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REVIEW ARTICLE

Nursing interventions for acute pain management in the post-anesthesia care unit: scoping review

Intervenções de enfermagem para o manejo da dor aguda na sala de recuperação pós-anestésica: revisão de escopo

Giulia Moreira Dias[1], Elizabete Cristina de Lira Santiago[2], Mani Indiana Funez[2]

[1.] Universidade de Brasília, Faculdade de Ciências e Tecnologias em Saúde, Brasília, DF, Brasil.
[2.] Universidade de Brasília, Programa de Pós-graduação em Ciências e Tecnologias em Saúde, Brasília, DF, Brasil.

Correspondence to:
Mani Indiana Funez
mani@unb.br

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ABSTRACT

BACKGROUND AND OBJECTIVES: Pain management by the nursing team in the Post-Anesthesia Care Unit (PACU) demands resoluteness in order to complete patient recovery. The aim of this study was to map nursing interventions for acute pain management in the PACU.

CONTENTS: This is a scoping review, according to the Joan Briggs Institute methodology, registered in the Open Science Framework (10.17605/OSF.IO/56TS7). The search was conducted via Pubmed, ***Biblioteca Virtual em Saúde*** (BVS - Virtual Health Library), Science Direct, Cochrane, CINAHL and the gray literature and updated on March 26, 2025, in addition to the exploratory search. Fourteen articles that met the eligibility criteria were included in the sample. The nursing interventions found were a) pharmacological - supervision of opioid infusion through patient-controlled analgesia or patient-controlled epidural analgesia; opioids through nurse-controlled analgesia; intravenous, oral or intramuscular opioid; oral analgesic; intravenous non-steroidal anti-inflammatory drug; and b) non-pharmacological - specially aromatherapy and music therapy, but also reiki, foot reflexology, therapeutic touch, guided imagination and comfort measures. In addition, the use of standardized pain assessment scales such as the Visual Analogue Scale, numerical pain scales and the verbal rating scale was discussed. The main limitation identified was the lack of recent studies.

CONCLUSION: Pharmacological and non-pharmacological interventions were mapped, used in combination, associated with the recommendation for a systematized pain assessment, thus demonstrating the autonomy and importance of nursing action in the treatment of acute pain in the PACU.

KEYWORDS: Acute pain, Analgesia, Nursing care, Post-anesthesia nursing.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O manejo da dor pela equipe de enfermagem na Sala de Recuperação Pós-Anestésica (SRPA) demanda resolutividade, visando concluir a recuperação dos pacientes. O objetivo do presente estudo foi mapear as intervenções de enfermagem para o manejo da dor aguda na SRPA.

CONTEÚDO: Trata-se de revisão de escopo, conforme a metodologia do *Joana Briggs Institute*, registrada no *Open Science Framework* (10.17605/OSF.IO/56TS7). A busca foi conduzida via Pubmed, Biblioteca Virtual em Saúde, ***Science Direct, Cochrane,*** CINAHL e literatura cinzenta e atualizada em 26 de março de 2025, além da busca exploratória. Foram incluídos na amostra 14 artigos que cumpriram os critérios de elegibilidade. As intervenções de enfermagem encontradas foram: a) farmacológicas - supervisão da infusão de opioides por meio da analgesia controlada pelo paciente ou analgesia peridural controlada pelo paciente; opioides por meio da analgesia controlada pela enfermagem; opioide por via venosa, oral ou intramuscular; analgésico por via oral; anti-inflamatório não esteroide por via venosa; e b) não farmacológicas - destacando-se aromaterapia, musicoterapia e Reik, reflexologia podal, toque terapêutico, imaginação guiada e medidas de conforto. Além disso, foi discutido o uso de escalas padronizadas para avaliação da dor como: escala visual analógica, escalas numéricas de dor e escala de classificação verbal. Identificou-se como principal limitação a ausência de estudos recentes.

