Rehabilitation and Sports Medicine. 2023; 3:59
doi: 10.56294/ri202359

REVIEW

Management of pain reduction in mechanically ventilated care subjects

Manejo en la disminución del dolor en sujetos de atención con asistencia ventilatoria mecánica

Yaneth Marleny Mallqui Cáceres[1]

[1]Universidad ISALUD, Ciudad Autónoma de Buenos Aires, Argentina.

Cite as: Mallqui Cáceres YM. Management of pain reduction in mechanically ventilated care subjects. Rehabilitation and Sports Medicine. 2023;3:59. https://doi.org/10.56294/ri202359

Submitted: 17-09-2023 **Revised:** 29-07-2023 **Accepted:** 27-09-2023 **Published:** 28-09-2023

Editor: Prof. Dr. Carlos Oscar Lepez

ABSTRACT

Introduction: pain is an unpleasant emotional experience linked to actual or potential injuries, concerns in intensive care units (ICU), affecting life and recovery of patients. It is essential to address this pain, classifying it with WHO criteria and guidelines. The approach is to explore types of pain and strategies for its management, seeking to improve quality of life during ICU hospitalization.
Methods: a PubMed search was performed with "Pain Management" AND "nursing" AND "Artificial Respiration", filtering for studies between 2018 and 2023. After review, 11 irrelevant articles were discarded, selecting 8 that met criteria.
Results: the outcome focuses on an independent approach to pain management in nursing, involving non-pharmacological measures and quality standards. This brings with it the responsibility to look for better alternatives to optimize nursing care in adequate pain management.
Conclusion: the data from these studies expose relevant information highlighting the importance of adequate independent pain management and sedation by nurses in critically ill ICU patients. The opportunity to implement more effective and patient-centered approaches to improve the well-being and recovery of critically ill patients is emphasized.

Keywords: Pain Management; Nursing; Artificial Respiration; Intensive Care Units.

RESUMEN

Introducción: el dolor es una experiencia emocional desagradable ligada a lesiones reales o potenciales que preocupa en unidades de cuidados intensivos (UCI), afectando vida y recuperación de pacientes. Es esencial abordar este dolor, clasificándolo con criterios y pautas de la OMS. El enfoque es explorar tipos de dolor y estrategias para su manejo, buscando mejorar calidad de vida durante internación en UCI.
Métodos: se realizó una búsqueda en PubMed con "Pain Management" AND "nursing" AND "Artificial Respiration", filtrando para estudios entre 2018 y 2023. Después de revisión, se descartaron 11 artículos irrelevantes, seleccionando 8 que cumplían criterios.
Resultados: el resultado se centra en un enfoque independiente de manejo del dolor en enfermería, involucrando medidas no farmacológicas y estándares de calidad. Esto conlleva la responsabilidad de buscar mejores alternativas para optimizar cuidados enfermeros en un adecuado manejo del dolor.
Conclusión: los datos de estos estudios exponen información relevante resaltando la importancia de un manejo independiente adecuado del dolor y sedación por enfermeros en pacientes críticos en UCI. Se enfatiza la oportunidad de implementar enfoques más efectivos y centrados en pacientes para mejorar bienestar y recuperación de críticos.

Palabras clave: Manejo Del Dolor; Enfermería; Respiración Artificial; Unidad De Cuidados Intensivos.

INTRODUCTION

Pain is an unpleasant sensory and emotional experience that significantly affects patients' quality of life in various clinical circumstances.[1] Therefore, the inability to verbally express pain does not mean the person is not experiencing it. Understanding that pain can manifest in various ways, even in patients who cannot articulate it with words, is crucial. For this reason, effective pain control becomes a priority to improve their well-being and expedite their recovery.[2] It is the responsibility of nursing professionals to be attentive to the patient's signals and manifestations to provide proper pain management and ensure their maximum comfort during the care and recovery process, especially in patients connected to a mechanical ventilator, who face complex and critical situations.[3,4]

The use of mechanical ventilator assistance is common in the closed intensive care unit (ICU), where ensuring optimal ventilation in patients with severe respiratory problems is of utmost importance. However, this procedure can cause pain and discomfort during its implementation and the presence of the endotracheal tube.

