


Neurocritical Patients: Review of the Scope of Nursing Diagnoses and Care in the Intensive Care Unit

SAGE Open Nursing
Volume 9: 1–8
© The Author(s) 2023
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/23779608231158978
journals.sagepub.com/home/son



Maria Luiza Peixoto Brito¹, Luis Fernando Reis Macedo¹ ,
Kenya Waléria de Siqueira Coelho Lisboa¹,
Valterlúcio dos Santos Sales¹, Sarah de Lima Pinto²
and Darly Suyane Felix Silva¹

Abstract

Objective: To identify the diagnoses and nursing care for neurocritical patients in the intensive care unit.

Method: This is a scope review study, based on the Joanna Briggs Institute, led by the following guiding question: what are the diagnoses and nursing care for neurocritical patients in the intensive care unit? Data collection was carried out in February 2022 in a paired manner, in the following databases: EMBASE, MEDLINE, PubMed, and SCOPUS. For sample selection, the following search strategy was used: “Neurology” AND “Nursing Care” OR “Nursing Diagnosis” AND “Critical Care.” Studies were independently selected, blinded by two reviewers.

Result: It was possible to identify 854 studies, which after analysis by title and abstract, only 27 articles passed the eligibility, of which 10 were part of this review.

Conclusion: According to the analysis of the studies, it was found that nursing care, combined with a care plan for neurocritical patients, allows for better results, with a view to the quality of life and health promotion.

Keywords

nursing care, neurology, critical care, nursing diagnosis, hospital care, neurosciences

Received 9 December 2022; revised 29 January 2023; accepted 5 February 2023

Introduction

Patients admitted to an intensive care unit (ICU) with neurological impairment are considered neurocritical patients (Delaney et al., 2018). This group needs specific care and constant surveillance by the multiprofessional health team in the hospital environment, to avoid further aggravations and secondary injuries. The execution of this care at the ICU level can be implemented by the nursing team, having as an instrument the systematization of nursing care (de Arruda et al., 2019; Unal et al., 2021).

In this group of patients, the diagnoses of ischemic and hemorrhagic stroke (cerebrovascular accident), traumatic brain injury, hydrocephalus, brain tumor, aneurysms, subarachnoid hemorrhage at admission or during ICU stay, patients with intracranial pressure (ICP), blood and brain parenchyma, intracranial hypertension, and intracranial hemorrhage (Wang et al., 2018).

Given these assumptions, it is observed that there is a greater need for intensive care for patients with severe

neurological impairment,² with the ICU being the most appropriate environment for patient handling together with the multidisciplinary team, as it offers care intensive care and continuous monitoring, through technological parameters, attributing to health professionals a greater control of interferences, speed in decision-making and precise actions to improve the prognosis (da Silva et al., 2020).

Within this context of care for neurocritical patients, nursing plays a fundamental role, due to the need for its permanence throughout the patient’s treatment and rehabilitation process, preventing or early detection of possible

¹Center for Health and Biological Sciences, Laboratory of Nursing in Neurosciences, Regional University of Cariri, Ceará, Brazil

²Department of Nursing, Regional University of Cariri, Ceará, Brazil

Corresponding Author:

Luis Fernando Reis Macedo, Center for Health and Biological Sciences, Laboratory of Nursing in Neurosciences, Regional University of Cariri, Ceará, Brazil.
Email: luis.reis@urca.br



complications, through actions based on the adequate promotion of cerebral perfusion, early detection of signs and symptoms of elevation or decompensation of ICP, and neurological examination using the Glasgow Coma Scale (GCS; Barcelos et al., 2016; Delaney et al., 2018).

The systematization of nursing care with a scientific basis guarantees a significant impact on interventions related to evolution and improvement in the patient's clinical condition. In this context, there are measures implemented by the nursing team, such as monitoring hemodynamic and ventilatory function, adequate patient positioning, assessment of vital signs, and performing oral hygiene and endotracheal aspiration, which are conducts that promote safety in the performance of care during care. Therefore, the planning of nursing care is essential in the care of neurocritical patients (Deldar et al., 2020).

Within this context, the nursing process assists in directed and focused care on the needs presented by patients (Barcelos et al., 2016). In addition, it is important to highlight that protocols are fundamental strategies for planning, implementation, and evaluation of actions, as well as in the standardization of work actions (Buterakos et al., 2022).

