INPLASY PROTOCOL

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Musculoskeletal complications following prone positioning during COVID-19 pandemic: a scoping review protocol

Aranis, N[1]; Pinto-Concha, JJ[2]; González-Seguel, F[3].

Review question / Objective: The research questions of this scoping review were structured using the Population, Concept and Context (PCC) method: What musculoskeletal adverse events (MSK-AEs) after at least one session of prone positioning in mechanically ventilated adults with acute respiratory distress syndrome have been reported? and, Which body postures have been used for prone positioning? The aim of this review is to identify the MSK-AEs reported after at least one session of prone positioning in mechanically ventilated adults with acute respiratory distress syndrome. The secondary objective is to identify the type of body postures that have been used for prone positioning.

Condition being studied: Since COVID-19 pandemic interest in PP has increased due to its proved effectiveness in moderate to severe ARDS patients, with great variability regarding the prone postures used. "Prone posture" was understood as any form of placement of the patient's body lying face down. As PP is not harmless, we will report their "Adverse Events", defined according to the International Classification for Patient Safety as an incident that can be a reportable circumstance, near miss, no harm incident or harmful incident, involving an unintentional and/or unexpected event or occurrence that may result in injury or death. Lastly, the "World Health Organization" defines "Musculoskeletal" as any condition related to the bones, ligaments, joints, tendons, muscles and nerves, involving more than 150 conditions that affect the locomotor system of individuals.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 April 2022 and was last updated on 21 April 2022 (registration number INPLASY202240133).

INTRODUCTION

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syndrome have been reported? and, Which body postures have been used for prone positioning? The aim of this review is to identify the MSK-AEs reported after at least one session of prone positioning in mechanically ventilated adults with acute respiratory distress syndrome. The secondary objective is to identify the type of body postures that have been used for prone positioning.

Rationale: Prone positioning (PP) is a strategy that has been widely used during the pandemic of coronavirus disease 19 (COVID-19) in patients with moderate to severe acute respiratory distress syndrome (ARDS). The benefits of positioning for the respiratory management in this kind of patients are well established, but is also known that is not free from harm. A recent scoping review identified above forty individual adverse events (AEs) associated to PP, with the following highest-pooled occurrence rates; severe desaturation (37.9%), barotrauma (31%), pressure sores (29.7%), ventilation-associated pneumonia (28.2%), facial edema (16.7%), arrhythmia (15.4%), hypotension (10.2%), and peripheral nerve injuries (8.1%). In particular, acute cases of COVID-19 patients and survivors of critical illness, due to their need for deep sedation, use of neuromuscular blocking agents, prolonged immobilization and corticosteroids therapy during PP, have reported to be more exposed to unexpected compression and stretching of the nerves which could lead to peripheral injuries, physical impairment, persistent exercise limitation, and other neuromuscular complications that may impact 5-year decreased health related quality of life, imposing a burden on patients, families, and society. This frame, which still seems to be underestimated, provides an important opportunity to collect data on the MSK-AEs of mechanically ventilated adult patients admitted in the ICU and that required different body postures of PP.

Condition being studied: Since COVID-19 pandemic interest in PP has increased due to its proved effectiveness in moderate to severe ARDS patients, with great variability

regarding the prone postures used. "Prone posture" was understood as any form of placement of the patient's body lying face down. As PP is not harmless, we will report their "Adverse Events", defined according to the International Classification for Patient Safety as an incident that can be a reportable circumstance, near miss, no harm incident or harmful incident, involving an unintentional and/or unexpected event or occurrence that may result in injury or death. Lastly, the "World Health Organization" defines "Musculoskeletal" as any condition related to the bones, ligaments, joints, tendons, muscles and nerves, involving more than 150 conditions that affect the locomotor system of individuals.

METHODS

Search strategy: The search syntax, composed of free and Mesh terms will be: ("prone position" [MeSH] OR "prone position" OR "prone positions" OR "prone positioning" OR "pronation" OR "prone" OR "proning" OR "ventral decubitus" OR "body positioning" OR "prone body position" OR "posture" [MeSH]) AND ("mechanical ventilation" OR "mechanically ventilated" OR "mechanical ventilator" OR "artificial, respiration" OR "artificial respiration" OR "mechanical ventilations" OR "respiration, artificial" [MeSH] OR "icu" OR "intensive care units" [MeSH] OR "intensive care unit" OR "critical care" OR "adult respiratory distress syndrome" OR "respiratory distress syndrome" [MeSH] OR "respiratory distress syndrome" OR "respiratory insufficiency" OR "acute respiratory failure" OR "acute respiratory distress syndrome" OR "respiratory failure" OR "lung insufficiency" OR "ARDS" OR "acute lung injury" OR "COVID-19" [MeSH] OR "coronavirus" [MeSH] OR "coronavirus" OR "SARS-CoV-2" [MeSH]) AND ("neuromuscular" OR "neuromuscular diseases" [MeSH] OR "muscular" OR "muscular disorders, atrophic" [MeSH] OR "musculoskeletal" OR "musculoskeletal system" [MeSH] OR "skeletal" OR "muscles" [MeSH] OR "peripheral nerve injury" OR "peripheral nerve injuries" [MeSH] OR "compression