In this context, nursing plays an essential role in the direct and specialized care of these ventilated patients, especially in the comprehensive management of the pain they may experience, through the application and understanding of different strategies such as the use of pain measurement scales, for example, the Critical Care Pain Observation Tool (CPOT).[5,6,7] This is a validated scale for this purpose that allows the assessment of pain in critically ill patients with impaired verbal or cognitive communication. It provides a means to assess, alleviate, and prevent pain by measuring 4 items: facial expression, body movements, muscle tension, and ventilator compliance. When evaluating these items, it assigns a score ranging from 0, which corresponds to minimal pain, to 8, which corresponds to maximum pain. This action becomes a priority for the nursing team to improve the quality of care in all intensive care units and, simultaneously, the patient's quality of life and facilitate their prompt recovery through independent interventions within the nursing professional's purview.

This review will focus on the main considerations in pain management in intubated patients from the nursing perspective.[8]

Innovative studies will be addressed, highlighting the fundamental role of empathetic communication and interdisciplinary intervention. Through this comprehensive approach, nursing professionals can significantly enhance the experience of intubated patients and optimize their recovery process.

It is crucial to remember that each patient is unique, and their experience of pain may differ from others. Therefore, the nursing role in pain management is key to providing personalized and objective care. Addressing these challenges allows us to move towards more humane and holistic care, ensuring maximum comfort and well-being for patients in a state of total fragility and vulnerability due to intubation. This not only affects their physical well-being but also their emotional and psychological well-being during their stay in intensive care.[6,9]

Ultimately, the aim is to emphasize the relevance of the nursing staff's role in managing pain in ventilated patients, focusing on providing holistic and humane care that promotes recovery and continuous improvement to enhance the quality of life of these critical patients.[10] With the right knowledge and informed practice, nursing professionals can make a significant difference in patients' experiences, providing comfort and relief in challenging medical situations.

In this regard, it is pertinent to ask whether the independent care provided by nursing professionals in the ICU is aimed at managing and preventing pain through the use of non-pharmacological measures, pain measurement tools, and the application of the CPOT scale, especially in older adult subjects receiving mechanical ventilatory assistance. This question is crucial to understanding the effectiveness of the interventions carried out by nurses in managing pain in this vulnerable population.

METHODS

A systematic review was performed following the PRISMA[11] workflow as a guide to perform systematic reviews on scientific papers related to the independent care of nursing professionals in managing pain reduction in older adult care subjects with mechanical ventilatory assistance.

The search was performed in the PubMed databases using the descriptor terms in health sciences (DeCS), which is a structured vocabulary that facilitated the search for the study, allowing the search expression to be constructed as follows: (Pain Management) AND (nursing) AND (Artificial Respiration).

The following filters were applied to limit the search: 2018-2023, Type of article: clinical trial, meta-analysis, randomized controlled trial, review and systematic review, English and Spanish language. These filters allow for the optimization of the search, helping in the most relevant approach and ensuring the inclusion of scientific papers that target the objective. We proceeded to review the titles and ABSTRACTS of the studies obtained through the search and the application of filters of the 19 papers, and 11 papers of the studies were discarded for not being of interest to the research topic. Finally, 8 papers were selected that met the established criteria: 5 open and free for the systematic review and 3 paid papers.

https://doi.org/10.56294/ri202359

RESULTS AND DISCUSSION

The management of pain by nurses in a non-pharmacological way is of utmost importance, being able to practice as part of our independent care and validating ourselves based on measurement scales adjusted for this type of patient, thus being one of our objectives in developing our profession.