Therefore, considering the importance of scientific foundations in clinical practice, the literature can guide nursing with care plans aimed at neurocritical patients. In this sense, this work is justified by the need for a study that guides nurses in nursing care for neurocritical patients, in which it presents the main nursing diagnoses (ND) updated by North American Nursing Diagnosis Association International (NANDA-I; NANDA I 2021–2023, 2022) and nursing care. It is worth mentioning that an updated study with postpandemic data is essential, which is relevant for the care of the neurocritical patient, as the pandemic presented new aspects regarding this assistance. Thus, this work aims to identify ND and nursing care for neurocritical patients in the ICU.

Methodology

This is a scope review study, based on the Joanna Briggs Institute (JBI, 2020; Lockwood & Tricco, 2020), to carry out a synthesis of knowledge and mapping of key concepts on the Systematization of Nursing Care for neurocritical patients in the ICU. This work was developed based on nine steps, described below: definition of the research question and objectives; definition of eligibility criteria; description of the planned approach, search for studies, selection, data extraction, and presentation of evidence; designation of the search for evidence; selection of evidence; extracting evidence; analysis of the evidence found; results presentation; and summary of evidence in relation to the objective of the review (Peters et al., 2015).

The research question is based on the acronym PCC; Population "P" (Neurocritical Patient), "C" concept (Nursing Care), and "C" context (ICU; Peters et al., 2015).

Based on this, the following guiding question was formulated to conduct the study: what are the diagnoses and nursing care for neurocritical patients in the ICU?

For data collection, the databases of journals from Excerpta Medica DataBASE (EMBASE) and Online System of Search and Analysis of Medical Literature (MEDLINE) were consulted; Medline US National Library of Medicine National Institutes of Health (PubMed) and SCOPUS, during February 2022 in a paired manner. In the sample selection procedure, controlled descriptors with AND and OR intersection Boolean connectors were used, with the following search strategy: "Neurology" AND "Nursing Care" OR "Nursing Diagnosis" AND "Critical Care."

The inclusion criteria for the selection of studies were: original articles in the full text available in full, online, and free of charge, published in English, Spanish, or Portuguese, with a temporal delimitation from the years 2017 to 2022, justified by the updating of the protocols of care for the neurocritical patient and the development of new assistance techniques due to COVID-19. Articles repeated in the same crossing and/or duplicated in different databases, review articles, and abstracts were excluded.

Studies retrieved using the formulated search strategy were extracted and imported into the *Reyyan Intelligent Systematic Review* system (*rayyan.ai*) for further screening (Ouzzani et al., 2016).

Studies were independently selected (JBI, 2020), blinded by two reviewers (M.L.P.B. and L.F.R.M), and divided into two stages. Initially, there was a selection by reading titles and abstracts, after the first screening, the full texts were read, examining these studies according to the eligibility criteria.

After this double-blind screening, 91% of the articles were excluded, 6% had an interreviewer disagreement, and 3% were included in the studies by both reviewers.

Disagreements that arose during the blind process were resolved by consensus, without the need for a third reviewer. Finally, the selection instrument (*rayyan.ai*) provided the number of sessions and minutes in the screening process by the reviewers.

To report the process of identification, screening, eligibility, and inclusion of studies, as represented in Figure 1, the *Preferred Reporting Items for Systematic Review and Meta-Analyses* (PRISMA; Tricco et al., 2018) flowchart was used.

To characterize the selected studies, we used a self-designed checklist containing variables referring to the author(s), year of publication, article title, indexing base/periodical, kind of study, study participants, and main results.

In the analysis process, the data reduction method was used, involving a thorough reading and organizing of the data in a logical structure, systematically comparing the results of the primary studies in question, facilitating the process of interpretive analysis (Lockwood & Tricco, 2020; Tricco et al., 2018). The results are presented in Tables 1 and 2 and later discussed based on the relevant current literature.