CONCLUSÃO: Foram mapeadas intervenções farmacológicas e não farmacológicas, utilizadas em combinação, associadas à recomendação de avaliação sistematizada da dor, evidenciando a autonomia e importância da atuação da enfermagem no tratamento da dor aguda na SRPA.

DESCRITORES: Analgesia, Cuidados de enfermagem, Dor aguda, Enfermagem em pós-anestésico.

HIGHLIGHTS

- The study recommends systematically assess pain using standardized instruments
- As a pharmacological measure for pain control, the study highlights the supervision of opioid use through patient-controlled analgesia and nurse-controlled analgesia
- Aromatherapy stands out among the non-pharmacological measures

INTRODUCTION

Recovery from anesthetics takes place in the immediate postoperative period in the Post-Anesthesia Care Unit (PACU), which aims to provide conditions for the recovery of consciousness and stability of vital signs in patients who underwent anesthetic-surgical procedures[1,2]. In this way, the PACU is the first place the patient will come into contact with after the surgical intervention and their transfer from the operating room, where their complaints, discomforts and complications must be solved so that they can be sent to their destination unit to complete their recovery[2,3].

Pain is one of the main complications found in the PACU[3-6] and is caused primarily by the stimulus caused by the surgical injury. Uncontrolled pain can lead to cardiovascular alterations and atelectasis[7], impacting both on parameters for discharge from the PACU, such as the Aldrete and Kroulik Index[8,9], and on post-operative outcomes, such as pneumonia. It also contributes significantly to delays in the flow of care, patient dissatisfaction and prolonged hospitalization[10-12].

Despite advances, the management of acute pain in the immediate postoperative period has been shown to be one of the main areas of care omitted in the PACU[10], and remains a demand for improvement. In this sense, the need for more studies to improve it has been pointed out[13]. Nursing care for patients with pain in the PACU includes assessment, pharmacological and/or non-pharmacological interventions and monitoring of pain in order to control it. The team's actions must be resolutive in order to avoid a negative impact on the patient's clinical condition[9]. Thus, studies on the subject can contribute to increasing and updating scientific evidence that can support care protocols for pain management in the PACU.

The present study's objective was to carry out a scoping review to map nursing interventions related to acute pain management in the PACU.

CONTENTS

This scoping review was developed according to the PRISMA extension for scoping reviews of the Joana Briggs Institute (The Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for JBI Scoping Reviews)[14]. The PCC mnemonic guided the search strategy, in which "P" was assigned to the population (adults in the immediate postoperative period); "C" to the concept (nursing interventions for pain management); and "C" to the context (post-anesthetic recovery room). Based on the PCC, the research question "What is the evidence or recommendations for nursing interventions in the treatment of acute pain in the post-anesthetic recovery room?" was formulated. The study is registered on the Open Science Framework platform (DOI 10.17605/OSF.IO/56TS7).

This research included studies with adults, which dealt with nursing interventions in the PACU to treat acute pain. All studies that did not answer the question, studies conducted with people over the age of 65, and studies that were not available to read in full were excluded.

All searches were carried out on September 9, 2024 in the following databases: Medical Literature Analysis and Retrieval System Online (Medline - via Pubmed), *Biblioteca Virtual em Saúde* (BVS - Virtual Health Library), Science Direct and Cochrane. The searches were updated on March 26, 2025 and, in addition to the databases previously searched, the Cumulative Index to Nursing and Allied Health Literature (CINAHL) was included, also extending to an exploratory search in the references of the selected articles. The gray literature was retrieved via Google Scholar, also on sites searching for material linked to scientific associations, government agencies and institutions providing health services. Books and manuals in the field of perioperative nursing were also considered.

Based on the research question, the following descriptors were chosen according to Decs/Mesh: "adult", "nursing", "pain" and "perioperative period" (Table 1), and were searched in titles, abstracts and keywords. A combination of the descriptors resulted in the search strategies shown in Table 2, according to the characteristics of the databases used. No publication date limitations were applied and documents in Portuguese and English were considered.

