



Pharmacological and non-pharmacological therapies in the management of pain in critically ill patients. Systematic review
Terapias farmacológicas y no farmacológicas en el manejo del dolor en pacientes críticos. Revisión sistemática

Lisbeth Nayeli Arciniega-Garrido
nachasnaye27@gmail.com

Universidad Iberoamericana del Ecuador, Quito. Pichincha, Ecuador
<https://orcid.org/0009-0008-8439-0267>

Mónica Gabriela Moreira-Meza
icabymez@gmail.com

Universidad Iberoamericana del Ecuador, Quito. Pichincha, Ecuador
<https://orcid.org/0009-0002-2138-1204>

Kleber Alexander Rodríguez-Merchán
alexander999@live.com

Universidad Iberoamericana del Ecuador, Quito. Pichincha, Ecuador
<https://orcid.org/0009-0003-7435-897X>

ABSTRACT

Objective: To analyse pharmacological and non-pharmacological therapies in pain management in critically ill patients. **Method:** Documentary, qualitative and systematic review research, with a sample of 40 articles. **Results and conclusions:** Due to their analgesic potency, opioids remain the first-line analgesic. Morphine and fentanyl are the main opioids used in pain management. Adjuvants also stand out as a fundamental component of the analgesic approach to minimize opioid doses. Non-pharmacological treatment, on the other hand, seeks to reduce pain, improve cognitive function, reduce stress, etc. The main non-pharmacological therapies include music therapy, massage, family presence, and cryotherapy. Finally, the most commonly used scales in the ICU include the EVA, ESCID, BPS, and CPOT, as they offer multiple classification categories.

Descriptors: intensive care; pain; pharmacological therapy; non-pharmacological therapy; pain scales (DeCS).

RESUMEN

Objetivo: Analizar las terapias farmacológicas y no farmacológicas en el manejo del dolor en pacientes críticos. **Método:** Investigación de tipo documental, cualitativa y de revisión sistemática, con una muestra de 21 artículos. **Resultados y conclusiones:** Por su potencia analgésica, los opioides siguen siendo el analgésico de primera línea. La morfina y el fentanilo son los principales opioides utilizados en el manejo del dolor. Asimismo, los coadyuvantes, destacan como un componente fundamental del abordaje de analgesia para minimizar la dosis de opioides. Por otra parte, el tratamiento no farmacológico, busca la reducción del dolor, mejorando la función cognitiva, reduciendo el estrés, etc. Entre las principales terapias no farmacológicas se encuentran: musicoterapia, masajes, presencia de familiares y crioterapia. Por último, entre las escalas más utilizadas en la UCI, se encuentran la EVA, ESCID, BPS y CPOT, pues cuentan con más categorías de clasificación.

Descriptores: cuidados intensivos; dolor; terapia farmacológica; terapia no farmacológica; escalas de dolor. (DeCS).

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Original short



INTRODUCTION

Pain is a sensory and emotional experience described by the individual as unpleasant and associated with actual or potential damage to the organism (1). It can be noted that in intensive care units (ICU), it is common for patients to experience pain, whether acute or chronic, depending on their illness, as well as altering physiological parameters, being irritable and apathetic towards healthcare staff, which leads to a slower recovery process. Pain is a worrying symptom in the ICU due to the fact that most users present invasive approaches, injuries, complications of the underlying pathology and the stay in the unit itself (2).

Likewise, patients admitted to the ICU are under life support measures such as mechanical ventilation and certain medications that make effective verbal communication with staff impossible. Pain is considered the fifth vital sign; however, its assessment, already complicated by its subjectivity, is more difficult in these units (3). Studies indicate that a significant proportion of ICU patients experience moderate to severe pain. The incidence varies, but it is estimated that between 40% and 70% of critically ill patients report pain. Untreated pain is associated with increased hospital stay, increased risk of complications and impaired post-ICU quality of life (4).

In the ICU, the prevalence of pain is around 40-77% according to a study carried out in 45 units in the United Kingdom. The American College of Critical Care Medicine (ACCM) indicates that the incidence of pain in critically ill patients, whether medically or surgically intervened, is 50%, generating physical and psychological alterations, and consequently, patient dissatisfaction with care (15%) (5). The World Health Organisation (WHO) has shown that pain is a major problem, affecting 12-23% of the population in Spain. The prevalence and intensity of pain is higher in females than in males (4).