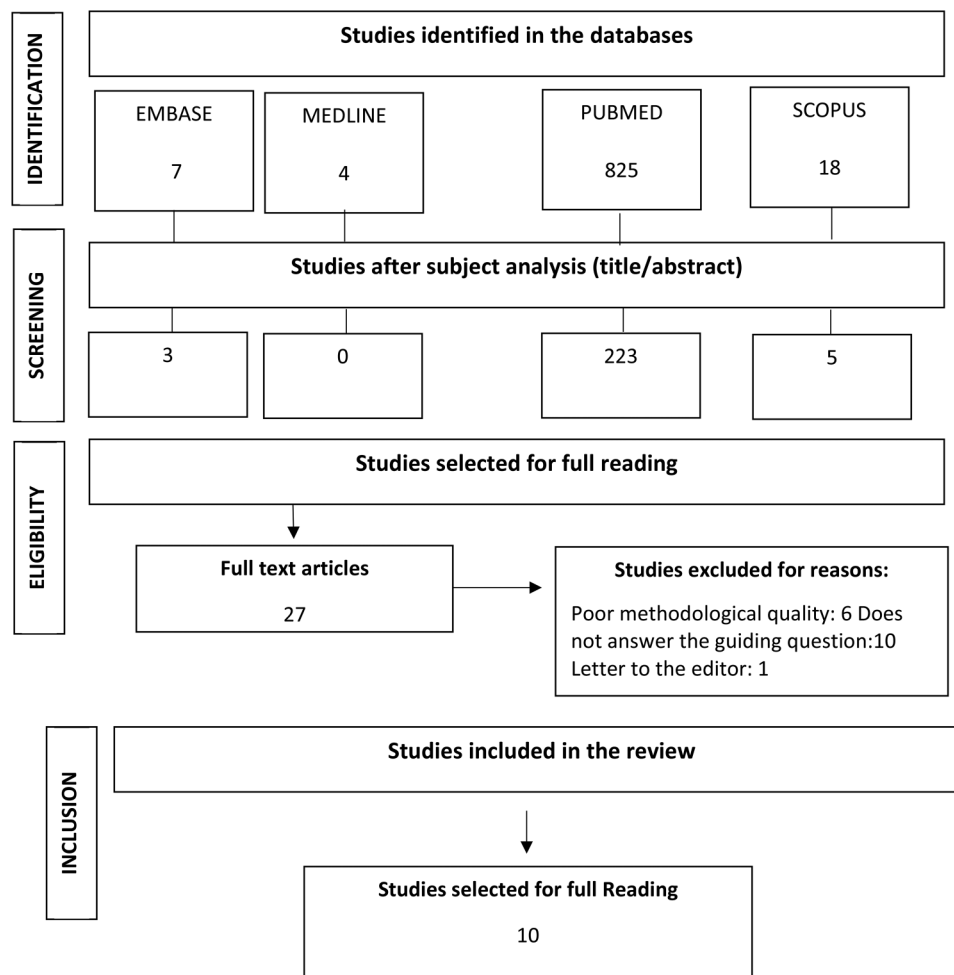


Figure 1. Flowchart of the search and selection process of articles selected for review, based on PRISMA (Crato, Ceará, Brazil, 2022).

Two independent researchers (M.L.P.B. and L.F.R.M) evaluated the methodological quality and risk of bias of the selected studies using the JBI Appraisal Tools (JBI, 2020). To resolve divergent data, the tool elements were used, promoting greater accuracy and minimizing bias. The analysis of the results was carried out descriptively, with a summary of each of the studies included in the present review being presented.

Results

A total of 854 studies were identified, which after analyzing the title and abstract, only 27 articles passed the eligibility, of which 10 works were selected for reading in full.

Presentation of Nursing Care Present in the Articles of This Review

- Nursing assessment and monitoring; complex care in the ICU; administration of artificial nutrition; comprehensive patient-centered care; daily monitoring of electrolytes,

performed by the nurse; nursing has an essential role in care (Ben-Tovim & Theilla, 2021).

- Nursing care for the prevention of ventilator-associated pneumonia (VAP) in ICU patients; patient care in the ICU, with the use of VAP packages in care; centered care with the objective of reducing ventilation days and ICU stay; extensive implementation of comprehensive critical care nursing protocols; infection monitoring; medication administration; prophylaxis of deep vein thrombosis; elevation of the head of the bed; professional hand washing; evaluation of the fan piping; assessment of cuff pressure; monitoring to perform weaning and spontaneous breathing test (Buterakos et al., 2022).
- Pain management assessment; pain assessment in critically ill patients admitted to the ICU; assessment of the level of consciousness and intubation (Deldar et al., 2020).
- Fluid control of critically ill patients; assessment of congestive signs such as the presence of edema and anasarca; evaluation of eliminations; assessment of pulmonary crackles; patient care on mechanical ventilatory support;

Table 1. Characterization of the Scoping Review Studies (Crato, Ceara, Brazil. 2022).