After retrieving the documents from the databases, the titles and abstracts of the references were downloaded and then uploaded to the Endnote reference manager in order to remove duplicates. The file from EndNote was transferred to Rayyan. The first stage of selecting sources of evidence took place by reading the titles and abstracts and applying the eligibility criteria by two reviewers independently and blindly. After breaking the blind, a third reviewer (M.I.F.) acted on the conflicting decisions, thus listing the articles eligible for full reading. In the second stage of selection, the documents were searched in their entirety and those available were analyzed taking into account the eligibility criteria. Data extraction used an instrument developed by the researchers according to the research objective and question, and the Microsoft Teams and Excel tools. The data extracted included: identification, objective, methodological aspects, results and final considerations. The analysis and synthesis of evidence was done through the search for evidence to answer the research question in a descriptive way and in tables.

RESULTS

The database search resulted in 1823 articles, of which 203 were duplicates. After reading the titles and abstracts and applying the eligibility criteria, 91 documents were eligible to be read in full text, in addition to the 25 articles resulting from the exploratory search. Of these, 14 studies were selected to be included in the sample. Figure 1 shows the search and selection flow diagram.

Table 3 summarizes the studies included in the sample of the present review. The articles were published between 1997 and 2025. Of the 14 articles, six (43%) were carried out in the United States[12,17-20,23], and the others in Brazil[6,27] (two, 14%), Canada[16] (one study, 7%), France[21] (one study, 7%), Sweden[22] (one study, 7%), Singapore[25] (one study, 7%), Thailand[24] (one study, 7%) and Turkey[26] (one study, 7%). These were: prospective (n=3), case study (n=1), observational study (n=1), clinical trial (n=1), experimental pilot (n=1), experimental study (n=2), quasi-experimental (n=1), narrative review (n=1), systematic review (n=1), qualitative (n=2), as described by the authors.

Table 1. Terms used according to the research question.

	Questions	Terms
Population	Adults in the immediate postoperative period	*Adult*
Concept	Nursing interventions for acute pain management	*Nursing, pain*
Context	Post-anesthesia care unit	*Perioperative period*

Table 2. Search strategy according to databases.

Databases	Mapping of terms
Medline via Pubmed	(((adult OR adults) AND (nursing OR nursing care)) AND (pain OR pain management)) AND (perioperative period OR postoperative period OR operative time OR intraoperative time)
BVS	((*adulto*) OR (adults)) AND ((*enfermagem*)) AND ((*dor*)) AND ((*período perioperatório*) OR (*período pós-operatório*) OR (*período pré-operatório*) OR (*período intraoperatório*))
Science Direct	(nursing) AND (pain) AND (perioperative period OR postoperative period OR operative time OR intraoperative time)
Cochrane	Nursing AND pain AND "perioperative period" OR "postoperative period" OR "operative time" OR "intraoperative time" AND adult OR adults
CINAHL	nursing AND pain AND "post operative care unit" OR PACU AND adult