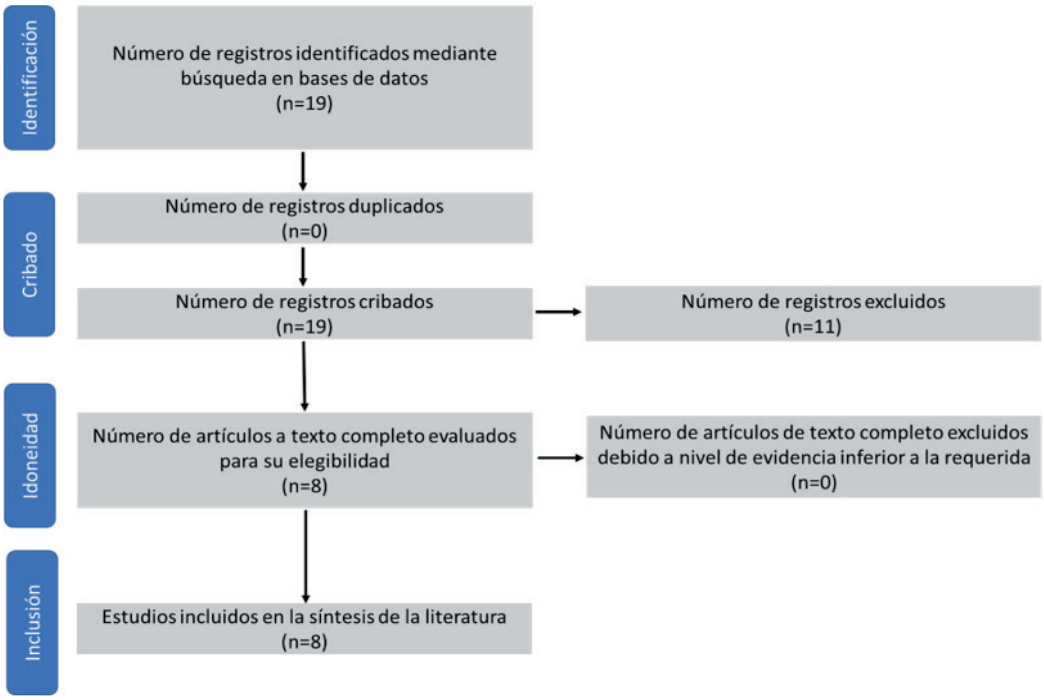

Figure 1. Flowchart for the review, according to PRISMA methodology

Table 1. Main characteristics of the included studies

Author, country, year	Sample	Type of intervention	Main results
Tanios et al, United States, 2019.[12]	90 patients in ICU	Clinical trial	The study aimed to determine the feasibility of conducting a multicenter randomized clinical trial of analgesia before sedation compared with protocol-directed sedation or both PDS and daily sedation interruption. The study workload perceived by the nursing staff was greater with protocol analgesia before sedation.
Chan et al, Australia, 2022.[13]	Scientific papers	Systematic review	They associated frailty with an increased risk of short-term mortality. Frail patients had longer ICU length of stay and hospital length of stay. Duration of mechanical ventilation was longer in frail patients. General pain management measures were taken.
Deffland et al, Germany, 2020.[9]	1323 patients	Clinical trial	Adherence to monitoring for pain, distress, and delirium (PAD bundle) is associated with a shorter hospital stay. Despite the improved clinical outcome, adherence to PAD elements was associated with reduced case mix per day and gain per day based on univariate analysis. Multiple linear analysis does not guarantee these results. PAD monitoring is important for clinical and economic outcome, and predicted case mix is better than disease severity according to machine learning analysis. Adherence to PAD bundles is also important for clinical and economic outcome.
Wang et al, China, 2022.[14]	243 patients	Clinical trial	The pain, distress and delirium care package (PAD) significantly reduced the incidence of delirium. Significant decreases in duration of delirium, ventilation time, and ICU stay were also found. The intervention group showed less short-term cognitive impairment at the 3-month follow-up assessment.
Samira Hamadeh et al, Australia, 2021.[15]	Scientific papers	Literature review	Behavioral pain assessment tools are the benchmark for pain assessment of sedated and ventilated patients; but the reliability and validity of physiologic parameters for assessing pain has yet to be determined. There are issues of compliance with pain assessment guidelines and tools and the impact on practices. More research is needed to explore the causal mechanisms contributing to poor compliance with established pain management guidelines.

