5, A7, A10, A11, A12, A13, A14
Preventive Skin Care	A1, A2, A4, A8, A10, A12, A13, A14, A15
Dressings and toppings	A1, A2, A3, A4, A5, A8, A9, A12, A13, A14, A15
Medical Device-Related Pressure Injuries	A3, A4, A10

Discussion

In the risk assessment, according to the guide on prevention and treatment of ulcers/PI, individuals with limited mobility, limited activity and a high potential for friction and shear at risk of developing pressure injuries should be considered. Individuals with PI stage 1 at risk of lesion progression should also be considered[6].

The conditions of the skin and ocular conjunctiva were evaluated before and after pronation to look for any skin damage, presence of infections, and vascular or thrombotic complications. Each team member should assess critically ill patients for potential harm mitigation when appropriate and refer any concerns noted to the team leader[12,13].

Prolonged pressure (greater than 8 hours) on the same points is strongly associated with the risk of PI. Systemic parameters that interfere with wound healing, such as hypoxemia, anemia or malnutrition, must be corrected preventively. In line with these mentioned precautions, rapid recognition of PI is important in preventing deterioration and that nutrition must be optimized and referral to tissue viability services is mandatory[14,15].

Using an established risk assessment tool to assess an individual's risk factors (Braden scale)[15].

In relation to skin and tissue assessment, a comprehensive skin and tissue assessment should be performed for all individuals at risk for pressure injuries at various times: as soon as possible after admission/transfer to the health facility; as part of every risk assessment; periodically as indicated by the individual's PI risk degree and prior to discharge from the care facility[16].

The condition of the skin and ocular conjunctiva should be evaluated before and after pronation to look for any skin damage, presence of infections, and vascular or thrombotic complications. Assessment of skin conditions and use of hydrocolloid dressings to protect various anatomical points (forehead, cheekbones, chest, iliac crests, knee) from PI in the patient preparation phase for prone positioning is good practice[12,17].

PI prevention measures involve a multidisciplinary approach and require daily inspection, hygiene, hydration, skin moisture and temperature control, and most importantly, reducing pressure on bony prominences. The record of skin conditions during admission to the unit and daily during the patient's hospitalization period is also

pointed out as an important care[16]. The practice of skin assessment before and after pronation to look for incipient wounds, other skin lesions, infections, and vascular or thrombotic complications is recommended[18,19].

Regarding early repositioning and mobilization, the head and arms position of patients in prone should be rotated every 2 to 4 hours. The head position must be changed 2 or 3 times during a prone position session and the breathing tube position must be changed between each prone position session[14,17].

The following recommendations were made for the patient in pronation: 1- the feet must be kept in dorsiflexion, with the ankle at 90°, and the toes must not touch the rigid structure of the bed; 2- recommend prone positioning with pads to relieve pressure and repositioning should be performed in a swimming position with the arm raised at less than a 90º angle from the shoulder to prevent brachial plexus injury. Alternating the arms and head every 2 hours is also recommended in order to prevent the development of pressure injuries to the elbows and face; 3- promote skeletal alignment, position the patient so that their body is aligned in such a way that there is minimal undue stress placed on the muscles and skeleton[20].

In their multi-case study at a Medical and Academic Center in the United States of America, a prone team, including physical therapists, was put in place to help with the workload needed to position the contingent of hospitalized patients. Indicative of the high level of acuity and workload, the pronation team positioned and repositioned over 500 times during this period, with 4 to 6 people needed to complete the reposition each time. The stoma therapist nurses collaborated with the prone team by developing a PI plan for all patients placed in the prone position for extended periods. This plan included the development of a positioning and a guide for the pronation team and the nursing team. This guide includes photographs of proper placement, pressure relief products, and recommended placement product usage[8].

Specially trained ICU staff conducted the protocol-guided pronation procedure, paying close attention to pressure areas and airway maintenance. Patients in this study were ideally repositioned every 2 hours when prone, through lateral head rotation and alternating arm positions with care to avoid shoulder dislocation and brachial plexus injury[15].