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Similarly, around 190 million people suffer from chronic pain in Latin America, representing 30% of the population; 63% of critically ill patients experience moderate to severe pain during their hospital stay in the ICU. Nursing care categorised as painful stands out as the main cause (2). In Ecuador, the results of the "Burden of Disease Study of Chronic Pain in Ecuador" were presented and revealed that more than 3.6 million patients, equivalent to 21 % of Ecuador's population, had chronic pain. Almost 11% of chronic pain patients are people aged between 55 and 59 years (6) however, there are no concrete statistical data on the prevalence of pain within ICUs in the country.

Pain management in the ICU is complex to assess given its unique characteristics. Therefore, this research arises from the question, what are the pharmacological and non-pharmacological therapies in pain management in critically ill patients? In systematic studies worldwide, opioids are the mainstay of pain management in critically ill patients (7). Therefore, a comprehensive pain assessment is recommended, based on validated pain assessment scales, such as the BPS (*Behavioral Pain Scale*) and the CPOT (*Critical Care Pain Observation Tool*), which should be simple, understandable and individualised in order to adjust treatment to the patient's needs (4).

Although drugs are essential, non-pharmacological therapies play a crucial role. These include mainly music therapy, massage therapy and companionship. These techniques promote relaxation, help to decrease anxiety and reduce pain perception, reduce stress, improve mood and physiological parameters (8). Therefore, pain reduction is considered a quality standard in the care of critically ill patients (3). Consequently, the aim of this research is to analyse pharmacological and non-pharmacological therapies in the management of pain in critically ill patients from a systematic review.



METHOD

This is a qualitative, qualitative, systematic review research study. Twenty-three scientific articles were analysed following the guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol.

The search was conducted in recognised scientific databases, such as PubMed, SciELO, Dialnet, Science Direct. Filters were applied to limit the results to studies published in English, Spanish and Portuguese between January 2020 and April 2025, with open access and thematic correlation; repositories were excluded. The following health descriptors were used to establish search strategies: "intensive care", "pain", "pharmacological therapy", "non-pharmacological therapy", "pain scales".

RESULTS

According to Zakeri, et al., (9) pain is classified as a frequent and complex symptom in hospitalisation in both critical and non-critical areas, covering a variety of conditions, therefore, all manifestations of pain should be considered real and existing due to the complications of its clinical picture. Within the intensive care setting a large percentage of patients experience pain, however, not all can express it verbally as they are sedated or with neurological injuries, otherwise, they present alterations in their physiological constants and delay in their recovery (10). As a consequence, several authors describe pain as the fifth vital constant and point out that it should always be recorded and evaluated.

Adequate pain assessment should be accompanied by a timely, multimodal and evidence-based treatment strategy (2). The selection of pain management strategy in ICU patients should encompass pharmacological and non-pharmacological approaches. In addition, standardised techniques, including the use of accepted



methods, are needed to perform a comprehensive assessment given the complex nature of pain in these patients (9).

Pharmacological treatment

Analgesia is based on reducing or eliminating the painful experience. Therefore, the World Health Organisation (WHO) proposes pain management starting from weaker drugs such as paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) to more potent drugs such as opioids, and is represented in its well-known "WHO analgesic ladder" (Figure 1). (Figure 1). Non-opioid analgesics are used to treat mild pain, and are beneficial in reducing the use of opioids. Paracetamol, NSAIDs and dipyrone are mainly mentioned (4). On the other hand, opioids are the analgesic drug of choice in critically ill patients with non-neuropathic pain and are very useful because of their speed of action and potency, although their major drawback is their numerous adverse effects (11).

Opioids are a cornerstone of pain management and sedoanalgesia in the mechanically ventilated patient (MVAP). The best evaluated and most recommended in clinical practice guidelines for critically ill patients are fentanyl and morphine. In critically ill patients, opioid withdrawal syndrome is a common and clinically significant condition, i.e. they are less susceptible to its effects requiring higher doses to achieve the expected analgesia, making future weaning difficult as mentioned by Delgado, et al (2). Thus, to guarantee an adequate effect, the association of opioids with adjuvant drugs is useful.



Figure 1. WHO analgesic ladder.

Source: (4).

Therefore, non-opioid analgesics can improve the overall efficacy of analgesia and/or reduce opioid requirements, i.e. the combination of opioids with adjuvants can reduce pain in critically ill patients. Pota, et al. (11), mention that the main adjuvant treatments are: dexmethomidine, NSAIDs (including diclofenac, indomethacin and ketoprofen), ketamine, nefopam, gabapentin, carbamazepine, clonidine, magnesium sulphate, pregabalin.