Kumpf et al, Germany, 2022.[16]	Scientific papers	Literature review	Development of quality indicators for intensive care in Germany. One of the indicators is to avoid anything related to inadequate sedation, either excessive or insufficient, as well as inadequate analgesia and untreated delirium, which can increase health risks and resource use. The mathematical formula for the indicator encompasses all three aspects: delirium, analgesia and sedation. A multimodal approach based on guidelines is implemented for the adequate management of these aspects in each Intensive Care Unit. Monitoring of the process is performed by measuring the depth of sedation, quality of analgesia and signs of delirium at least every eight hours.
Gilder et al, New Zealand, 2019.[17]	1200 patients of the cardiovascular surgery service	Clinical trial	The study aims to evaluate the safety and efficacy of avoiding endotracheal suctioning in postoperative cardiac surgery patients ventilated for ≤ 12 hours. Pain assessments were performed before, during and after endotracheal suctioning and patient experience will be investigated with a brief interview the following day. Pain was assessed using the critical care pain observation tool (CPOT).
AminiSaman, Iran, 2018.[18]	50 patients under mechanical ventilation	Clinical Trial	Transcutaneous electrical nerve stimulation (TENS) at acupuncture points (Hegu and Zusanli) significantly reduced pain intensity compared to the sham group. The use of analgesics and sedatives was also significantly lower in the TENS group.

Proper pain, sedation, and delirium management in critically ill patients in intensive care units (ICUs) is paramount to ensure their well-being and optimize clinical outcomes.[19] This scientific article presents a discussion based on a series of studies that address various strategies and interventions in the management of these critical aspects in ICU patients.[20]

Pain management in ventilated patients is a crucial challenge in intensive medical care. In this context, the role of nursing is elevated to a position of paramount importance, as it deploys a set of essential skills and knowledge to ensure the comprehensive well-being of critically ill patients. Pain control contributes to patient comfort and directly impacts their recovery and the optimization of clinical outcomes.[9]

The study conducted by Tanios highlights the feasibility of implementing an Analgesia-First Sedation (AFS) approach compared to other forms of sedation.[12] This approach could have significant benefits in terms of clinical and economic outcomes. Tanios' research emphasizes the need to adopt innovative approaches prioritizing pain control as the foundation for sedation management in critically ill patients. This study provides a solid basis for the reevaluation of current practices in pain and sedation management in ICUs.

Nursing can exercise its care independently by assessing and monitoring patients using tools such as the CPOT[17] and the RASS. This allows for identifying and addressing individual analgesia and sedation needs for each patient. Furthermore, management is responsible for organizing and prioritizing care tasks according to workload based on the patient's criticality. Communication and interprofessional collaboration are key, involving objective, critical judgment by sharing relevant information, participating in team meetings, and collaborating in decision-making to ensure individualized care tailored to each patient's needs. These aspects ensure quality care in the intensive care environment.[21]

The study by Chan[13] focused on frailty in surgical patients admitted to the ICU. The research found that frailty was associated with a higher risk of short-term mortality and longer ICU and hospital stays. These results highlight the importance of identifying and addressing frailty in surgical patients, which can have significant implications for their recovery and prognosis.