neuropathy" OR "impair" OR "complication" OR "complications" OR "dysfunction" OR "weakness" OR "muscle weakness" [MeSH] OR "atrophy" [MeSH] OR "disability" OR "frailty" [MeSH] OR "adverse events" OR "chronic pain" [MeSH] OR "persistent pain" OR "pain symptom" OR "muscle strength" OR "functional outcome"). Additional reference and citations searches will also be conducted.

Participant or population: Mechanically ventilated adult patients who required PP due to ARDS.

Intervention: Not applicable.

Comparator: Not applicable.

Study designs to be included: Original studies (including randomized controlled trials, non-randomized trials, prospective and retrospective observational studies, case reports, and letters, editorials or correspondences with original data) and recommendation documents (including care protocols, guidelines or any no-original study providing clinical recommendations) will be included.

Eligibility criteria: Based on the PCC method, we will include the following: 1) Population: mechanically ventilated adult patients who required PP due to ARDS; 2) Concept: reporting either MSK-AEs after at least one session of prone positioning or types of body postures; 3) Context: During the COVID-19 pandemic, including documents published from December 1st 2019 to date. The initial time limit was established from the beginning of the COVID-19 pandemic, where the recommendations of PP were emphasized. Studies will be limited to English or Spanish language and full text availability. Exclusion criteria will be documents on awake prone positioning (i.e., receiving non-invasive ventilation or high flow nasal cannula), pediatric or neonatal population, animal or experimental models.

Information sources: The following biomedical databases will be explored from

December 1st 2019 to date, selected by relevance and institution accessibility; PubMed (NCBI), CINAHL Plus with full text (EBSCO), SciELO, LILACS, and WorldWideScience. All selected data will be collected in a predesigned screening tool according to the eligibility criteria. Two blinded reviewers to each other judgment (NA-S and JJP-C) screened independently the identified documents; first by title and abstract, and secondly, by full text only the selected ones. The disagreements between reviewers were resolved by consensus with a third reviewer (FG-S). Additionally, a hand search will be performed following three strategies: (1) using the website search bar of scientific societies affiliated to the World Federation of Intensive and Critical Care (WFICC) available at https://www.wficc.com/societies, typing "prone position", "prone positioning", "posición prono", "posture", "neuromuscular diseases", "musculoskeletal" and "complications"; (2) revision of the title's references of systematic and narrative reviews identified during document selection; and (3) hand searching of authors' personal files selecting non-duplicated documents. Mendeley© v. 1.19.4 will be used for bibliographic management and administration of the reference database.

Main outcome(s): To identify the MSK-AEs reported after at least one session of prone positioning in mechanically ventilated adults with acute respiratory distress syndrome.

Additional outcome(s): To identify the type of body postures that have been used for prone positioning.

Data management: We will develop a standardized data charting form in Excel® extracting the following variables according to the two research questions: (a) bibliometric variables (type of document, study design, author/s, year of publication, journal or scientific society scope, country, and population studied), (b) variables related to PP (body posture used, prone position duration, and frequency of repositioning), (c) variables related to MSK-

AEs (MSK-AEs reported, body segment involved, instrument used to measure the AEs, time of appearance, treatment of the AEs, and severity).

Quality assessment / Risk of bias analysis: Not applicable.

Strategy of data synthesis: "Preferred Reporting Items for Systematic Reviews and Meta-Analyzes extension for Scoping Reviews Checklist" (PRISMA-ScR) will be used as a reference for final document selection process. The data extracted from the study will be presented in a descriptive way in text, tables, figures or graphically so that it can be summarized or conceptualized as needed.

Subgroup analysis: Not applicable.

Sensitivity analysis: Not applicable.

Language: English and Spanish only.

Country(ies) involved: Chile.

Keywords: "prone position"; "mechanical ventilation"; "musculoskeletal disease"; "complications"; "adverse events".

Contributions of each author:
Author 1 - Nadine Aranis - Lead author, development of the main idea, methodology, writing and revision of the final protocol.
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