Non-pharmacological treatment

Non-pharmacological methods do not replace pharmacological treatments, but are complementary to treatment. These strategies are especially worthwhile for the management of mild to moderate pain (12,13). Delgado et al. (2) mention that non-pharmacological therapy has a clear effect on vital signs such as heart rate, respiratory rate, oxygen saturation, and reduces motor activity and arousal state

especialmente después de la aplicación de métodos invasivos. Potenciales ventajas de la terapia no farmacológica incluyen una analgesia más efectiva, dosis más bajas de opioides y un menor riesgo de efectos secundarios relacionados con su uso, divididos en técnicas invasivas y no invasivas como se muestra en la tabla 1.

Table 1. Adapted from "*Pain management in critically ill patients*".

Invasive techniques	Non-invasive techniques
Acupuncture	Behaviour modification
Ablative procedures	Aromatherapy
Nerve blocks	Cryotherapy
CNS stimulation	Psychotherapy
	Music Therapy
	Massage therapy

Source: (4)

Non-pharmacological interventions and treatments generally have effects on both physiological and psychological dimensions. However, each type of intervention usually has a primary goal (14). The most common non-pharmacological methods for pain management include: massage therapy, cold therapy, music therapy and relaxation techniques. These methods aim to address the physical-sensory component of pain (massage therapy and pain therapy) and the emotional and cognitive component (music therapy and relaxation techniques). Some methods have demonstrated a reduction in pain scores on both visual/verbal numerical scales and behavioural scales. In addition, family involvement should be considered (15, 16).

On the other hand, Nordness et al. (17) note that relaxation techniques and massage reduce the impact of pain by providing comfort, relaxation and improving the quality



of sleep and rest. According to a high-quality systematic review, music therapy was found to be the most effective technique for mechanically ventilated patients, reducing their need for sedation and analgesics (18). Similarly, Wang et al (19) state that the efficacy of massage therapy has been well documented through multiple systematic reviews and meta-analyses; however, although this therapy has been beneficial for pain intensity, it does not appear to improve physical function in people with chronic pain.

Pain measurement scales

Identifying pain in patients in the Intensive Care Unit is the crucial start of their therapy. However, clinical conditions may prevent verbal communication (sedation, delirium, tracheal intubation, neuromuscular obstruction and weakness). The application of scales has shown clinically relevant advances in outcomes, including survival, use of mechanical ventilation, coma and delirium, ICU reintegration, among others. Guerrero et al. (20) consider that self-assessment of pain is a standard and, whenever feasible, attempts should be made to measure patient self-reported pain using validated scales, at least every nursing shift (preferably every 4 h), when the patient experiences pain before, during and after each procedure that may be painful.

Thus, verified scales are applied based on the quantification of pain expressed by the patient whenever feasible, notably the Visual Analogue Scale (VAS) and the Verbal Numerical Scale (VNS) and other methods of identifying behavioural pain in situations where communication is not possible (Campbell Scale or Pain Indicator Behaviour Scale (PBS). The Behaviours Associated with Pain Scale (BPS) and the Critical Care Observation Tool (CPOT) may also be useful for measuring pain in non-communicating patients, linking temporary increases of 5-20% in their value to the existence of pain (21).

So, the Visual Analogue Scale (Figure 2) is a tool in which the patient is asked to point his or her finger at the intensity of pain he or she feels, going from the extreme of "no pain" to the extreme of "the worst pain imaginable".

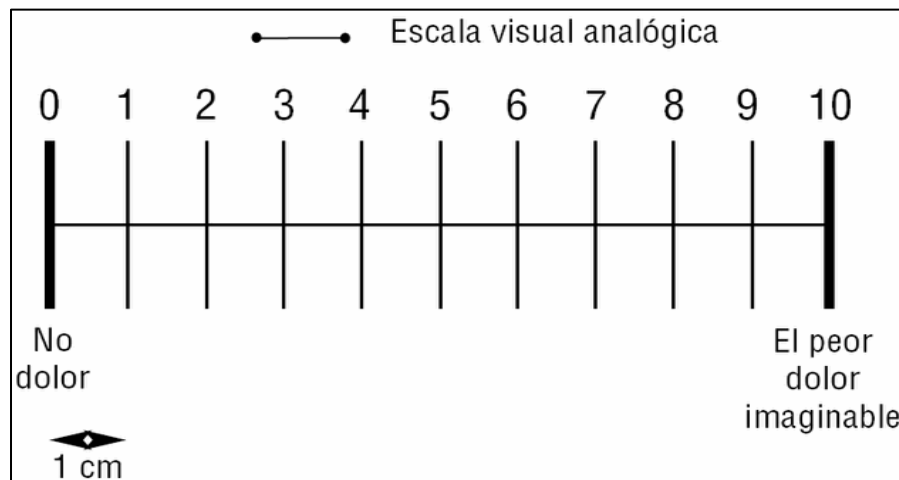


Figure 2. *Visual Analogue Scale.*

Source: (4).