In this study, competencies specific to the nursing profession for pain management that can be applied in the critical care area are identified: conducting a comprehensive assessment of the patient's physical, cognitive, and psychosocial status to identify specific needs and limitations related to frailty; developing an individualized care plan; promoting early mobilization and exercise; implementing fall prevention measures; providing support;[22] offering emotional support and reassurance to alleviate anxiety and promote a sense of security; collaborating with the interdisciplinary team.[13]

Furthermore, while adherence to the PAD (Pain, Agitation, Delirium) guidelines is associated with shorter hospital stays and better clinical outcomes, it also highlights the need to address specific challenges, such as staff workload variability. The findings of Deffland emphasize the importance of coordination and collaboration among nursing professionals and the multidisciplinary team to optimize patient outcomes.[9]

As care strategies for effective pain management from nursing intervention, effective strategies can encompass optimizing pain treatment, reducing exposure to sedatives, and preventing and treating delirium, which can significantly improve short-term and long-term outcomes. Additionally, the study suggests that clinical bundles and concepts, such as the ABCDEF approach, can improve pain, sedation, and delirium management.[24]

This approach focuses on pain assessment, prevention, and treatment; spontaneous awakening and breathing trials; choice of analgesia and sedation; delirium assessment, prevention, and treatment; early mobility and exercise; and family engagement or empowerment.[9,25]

The randomized intervention study by Wang[26] in 2022 evaluated a care bundle for pain, distress, and delirium in ICU patients. The results showed that this bundle reduced the incidence and duration of delirium, ventilation time, and ICU stay. Additionally, patients in the intervention group had less short-term cognitive decline. These results suggest that an intervention focused on managing these aspects can significantly improve outcomes in ICU patients.[27]

Independent care that nursing can provide in management may include managing protocols for pain, agitation, and anxiety assessment and management; establishing guidelines that promote policies respecting rest and sleep schedules; creating a conducive environment for comfort, thus minimizing disruptions to rest and sleep; facilitating patient orientation; promoting early mobilization to prevent pressure injuries caused by prolonged immobility; promoting hygiene and nutrition; and educating patients and families about care management.[28]

The scoping review by Samira Hamadeh et al. highlights the need for behavioral pain assessment tools in sedated and ventilated ICU patients. The lack of confidence and validity in physiological parameters for pain assessment underscores the importance of developing more effective assessment strategies. Nursing is crucial in implementing and adapting pain assessment tools, contributing to more accurate and personalized care.

The review article by Kumpf[16] in 2022 addresses the development of quality indicators for intensive care in Germany. One of the indicators focuses on avoiding inadequate sedation, inadequate analgesia, and untreated delirium, as these can increase health risks and resource utilization. Implementing a multimodal, guideline-based approach for properly managing these aspects in each ICU can improve the standard of care. Additionally, it is suggested to evaluate an outcomes indicator to measure the effectiveness of implemented interventions. To improve pain management and indirectly provide quality care, the following can be proposed by management: establishing appropriate standards and procedural protocols for analgesia administration; training medical and nursing staff in specialized sedation and analgesia techniques; collaborating with a specialized intensive care center to avoid ventilation-related complications; implementing measures to prevent infections, following recommendations from the Hospital Infection Control Committee; limiting tidal volume in ventilation to prevent lung damage; using hospital infection surveillance systems to assess the effectiveness of implemented measures.

The randomized controlled trial by Eileen Gilder[17] evaluated the avoidance of endotracheal suctioning in postoperative cardiac surgery patients who were ventilated for less than 12 hours. The results could have an interesting impact on nursing practice by avoiding a necessary procedure. It also underscores the importance of considering the patient's experience in pain management and comfort.

The clinical trial by AminiSaman[18] explored the use of transcutaneous electrical nerve stimulation (TENS) in mechanically ventilated patients in the ICU. The results showed a significant reduction in pain intensity and decreased use of analgesics and sedatives in the TENS-treated group. These findings suggest that TENS could be an effective and less invasive therapeutic option for pain management in these patients.[29]

Considering these alternative techniques that promote pain reduction opens up new possibilities for the approach in intensive care units, and nurses may play a crucial role in assessing patient pain and monitoring their response to TENS and acupuncture treatments. Additionally, nurses may be responsible for placing TENS electrodes and supervising patients during treatment. Nurses need to be trained in TENS and acupuncture to ensure the safety and effectiveness of the treatment, including the proper placement of TENS therapy electrodes.