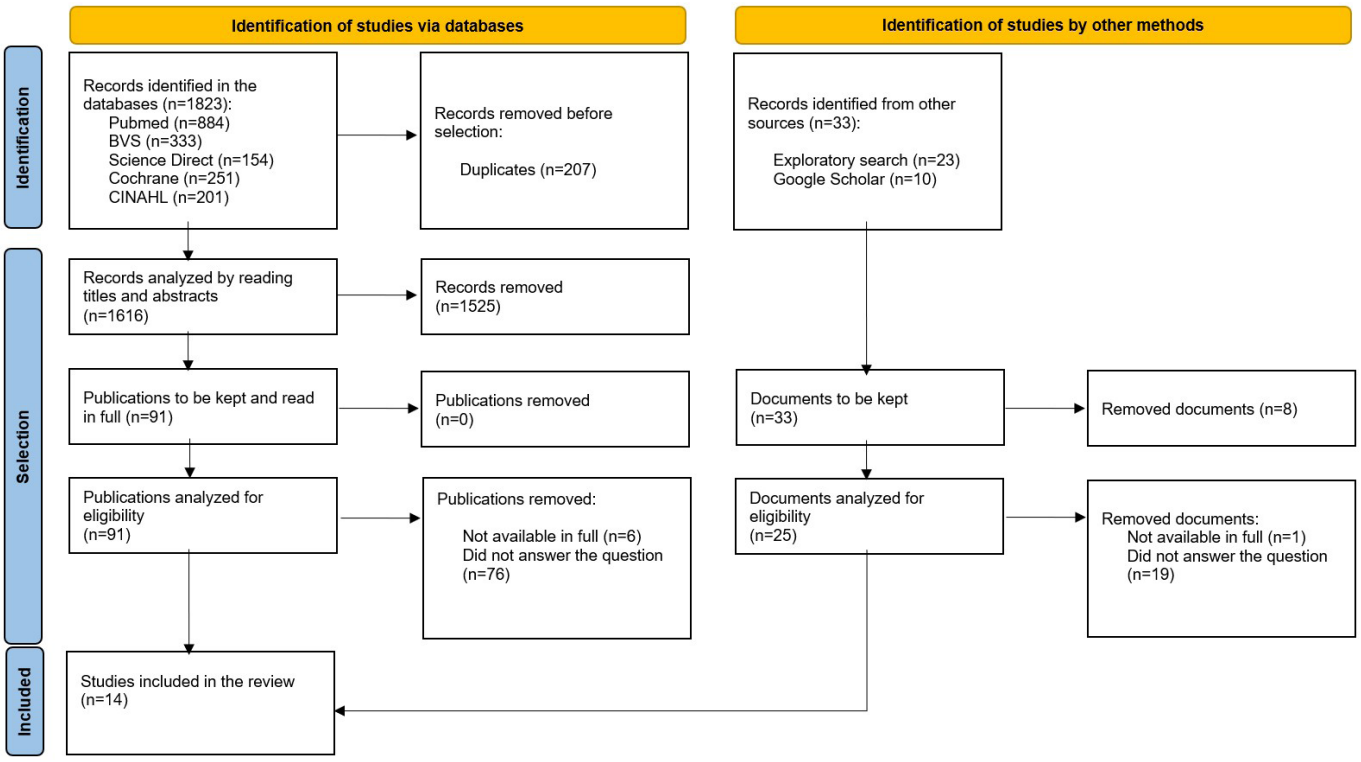

Figure 1. Flowchart adapted from PRISMA-ScR[15].

The sample of the studies ranged from 1 to 261 participants, covering adults aged between 18 and 65. The surgical interventions reported in the studies were: laparoscopic gynecological surgery[20,22], abdominal hysterectomy[16,18], hepatectomy[26], arthroscopic surgeries[19], lumbar microdiscectomy[12], general surgery[25], orthopedic surgery[6,17,25], abdominal surgeries[6,17], thoracic decompression[17], cervical sympathectomy[17], tonsillectomy [21] and urological surgery[6].

Pain management by the nursing team in the PACU unanimously involved the administration of drugs through different routes of administration and modalities of analgesia, with the objective of controlling pain. The classes of drugs administered were: analgesics[19,20,23], anti-inflammatories[18-20,23], anesthetics[26] and opioids[12,16-19,21-26]. The interventions also included use of standardized instruments for pain assessment and reassessment, in order to promote appropriate intervention. In addition, some studies included non-pharmacological approaches, such as music therapy[12,18,20,22], reiki[19], foot reflexology[19], therapeutic touch[19], guided imagination[20], comfort measures[27] and aromatherapy[6].

Table 3. Synthesis of studies included in this scoping review on nursing interventions in the post-anesthetic care unit for the management of acute pain in adults.