Reference	Journal	Type of study/sample	Objective	Risk of Bias*
Ben-Tovim and Theilla (2021)	<i>Intensive and Critical Care Nursing</i>	Descriptive, exploratory study, with intentional sampling of ($n = 45$).	To assess the perceived and real role of intensive care nurses in nutritional care and their knowledge of the identification and management of hypophosphatemia and refeeding syndrome.	100%
Buterakos et al. (2022)	<i>American Journal of Infection Control</i>	Retrospective study of medical records from 2017 to 2020.	Assess whether sample collection impacted diagnosis and whether implementing a VAP package would decrease rates at our center.	100%
Deldar et al. (2020)	<i>BMC Medical Education</i>	Quasi-experimental study with ($n = 70$) nurses.	To evaluate the effect of these two methods on the diagnosis and management of pain in mechanically ventilated patients.	100%
da Silva et al. (2020)	<i>The Latin American Journal of Nursing</i>	Cohort study with ($n = 93$) patients.	Clinically validate the nursing diagnosis Dysfunctional Response to Ventilatory Weaning in adult patients hospitalized in ICUs.	100%
Biyabanaki et al. (2020)	<i>Indian Journal of Critical Care: Official publication of the Indian Society of Intensive Care Medicine</i>	Cross-sectional study	To know the perception and practices of nurses in ICUs to assess delirium and its barriers.	100%
Olsen et al. (2020)	<i>Acta Neurochirurgica</i>	Consecutive sample of patients admitted to the neuro-ICU	Compare latest measurements, that is, FOUR score and automated pupillometry, with standard monitoring with the GCS and visual inspection of pupils	100%
Souza et al. (2017)	<i>Revista Gaúcha de Enfermagem</i>	Experience report	To narrate the experience of training nurses in the implementation of a systematic instrument for screening delirium using the Confusion Assessment Method for ICU.	100%
Wuni et al. (2020)	<i>Pain Research and Management</i>	Descriptive, cross-sectional study based on institutions with ($n = 180$) nurses.	To assess nurses' knowledge and practices and identify barriers to pediatric pain management at the Tamale University Hospital, Ghana.	100%
Li et al. (2017)	<i>Medicine</i>	Longitudinal study	Assess whether implementation of the FMEA will significantly reduce the incidence of CRBSIs in the ICU.	100%
Delaney et al. (2018)	<i>BMJ Open</i>	Prospective observational study, composed of ($n = 80$) adults.	To assess the feasibility and accuracy of a number of sleep assessment techniques that have the potential to allow for widespread implementation of sleep monitoring in the ICU.	100%

Note. ICU = intensive care unit; GCS = Glasgow Coma Scale; CRBSI = catheter-related bloodstream infection; FMEA = failure mode and effect analysis.

*Risk of bias calculated by JBI Appraisal Tools.

monitoring of ventilatory parameters; adequate positioning for gas exchange optimization; performance of specific oral hygiene in patients with orotracheal tube and tracheostomy; continuous assessment of the level of sedation and consciousness; monitoring for weaning from ventilation and removal of the artificial airway (da Silva et al., 2020).

- Early assessment and care of patients with delirium in the ICU; assessment of the level of sedation; ICU nurses have the role of early diagnosis and care (Biyabanaki et al., 2020).

- Frequent monitoring to identify clinical signs in critically ill patients; frequent assessment of pupillary function is valuable for clinically monitoring ICP; perform visual inspection; perform assessment for sedation, evolving brainstem injury, intracranial hypertension, or levels of consciousness; use the GCS (Olsen et al., 2020).

- Delirium assessment; quality-centered care through early identification of dysfunction and its causes; pain control; prevention and early identification of dysfunction; critical assessment in intubated patients (Souza et al., 2017).