Effective communication between the ventilated patient and the nursing team is essential for optimal pain management. Nursing provides information about the effects of medications and interventions and acts as an empathetic link between the patient and the medical team. Empathy and emotional support play a crucial role in the patient's perception of pain, and nursing staff are vital in ensuring that patients feel heard and understood.[30,31,32,33]

In the case of ventilated patients, nursing also faces the additional challenge of limited communication due to intubation and sedation. This requires even more careful observation and assessment to identify any signs of discomfort or pain in the patient. Nurses' ability and mastery of tools to interpret non-verbal cues and physiological reactions are essential for appropriate pain management in this vulnerable population.

CONCLUSIONS

Nurses play an essential role in the care of these patients, as they can carry out non-pharmacological interventions and use pain assessment tools to provide individualized care. Research suggests that innovative approaches, such as analgesia before sedation, can have significant benefits in terms of clinical and economic outcomes. Furthermore, it emphasizes the importance of addressing frailty in surgical patients and maintaining

adherence to care bundles for pain, distress, and delirium. Effective communication and empathy on the part of nurses are crucial to ensuring the well-being of patients, especially those under mechanical ventilation. These findings support the need for high-quality, patient-centered care in the ICU setting, where proper pain management plays a vital role in recovery and optimizing clinical outcomes.

REFERENCES

1. Denson JL, Gillet AS, Zu Y, Brown M, Pham T, Yoshida Y, et al. Metabolic Syndrome and Acute Respiratory Distress Syndrome in Hospitalized Patients With COVID-19. JAMA Netw Open 2021;4:e2140568. https://doi.org/10.1001/jamanetworkopen.2021.40568.

2. Fourie A, Ahtiala M, Black J, Hevia H, Coyer F, Gefen A, et al. Skin damage prevention in the prone ventilated critically ill patient: A comprehensive review and gap analysis (PRONEtect study). J Tissue Viability 2021;30:466-77. https://doi.org/10.1016/j.jtv.2021.09.005.

3. Rosa CD la, Jiménez-Franco LE, Llano RT del, Vega-Cardulis E, Cardulis-Cárdenas O. Trends, collaboration and impact of Latin American scientific production in anesthesiology and pain medicine in Scopus and Web of Science. Data Metadata 2022;1:13-13. https://doi.org/10.56294/dm202213.

4. Evans GW. Projected Behavioral Impacts of Global Climate Change. Annu Rev Psychol 2019;70:449-74. https://doi.org/10.1146/annurev-psych-010418-103023.

5. Frade-Mera MJ, Arias-Rivera S, Zaragoza-García I, Martí JD, Gallart E, San José-Arribas A, et al. The impact of ABCDE bundle implementation on patient outcomes: A nationwide cohort study. Nurs Crit Care 2022;27:772-83. https://doi.org/10.1111/nicc.12740.

6. Emeriaud G, López-Fernández YM, Iyer NP, Bembea MM, Agulnik A, Barbaro RP, et al. Executive Summary of the Second International Guidelines for the Diagnosis and Management of Pediatric Acute Respiratory Distress Syndrome (PALICC-2). Pediatr Crit Care Med J Soc Crit Care Med World Fed Pediatr Intensive Crit Care Soc 2023;24:143-68. https://doi.org/10.1097/PCC.0000000000003147.

7. Jacq G, Melot K, Bezou M, Foucault L, Courau-Courtois J, Cavelot S, et al. Music for pain relief during bed bathing of mechanically ventilated patients: A pilot study. PLOS ONE 2018;13:e0207174. https://doi.org/10.1371/journal.pone.0207174.

8. Niazoa J, Pérez-Galavís A, Ron M, Rodríguez-Martínez C, Cardoza W. Teleworking and Health in Times of Pandemic from the Perception of the Administrative Staff of a Pharmacy. Data Metadata 2022;1:23-23. https://doi.org/10.56294/dm202263.