In order to use this scale, the patient needs to have good motor and visual coordination, so it has limitations in elderly and sedated patients (4). On the other hand, the Pain Indicator Behaviours Scale (PICS) comprises 5 behavioural indicators; López et al. (22) mention that it was mainly tested in critically ill medical and postoperative patients, who could not self-report and were under mechanical ventilation (table 3).



Table 3. *Adapted from "Validation of the Pain Indicator Behaviours Scale to assess pain in critically ill, non-communicative and mechanically ventilated patients: results of the ESCID project".*

	0	1	2	Partial Score
Facial musculature	Relaxed	Tension, frown/painful gesture	Habitual frowning/ clenched teeth	
"Peace of mind"	Calm, relaxed, normal movements	Occasional fidgeting and/or posturing	Frequent movements, including head or limbs	
Muscle tone	Normal	Increased. Flexion of fingers and/or toes	Rigid	
Adaptation to mechanical ventilation (MV)	Tolerating mechanical ventilation	Coughing, but tolerates MV	Struggling with the respirator	
Comfort	Comfortable, quiet	Soothes to touch and/or voice. Easy to distract	Difficult to comfort by touch or by talking to him/her	
				Total score 10
0: no pain	1-3: mild-moderate pain	4-6: moderate-severe pain	> 6: very severe pain	
	Consider other possible causes			

Source: (22).

Likewise, the BPS, developed for incommunicable patients in critical settings, is distinguished by its reliability and validity, which is supported by three essential factors: facial expression, upper limb movement and adaptation to mechanical ventilation. The scale measures the items presented in Table 4 and 5. Finally, one study demonstrates that with the adoption of CPOT there was an increase in pain relief interventions for mechanically ventilated patients, which contributed to effective pain management and also to reduced levels of sedation. The applicability of the



CPOT scale in pain monitoring in primary sclerosing cholangitis with brain lesions and their compromised verbal communication is highlighted (4,23).

Table 4. Adapted from "*Pain management in the critically ill patient*".

Indicator	Description	Score
Facial Expression	Relaxed	1
	Partially tense	2
	Totally tense	3
	Grimacing	4
Movement of the lower limbs	Relaxed	1
	Partially flexed	2
	Fully flexed	3
	Fully contracted	4
Mechanical Ventilation	Tolerating movements	1
	Coughing, but tolerating for most of the time.	2
	Fighting the fan	3
	Unable to control the fan	4
	Final Score	

Source: (4).



Table 5. Adapted from *"Pain management in the critically ill patient"*.

Indicator	Description	Score
Facial expression	Relaxed. No muscle tension	0
	Tense. Presence of frown, low eyebrows, contracted eye orbits.	1
	All of the above facial movements plus tightly closed and grimacing eyelids	2
Body movement	No movement	0
	Slow, cautious movements, no touching or rubbing of the painful area, protection, sharp attention through the movements	1
	Pulls on the tube, moves or bangs limbs, tries to sit up, does not follow commands, restlessness	2
Muscle tension (passive flexion and extension of limbs)	Relaxed, no resistance to passive movements	0
	Tight, rigid, with resistance to passive movements	1
	strong resistance to passive movements, inability to perform them completely, very tense	2
Ventilator adaptation (intubated patients)	Well adapted to the fan, no alarms are triggered, easy ventilation	0
	Spontaneous arrest alarms, coughs, but tolerates breathing	1
	Asynchrony, fan stops, alarms are triggered frequently, struggles with the fan	2
Vocalisation (extubated patients)	Speak in normal pitch or do not articulate sound	0
	Sigh, moan	1
	Shouting, sobbing	2
Final score		

Source: (4).



CONCLUSION

Among pharmacological and non-pharmacological therapy, the use of drugs (most commonly used are fentanyl and morphine) is still pointed out as the most effective treatment for pain relief in critically ill patients, although non-pharmacological techniques (music therapy, accompanying massage therapy) can complement it as they encompass an emotional approach especially in conscious patients. Therefore, preventive analgesia and non-pharmacological analgesic interventions are recommended before invasive and potentially painful procedures in critically ill patients. On the other hand, being subjective in nature, pain becomes a measurable element, so that, among the pain measurement scales applied in the ICU, the BPS and CPOT are indicated as the most effective in patients with deep sedation and under mechanical ventilation, and the VAS is the most widely applied and effective in awake and cooperative patients.

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CONFLICT OF INTEREST

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