Table 2. Presentation of the North American Nursing Diagnosis Association International (NANDA-I) Nursing Diagnosis Present in the Articles of this Review (Crato, Ceara, Brazil).

Nursing diagnoses NANDA-I	References
Risk for electrolyte imbalance	(Ben-Tovim & Theilla, 2021; da Silva et al., 2020)
Ineffective breathing pattern	(Buterakos et al., 2022; da Silva et al., 2020; Souza et al., 2017)
Impaired spontaneous ventilation	(Buterakos et al., 2022; da Silva et al., 2020)
Risk for ineffective cerebral tissue perfusion	(Buterakos et al., 2022; da Silva et al., 2020; Olsen et al., 2020)
Risk for infection	(Asim et al., 2021; Buterakos et al., 2022; Delaney et al., 2018)
Acute pain	(da Silva et al., 2020; Deldar et al., 2020; Souza et al., 2017; Wuni et al., 2020)
Chronic pain	(da Silva et al., 2020; Deldar et al., 2020; Souza et al., 2017; Wuni et al., 2020)
Risk for acute confusion	(Biyabanaki et al., 2020; da Silva et al., 2020; Deldar et al., 2020)
Ineffective airway clearance	(da Silva et al., 2020)
Anxiety	(da Silva et al., 2020; Souza et al., 2017)
Disturbed sleep pattern	(da Silva et al., 2020; Delaney et al., 2018; Souza et al., 2017)
Fear	(Delaney et al., 2018; Souza et al., 2017)
Impaired gas exchange	(da Silva et al., 2020)
Dysfunctional ventilatory weaning response	(da Silva et al., 2020)
Acute confusion	(Biyabanaki et al., 2020; Li et al., 2017)
Risk for acute confusion	(Biyabanaki et al., 2020; Li et al., 2017)
Acute substance withdrawal syndrome	(Olsen et al., 2020)
Decreased cardiac output	(Olsen et al., 2020)

- Pain management; assessment of pain management in invasive procedures (Wuni et al., 2020).
- Peripherally inserted central catheter care; assistance in long-term total parenteral nutrition; monitoring and care of catheters (Li et al., 2017).
- Intensive care and sleep monitoring; monitor ICU patients and their sleep disorders; care focused on the incidence of delirium (Delaney et al., 2018).

Discussion

The present study points out important attributions of nurses regarding nursing care for neurocritical patients. Furthermore, it was possible to analyze the data on ND and care in the literature. However, it was observed that there are few studies addressing this issue, in which the importance of such research is highlighted. To facilitate understanding, these data were organized into the following topics: main ND (NANDA I 2021–2023, 2022) and nursing care.

Nursing Diagnosis

Nursing diagnoses in neurocritical patients are systematized and complex, and must be drawn from the evidence, especially following the taxonomy of the NANDA-I (NANDA I 2021–2023, 2022).

In the study by Soares et al. (2019), nursing diagnoses were considered in 184 medical records of neurocritical patients. Within this context, 19 nursing diagnoses were identified, and the risk of electrolyte imbalance, decreased intracranial adaptive capacity, risk of ineffective cerebral

tissue perfusion, acute confusion, risk of infection, and acute pain were the most observed diagnoses. In this context, Souza et al. (2017) confirm in their study the nursing diagnoses highlighted earlier in the research by Soares et al. (2019).

In a cross-sectional study with 219 patients with clinical priorities in urgency and emergency (Franco et al., 2018) identified some nursing diagnoses, with a higher prevalence of ineffective breathing patterns being present in 28.3% and acute pain in 22.3%. In addition to these, chronic pain, impaired spontaneous ventilation, impaired gas exchange, ineffective airway clearance, and decreased cardiac output have also been established. These are nursing diagnoses present in neurocritical patients, since they are inserted in emergencies.

In addition, based on the analysis of medical records, the prevalence of the following nursing diagnoses, acute confusion in 28% and the risk of acute confusion in 100%, as evidenced in the study by Soares et al. (2019). From this perspective, it is suggested that the change in cognitive function is associated with the patient's infectious condition, in which the incidence was observed. Thus, the importance of nurses in nursing systematization is noted.