9. Deffland M, Spies C, Weiss B, Keller N, Jenny M, Kruppa J, et al. Effects of pain, sedation and delirium monitoring on clinical and economic outcome: A retrospective study. PloS One 2020;15:e0234801. https://doi.org/10.1371/journal.pone.0234801.

10. Quispe IZ, Ron M, Hernandéz-Runque E, Escalona E, Trovat-Ascanio V. Evaluación ergonómica del puesto de trabajo colgador de pollo en empresa beneficiadora de aves. Salud Cienc Tecnol 2022;2:217-217. https://doi.org/10.56294/saludcyt2022217.

11. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. Declaración PRISMA 2020: una guía actualizada para la publicación de revisiones sistemáticas. Rev Esp Cardiol 2021;74:790-9. https://doi.org/10.1016/j.recesp.2021.06.016.

12. Tanios M, Nguyen HM, Park H, Mehta S, Epstein SK, Youssef F, et al. Analgesia-first sedation in critically ill adults: A U.S. pilot, randomized controlled trial. J Crit Care 2019;53:107-13. https://doi.org/10.1016/j.jcrc.2019.06.008.

13. Chan R, Ueno R, Afroz A, Billah B, Tiruvoipati R, Subramaniam A. Association between frailty and clinical outcomes in surgical patients admitted to intensive care units: a systematic review and meta-analysis. Br J Anaesth 2022;128:258-71. https://doi.org/10.1016/j.bja.2021.11.018.

14. Wang X-P, Lv D, Chen Y-F, Chen N, Li X-D, Xu C-F, et al. Impact of Pain, Agitation, and Delirium Bundle on

Delirium and Cognitive Function. J Nurs Res JNR 2022;30:e222. https://doi.org/10.1097/jnr.0000000000000497.

15. Kerbage SH, Garvey L, Lambert GW, Willetts G. Pain assessment of the adult sedated and ventilated patients in the intensive care setting: A scoping review. Int J Nurs Stud 2021;122:104044. https://doi.org/10.1016/j.ijnurstu.2021.104044.

16. Kumpf O, Assenheimer M, Bloos F, Brauchle M, Braun J-P, Brinkmann A, et al. Quality indicators in intensive care medicine for Germany - fourth edition 2022. Ger Med Sci GMS E-J 2023;21:Doc10. https://doi.org/10.3205/000324.

17. Gilder E, Parke RL, McGuinness S, Jull A. Study protocol: A randomized controlled trial assessing the avoidance of endotracheal suction in cardiac surgical patients ventilated for ≤ 12 hr. J Adv Nurs 2019;75:2006-14. https://doi.org/10.1111/jan.13994.

18. AminiSaman J, Mohammadi S, Karimpour H, Hemmatpour B, Sharifi H, Kawyannejad R. Transcutaneous Electrical Nerve Stimulation at the Acupuncture Points to Relieve Pain of Patients Under Mechanical Ventilation: A Randomized Controlled Study. J Acupunct Meridian Stud 2018;11:290-5. https://doi.org/10.1016/j.jams.2018.06.008.

19. Espinoza PV, Lara LL. Uso de la tetanalgesia para valoración del dolor. Salud Cienc Tecnol 2023;3:347-347. https://doi.org/10.56294/saludcyt2023347.

20. Tasaka S, Ohshimo S, Takeuchi M, Yasuda H, Ichikado K, Tsushima K, et al. ARDS clinical practice guideline 2021. Respir Investig 2022;60:446-95. https://doi.org/10.1016/j.resinv.2022.05.003.

21. Best KM, Asaro LA, Curley MAQ, Randomized Evaluation of Sedation Titration for Respiratory Failure (RESTORE) Study Investigators. Sedation Management for Critically Ill Children with Pre-Existing Cognitive Impairment. J Pediatr 2019;206:204-211.e1. https://doi.org/10.1016/j.jpeds.2018.10.042.