Authors/Location	Type of study* and sample	Objective	Surgical intervention	Intervention in the PACU for pain management	Outcomes of interest
Heiser et al.[12] **USA**	Experimental, controlled, prospective study n= 34 23 to 59 years old	To investigate the effects of a non-pharmacological and non-invasive intervention (music) in combination with a pharmacological agent (IV morphine) on the levels of pain, anxiety, satisfaction and physiological parameters of patients in the post-operative period.	Lumbar microdiscectomy.	One hour of uninterrupted music, in the musical style previously chosen by the patient or without music therapy + intravenous PCA (morphine). Pain assessment after 1 hour in the PACU using the VAS*.	There was no significant difference between the two groups in terms of pain levels and consumption analgesic drugs.
Choiniere et al.[16] **Canada**	Prospective study n=126 37 to 49 years old	To evaluate the efficacy, clinical and economic benefits when comparing PCA with regular IM opioid administration after hysterectomy.	Abdominal hysterectomy.	IV morphine (3mg) until reaching relief or maximum dose of 15mg + PCA morphine or IM morphine. Pain assessment every 10 minutes until relief and then at a fixed schedule using the VAS*.	Pain levels were low and similar between the groups, but patients in the IM group received more morphine than those in the PCA group.
Puntillo and Weitz[17] **USA**	Observational study n=39 48 to 53 years old	To study the relationship between the pain reported by PACU patients and the amount of opioids administered, as well as the general effect of the patients' analgesics.	Abdominal surgery, orthopedic surgery, thoracic decompression and cervical sympathectomy.	IV opioid (morphine, fentanyl, combination of morphine, fentanyl and meperidine). Pain assessment every 5 minutes for 90 minutes or until discharge using the NPS*.	The decrease in pain level did not go beyond moderate pain, suggesting that the intervention was not effective, which may be related to the drugs dosages.
Taylor et al.[18] **USA**	Semi-experimental study n=61 24 to 62 years old	To examine the effect of the use of music on patients' perception of pain in the PACU.	Abdominal hysterectomy.	Relaxing music chosen in advance by the patient or solely the use of a silent headset + nursing care and administration of IV and IM opioids (morphine, meperidine and fentanyl) and IV NSAIDs (ketorolac). Pain assessment every 15 minutes in the PACU using VRS*; Pain assessment using the NGPIS* before discharge from the PACU.	There was no significant difference between the two groups in terms of pain levels.

*PCA – Patient-controlled analgesia; PCA – Patient-controlled epidural analgesia; NSAIDs – Nonsteroidal anti-inflammatory drugs; NPS – Numerical Pain Scale; VAS – Visual Analog Scale; VCS – Verbal Rating Scale; GNPIS – Graphic Numeric Pain Intensity Scale; PACU – Post-anesthesia care unit; IV – intravenous; IM – intramuscular. Source: Prepared by the author.

Table 3. Continued....

Authors/Location	Type of study* and sample	Objective	Surgical intervention	Intervention in the PACU for pain management	Outcomes of interest
Scales[19] **USA**	Case report n=1 37 years old	To show the effectiveness of different holistic healing techniques in the perianesthesia to reduce pain and stress.	Arthroscopic repair of the anterior cruciate ligament, arthroscopic lateral meniscectomy and open repair of the collateral ligament in the left knee.	Oral opioid (hydrocodone) + oral analgesic (paracetamol) + IV NSAID (tromethamine). Oral opioid (oxycodone) + oral analgesic (paracetamol). Reiki + foot reflexology + therapeutic touch. Pain assessment using the NPS*.	The use of holistic techniques improved pain control when combined with the drugs.
Laurion and Fetzer[20] **USA**	Experimental, pilot study n=84 20 to 55 years old	To determine the effect of guided imagination and music therapy on pain, nausea and vomiting and length of stay in the PACU of patients undergoing laparoscopic gynecological surgery.	Bilateral laparoscopic tubal cauterization/ banding and diagnostic/ operative laparoscopies with or without hysteroscopy.	Audio-guided imagination Or Music Or Conventional care + Paracetamol and ibuprofen (route of administration not specified). Pain assessment using the NPS*.	The groups that received guided imagination or music had lower levels of pain (p=0.002).
Elstraete et al.[21] **France**	Prospective, randomized, double-blind, placebo-controlled study n=40 22 to 49 years old	To evaluate the effect of continuous low doses of IV ketamine, supplemented with remifentanil-based anesthesia and started immediately after anesthetic induction, on postoperative morphine consumption and pain scores.	Tonsillectomy by electrodissection.	IV morphine 3mg every 5 minutes until reaching VAS* <30mm on swallowing. Assessment of pain at rest and when swallowing by VAS* at 15, 30, 45, 60 and 90 minutes.	The addition of ketamine to the anesthesia did not reduce postoperative pain levels.