The results of da Silva et al. (2020), corroborate the most recent findings identified in this research, such as the risk of decreased cardiac output, anxiety related to the threat of death, stress factors, and fear associated with separation from the support system. Sleep pattern disturbances and sleep deprivation are nursing diagnoses present in critically ill patients, which are associated with risks of both physical and psychological complications, requiring comprehensive care and interventions (Olsen et al., 2020).

Main Nursing Care

Nursing care in the ICU for neurocritical patients allows nurses to provide patient-centered care, being evaluated as a complex care that requires comprehensive monitoring, and has an essential role in the identification of clinical signs and early diagnoses (Biyabanaki et al., 2020). In this context, Barcelos et al. (2016) confirm that nursing is fundamental in the care of neurocritical patients and in the process of treatment and prevention of complications, with the maintenance of surveillance of signs and symptoms, such as assessment of respiratory and heart rate, blood pressure and oxygen saturation.

Among the care performed by nursing, prevention of VAP in neurocritical patients, assistance in mechanical ventilation (MV), and the process of weaning from ventilation were found. Regina et al. (2020) highlight that neurological patients undergoing prolonged MV had a higher risk of pathologies such as VAP, ventilation-induced diaphragmatic dysfunction, ventilation-induced lung injury, polyneuropathy, tracheostomies, and risk of increased mortality.

The assessment of the level of sedation and consciousness is a strategy addressed by (Souza et al., 2017), through the application of the Richmond Agitation and Sedation Scale, in which, according to the study, after the assessment with the appropriate tool, 55.9% of the patients evolved with neurological sequelae. In this context, the application of the scale and the correlation with the severity of the patient's clinical condition is notorious, contributing to the reduction of injuries and ICU stay. This study also highlights the importance of using the GCS, promoting scientifically based assistance, as the application of scales aims to assess the severity of the patient, and is associated with a reduction in MV and ICU stay (Ben-Tovim & Theilla, 2021).

The results observed in the study confirm with the findings seen in the research by Souza et al. (2017), in which the evaluation is carried out with the GCS, evaluating the level of consciousness, in which, it is clear that the study allowed an evaluation through the GCS, with an average of four. In this context, the score shows that the profile of these neurocritical patients is likely to be associated with serious physical and neurological consequences during the hospitalization period; and nursing has a key role in this assistance, providing clinical management, hemodynamic control, early detection of signs and symptoms and a care plan (Rodríguez et al., 2016).

Another perspective of nursing performance in the face of neurocritical patients was addressed by Souza et al. (2017), for example in the assessment of the pupil, considering a standard procedure in the care of the neurocritical patient. In this context, it was observed that routine pupillometric assessments are an essential complement for ICP monitoring, reflecting in some cases as an indicator of ICP increase (Santos et al., 2020). Thus, specific nursing interventions to reduce ICP can be noted, such as maintaining the elevation

of the head of the bed at 30°. Based on the data analyzed in the studies, it is possible to suggest that the proper nursing intervention was successful with a frequency of 100% in critically ill patients evaluated in the research by Buterakos et al. (2022).

Furthermore, this study emphasizes the importance of comprehensive monitoring and registration by the nursing professional, as they help in the development of well-founded nursing care, in addition to ensuring the continuity of specific care for the neurocritical patient.

Implications for Practice

This study provides nurses with a necessary aspect for the development of care in critically ill patients, as well as enabling the orientation of individual care. The nursing team needs to be directed to the care of critically ill patients, because the care policies require knowledge of this.

Using this study as a basis for care, nurses will have guidance for the provision of technical care and knowledge of the main nursing diagnoses used in ICUs for neurocritical patients.

Conclusion

This review allowed the identification of nursing care for neurocritical patients, even considering that the scenario in the area is still scarce. Descriptive and cross-sectional studies predominated in the review sample, in which the information analyzed was essential for building an overview of ND and nursing care for neurocritical patients.

The study showed the prevalence of ND and their respective interventions that must be performed by nurses in the ICU, being necessary that nursing professionals recognize and update themselves regarding the nursing process, and perform care in an individualized way, focusing on the needs of each patient. It is worth noting that through this review work, it was observed that the literature addresses the importance of nursing systematization being essential for a satisfactory prognosis.