22. Aucatoma DVR, Gamboa MSR. Uso de terapia alternativa y complementaria para aliviar el dolor en adultos y adultos mayores. Salud Cienc Tecnol 2022;2:76-76. https://doi.org/10.56294/saludcyt202276.

23. Yanez KPT, Torres NAC. Percepción y nivel de conocimientos en estudiantes de enfermería sobre cuidados paliativos. Salud Cienc Tecnol 2023;3:305-305. https://doi.org/10.56294/saludcyt2023305.

24. Ramírez ME, Ron M, Mago G, Hernandez-Runque E, Martínez MDC, Escalona E. Proposal for an epidemiological surveillance program for the prevention of occupational accidents and diseases in workers exposed to carbon dioxide (CO2) at a Venezuelan brewing company. Data Metadata 2023;2:55-55. https://doi.org/10.56294/dm202355.

25. Balas MC, Tan A, Pun BT, Ely EW, Carson SS, Mion L, et al. Effects of a National Quality Improvement Collaborative on ABCDEF Bundle Implementation. Am J Crit Care Off Publ Am Assoc Crit-Care Nurses 2022;31:54-64. https://doi.org/10.4037/ajcc2022768.

26. Wang X-P, Lv D, Chen Y-F, Chen N, Li X-D, Xu C-F, et al. Impact of Pain, Agitation, and Delirium Bundle on Delirium and Cognitive Function. J Nurs Res JNR 2022;30:e222. https://doi.org/10.1097/jnr.0000000000000497.

27. García GNR, García KGR, Rojas JAA, León DE. Trastornos musculoesqueléticos asociados a la actividad laboral. Salud Cienc Tecnol 2023;3:441-441. https://doi.org/10.56294/saludcyt2023441.

28. Ayasrah SM. Pain among non-verbal critically Ill mechanically ventilated patients: Prevalence, correlates and predictors. J Crit Care 2019;49:14-20. https://doi.org/10.1016/j.jcrc.2018.10.002.

29. Orsetti M, Bertolini Y, Villaalta AF, Creo F, Santillan P. Management of operational activities at the Regional Human Milk Collection Center: an analysis from the perspective of local intervention strategies and information systems. Data Metadata 2022;1:35-35. https://doi.org/10.56294/dm202273.

30. Mazzu MA, Campbell ML, Schwartzstein RM, White DB, Mitchell SL, Fehnel CR. Evidence Guiding Withdrawal of Mechanical Ventilation at the End of Life: A Review. J Pain Symptom Manage 2023;66:e399-426.

https://doi.org/10.1016/j.jpainsymman.2023.05.009.

31. Perkins GD, Mistry D, Lall R, Gao-Smith F, Snelson C, Hart N, et al. Protocolised non-invasive compared with invasive weaning from mechanical ventilation for adults in intensive care: the Breathe RCT. Health Technol Assess Winch Engl 2019;23:1-114. https://doi.org/10.3310/hta23480.

32. Sasabe Y, Niitani M, Teramoto C, Yamaga S, Shime N, Tanabe K, et al. Deep sedation predicts pressure injury in patients admitted to intensive care units. Nurs Crit Care 2022;27:877-84. https://doi.org/10.1111/nicc.12753.

33. Sulla F, La Chimia M, Barbieri L, Gigantiello A, Iraci C, Virgili G, et al. A first contribution to the validation of the Italian version of the Behavioral Pain Scale in sedated, intubated, and mechanically ventilated paediatric patients. Acta Bio-Medica Atenei Parm 2018;89:19-24. https://doi.org/10.23750/abm.v89i7-S.7945.

FINANCING

No financing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Yaneth Marleny Mallqui Cáceres.
Research: Yaneth Marleny Mallqui Cáceres.
Methodology: Yaneth Marleny Mallqui Cáceres.
Project administration: Yaneth Marleny Mallqui Cáceres.
Original drafting and editing: Yaneth Marleny Mallqui Cáceres.
Writing-revision and editing: Yaneth Marleny Mallqui Cáceres.