An ICU prone team is essential for the systematics of critically ill COVID-19 patients on prone; the team consisted of a nurse and at least four physical therapists. During the pronation maneuvers, the nurse in charge managed the head and the main devices (such as the endotracheal tube, central venous catheter, dialysis catheter), coordinating the team during the maneuver and ensuring the correct execution and time of pronation. Physiotherapists were positioned in pairs on both sides of the patient to perform pronation according to the nurse's instructions; two physical therapists managed pronation of the thoracoabdominal area, while another two managed the legs and urinary catheter[21].

Regarding support surfaces, a support surface should be selected that meets the individual need for pressure redistribution based on the following factors: level of immobility and inactivity, need to influence microclimate control and shear reduction, size and individual's weight, number, severity and location of existing PIs and risk of developing new lesions.

Patients admitted to the ICU are usually placed on an air mattress. It is recommended that any patient who is immobile and considered to be at high risk of developing PI benefits from having an appropriate support surface. These surfaces work to redistribute pressure and shear across the skin surface, promoting immersion, envelopment, and alleviation of tissue deformations[12,20].

Authors[22] suggest the use of a surgical sponge as an appropriate material to immobilize and protect delicate grafts. In the authors' opinion, surgical sponges represent an effective method of pressure relief in mechanically ventilated patients in the prone position.

The correct classification of the types of PI allows the identification of other types of wounds, outlining effective measures, based on the etiology of the lesion and its different forms of manifestation and/or classification. The importance of correctly documenting the level of tissue loss is highlighted. It also allows to verify if there is clinical agreement in the classification of PI among the responsible health professionals[19].

Another PI prevention measure is to carry out an initial and comprehensive assessment of the individual with PI, with definition of treatment goals and monitoring of the wound healing progress[14,19].

Evidence points to the need to implement a skin care regimen that includes: keeping the skin clean and properly hydrated, cleaning the skin immediately after incontinence episodes, avoiding the use of alkaline soaps and cleansers, and protecting the skin from moisture with a barrier product, among others[12,13,15-19,24].

Medical device-related PI had a strong incidence and prevalence in the patient with COVID-19 in the prone position. The following are listed as preventive measures for this type of injury: review and select devices to reduce the risk of developing pressure injuries related to medical devices, considering: the device's ability to minimize tissue damage, correct size/shape of the device for the individual, ability to correctly apply the device in accordance with the manufacturer's instructions, and ability to properly secure the device[6,13,15,20].

Select the most appropriate coverage for the prevention and/or treatment of PI, based on the individual's and/or informal caregiver's goals and self-care skills, and based on clinical assessment. Different types of dressings were used for the prevention of PI, from fatty acids in areas of bony prominences, to dressings made with polyurethane foam to provide cushioning, combined with silicone to protect the surrounding skin, or hydrocolloid dressings for stages 2 and 3 and to protect nostrils and lips against medical device related PI[19].

Prophylactic dressings have become widely accepted as an auxiliary method of preventing the

development of PI in patients considered at risk. Types of prophylactic dressings available include soft silicone foam, multi-layer dressings to redistribute pressure and shear, polyurethane and hydrocolloid to relieve friction[24].

The studies are in line with the proposed study[6], reinforcing the importance of early professional training for safe and quality care. Bringing strategies such as evaluating the prior knowledge of health professionals about preventive measures of PI, at an organizational level, to facilitate the implementation of education and quality improvement programs, in addition to highlighting the multiprofessional performance[8,13,16,18,19,21,25].

A limitation of this study is the adoption of studies available in full in the five selected databases, which may have limited access to other available evidence. Added to the fact that COVID-19 is still a new disease with a lot of information and little stability, in addition to behaving due to the infectious-contagious nature with aggravation and abrupt clinical deterioration of the patient's conditions and the prone position being little used by the intensive care team before of this scenario.

Taking into account the scenario of coping with COVID-19 in global health, mapping and understanding the unfolding of PI in the prognosis of the COVID-19 patient, allows the elaboration of real and peculiar preventive strategies based on the patient's needs26. In addition, the study allows us to reflect on the role of the nursing professional in the creation and elaboration of clinical protocols based on patient safety.

Conclusion

The PI preventive measures for patients with COVID-19 in prone position include risk assessment and stratification activities, skin and tissue accuracy, early repositioning and mobilization, use of support surfaces for pressure relief and skin and tissue protection, classification, evaluation and monitoring of PI, healing process and health professional education.

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