The data obtained in the review showed that the previously mentioned nursing care can be added to a neurocritical patient's care plan, enabling better results, with a view to the quality of life and health promotion. Finally, it is hoped that this work can be useful for the elaboration of new studies on quality nursing care.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Luis Fernando Reis Macedo  <https://orcid.org/0000-0002-3262-9503>

References

- Asim, M., Wang, B., Hao, B., & Wang, X. (2021). Ketamine for post-traumatic stress disorders and its possible therapeutic mechanism. *Neurochemistry International*, *146*, 105044. <https://doi.org/10.1016/J.NEUINT.2021.105044>
- Barcelos, D. G. d., Santos, C. M. d., Manhães, L. S. P., & Azevedo, A. S. d. (2016). Atuação do enfermeiro em pacientes vítimas do acidente vascular encefálico hemorrágico na unidade de terapia intensiva. *Biológicas & Saúde*, *6*(22), 1–13. <https://doi.org/10.25242/886862220161097>
- Ben-Tovim, H., & Theilla, M. (2021). Role and knowledge of critical care nurses in the assessment and management of hypophosphataemia and refeeding syndrome. A descriptive exploratory study. *Intensive & Critical Care Nursing*, *67*, 103097. <https://doi.org/10.1016/J.ICCN.2021.103097>
- Biyabanaki, F., Arab, M., & Dehghan, M. (2020). Iranian nurses perception and practices for delirium assessment in intensive care units. *Indian Journal of Critical Care Medicine*, *24*(10), 955–959. <https://doi.org/10.5005/JIP-JOURNALS-10071-23502>
- Buterakos, R., Jenkins, P. M., Cranford, J., Haake, R. S., Maxson, M., Moon, J., Rice, B., & Sachwani-Daswani, G. R. (2022). An in-depth look at ventilator-associated pneumonia in trauma patients and efforts to increase bundle compliance, education and documentation in a surgical trauma critical care unit. *American Journal of Infection Control*, *50*(12), 1333–1338. <https://doi.org/10.1016/J.AJIC.2022.01.029>
- da Silva, L. C. R., Tonelli, I. S., Oliveira, R. C. C., Lemos, P. L., de Matos, S. S., & Chianca, T. C. M. (2020). Clinical study of dysfunctional ventilatory weaning response in critically ill patients. *Revista Latino-Americana de Enfermagem*, *28*, 1–13. <https://doi.org/10.1590/1518-8345.3522.3334>
- de Arruda, P. L., de Oliveira Xavier, R., Lira, G. G., de Arruda, R. G., de Melo, R. A., & Fernandes, F. E. C. V. (2019). Evolução clínica e sobrevida de pacientes neurocríticos. *Revista Da Escola de Enfermagem Da USP*, *53*, 1–8. <https://doi.org/10.1590/S1980-220X2018016903505>
- Delaney, L. J., Currie, M. J., Huang, H. C. C., Litton, E., Wibrow, B., Lopez, V., & Haren, F. V. (2018). Investigating the application of motion accelerometers as a sleep monitoring technique and the clinical burden of the intensive care environment on sleep quality: study protocol for a prospective observational study in Australia. *BMJ Open*, *8*(1), e019704. <https://doi.org/10.1136/BMJOPEN-2017-019704>
- Deldar, K., Froutan, R., Sedaghat, A., & Mazlom, S. R. (2020). Continuing nursing education: use of observational pain assessment tool for diagnosis and management of pain in critically ill patients following training through a social networking app versus lectures. *BMC Medical Education*, *20*(1), Article 247. <https://doi.org/10.1186/S12909-020-02159-5>
- Franco, B., Busin, L., Chianca, T. C. M., Moraes, V. M., Pires, A. U. B., Lucena, A., & de, F. (2018). Associações entre discriminadores do Sistema de Triagem de Manchester e diagnósticos de enfermagem. *Revista Gaúcha de Enfermagem*, *39*, e20170131. <https://doi.org/10.1590/1983-1447.2018.2017-0131>
- JBI (2020). *JBI manual for evidence synthesis*. JBI.
- Li, X., He, M., & Wang, H. (2017). Application of failure mode and effect analysis in managing catheter-related blood stream infection in intensive care unit. *Medicine*, *96*(51), e9339. <https://doi.org/10.1097/MD.00000000000009339>
- Lockwood, C., & Tricco, A. C. (2020). Preparing scoping reviews for publication using methodological guides and reporting standards. *Nursing & Health Sciences*, *22*(1), 1–4. <https://doi.org/10.1111/NHS.12673>
- NANDA I 2021–2023 (2022). NANDA I enfermagem e Diagnósticos 2021-2023. Scribd. <https://pt.scribd.com/document/531212468/NANDA-21Enfermagem-e-Diagnosticos-2021-2023>
- Olsen, M. H., Jensen, H. R., Ebdrup, S. R., Topp, N. H., Strange, D. G., Møller, K., & Kondziella, D. (2020). Automated pupillometry and the FOUR score – what is the diagnostic benefit in neurointensive care? *Acta Neurochirurgica*, *162*(7), 1639–1645. <https://doi.org/10.1007/S00701-020-04381-Y>
- Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan—a web and mobile app for systematic reviews. *Systematic Reviews*, *5*(1), 210. <https://doi.org/10.1186/s13643-016-0384-4>
- Peters, M. D. J., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare*, *13*(3), 141–146. <https://doi.org/10.1097/XEB.0000000000000050>
- Regina, K., Da, P., Cacicano, S., de Lima, J., Saavedra, I., Lopes Monteir, E., Volpáti, N. V., Lameira, T., Amaral, M., Sacramento, D. S., & Rezende Do Prado, P. (2020). Intervenções de Enfermagem para pacientes neurocríticos. *Revista de Enfermagem UFPE on Line*, *14*, 243847. <https://doi.org/10.5205/1981-8963.2020.243847>
- Rodriguez, A. H., Bub, M. B. C., Perão, O. F., Zandonadi, G., & Rodriguez, M. d. J. H. (2016). Características epidemiológicas e causas de óbitos em pacientes internados em terapia intensiva. *Revista Brasileira de Enfermagem*, *69*(2), 229–234. <https://doi.org/10.1590/0034-7167.20166902041>
- Santos, D. F., Padula, M. P. C., & Waters, C. (2020). Diagnósticos de enfermagem dos pacientes com acidente vascular cerebral isquêmico: Uma pesquisa bibliográfica. *Brazilian Journal of Health Review*, *3*(1), 644–672. <https://doi.org/10.34119/BJHRV3N1-052>
- Soares, F. M. M., Pequeno, C. L. D., Maia, M. P., Mariano, M. R., Abreu, R. N. D. C. d., Filho, S. P. C. S., Andrade, I. R. C., & Freitas, J. G. (2019). Perfil clínico de pacientes internados em unidades de neurologia. *Revista Enfermagem Atual In Derme*, *87*(25), 1–7. <https://doi.org/10.31011/REaid-2019-V.87-N.ESPECIAL-ART.162>
- Souza, R. C., da, S., Bersaneti, M. D. R., Siqueira, E. M. P., Meira, L., Brumatti, D. L., Prado, N. R., & de, O. (2017). Nurses' training in the use of a delirium screening tool. *Revista Gaúcha de Enfermagem*, *38*(1), e64484. <https://doi.org/10.1590/1983-1447.2017.01.64484>
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., & Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, *169*(7), 467–473. https://doi.org/10.7326/M18-0850/SUPPL_FILE/M18-0850_SUPPLEMENT.PDF
- Unal, A., Arsava, E. M., Caglar, G., & Topcuoglu, M. A. (2021). Alarms in a neurocritical care unit: A prospective

- study. *Journal of Clinical Monitoring and Computing*, 36(4), 995–1001. <https://doi.org/10.1007/S10877-021-00724-X/FIGURES/1>
- Wang, C., Song, Z., Li, S., & Tai, S. (2018). Extended nursing for the recovery of urinary functions and quality of life after robot-assisted laparoscopic radical prostatectomy: A randomized controlled trial. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, 26(5), 1553–1560. <https://doi.org/10.1007/S00520-017-3988-X>
- Wuni, A., Salia, S. M., Ibrahim, M. M., Idriss, I., Nyarko, B. A., Seini, S. N., Tonsagri, I., & Mohammed, J. (2020). Evaluating knowledge, practices, and barriers of paediatric pain management among nurses in a tertiary health facility in the northern region of Ghana: A descriptive cross-sectional study. *Pain Research & Management*, 2020, 1–11. <https://doi.org/10.1155/2020/8846599>