*PCA – Patient-controlled analgesia; PCA – Patient-controlled epidural analgesia; NSAIDs – Nonsteroidal anti-inflammatory drugs; NPS – Numerical Pain Scale; VAS – Visual Analog Scale; VCS – Verbal Rating Scale; GNPIS – Graphic Numeric Pain Intensity Scale; PACU – Post-anesthesia care unit; IV – intravenous; IM – intramuscular. Source: Prepared by the author.

Table 3. Continued....

Authors/Location	Type of study* and sample	Objective	Surgical intervention	Intervention in the PACU for pain management	Outcomes of interest
Ikonomidou et al.[22] **Sweden**	Experimental, controlled, prospective study n=60 25 to 45 years old	To test the hypothesis that listening to relaxing music in the pre- and post-operative period could affect the experience of pain, nausea or well-being and that this may have an effect on the vital signs of women undergoing laparoscopic gynecological surgery.	Laparoscopic sterilization or laparoscopic tubal dyeing as part of an infertility program.	Using headphones without music Or Peaceful Pan Flute music 15 minutes after admission to the PACU + IV opioid (ketobemidone 2.5mg) if pain > 3 or at nursing discretion. Pain assessment using the VAS*.	There was no difference in pain levels when comparing the groups. However, opioid consumption was lower in the group that received music (p=0.04).
Pasero and McCaffery[23] **USA**	Narrative review	To promote an overview of the primary methods used to manage orthopedic pain and describe the role of perianesthesia nurses when administering them.	Orthopedic surgeries.	Multimodal analgesia, NSAIDs (oral, rectal or IV), paracetamol (oral or rectal), IV opioids, PCA (IV, oral and transdermal).	There are numerous ways of treating orthopedic postoperative pain and no consensus on which is best, but there is consensus that the multimodal approach is the most effective.
Charuluxananan et al.[24] **Thailand**	Retrospective qualitative study n=261 28 to 58 years old	To study the status of post-anesthetic pain management in order to determine factors for increasing the quality of anesthetic services in Thailand.	Not reported.	IV and IM opioids (morphine, meperidine, fentanyl and tramadol). Pain assessment protocol or no assessment.	The study revealed inadequate pain management in the PACU in Thailand.
Tan et al.[25] **Singapore**	Randomized clinical trial n=120 32 to 60 years old	To determine the effectiveness of a nurse-controlled analgesia protocol in reducing the time to reach a satisfactory postoperative pain score.	General and orthopedic surgery.	Protocol of analgesia administered by doctors (control group) Or Nurse-controlled analgesia protocol (IV morphine bolus 1-2mg) (intervention group). Pain assessment using the NPS*.	The nurse-controlled analgesia protocol was effective in reducing pain in less time (p=0.037).
Aydogan et al.[26] **Turkey**	Prospective, randomized, double-blind study n= 42 18 to 38 years old	To examine the difference in acute postoperative pain intensity, morphine consumption, and adverse effects between patients who received IV PCA and PCEA for pain control in liver donors.	Right hepatectomy for liver donation.	Morphine infusion through the PCA device and epidural anesthesia + morphine infusion through the PCEA device. Pain assessment using the VAS*.	The use of PCEA showed a greater reduction in the intensity of acute postoperative pain and morphine consumption than the use of the IV PCA device (p>0.05).

*PCA – Patient-controlled analgesia; PCA – Patient-controlled epidural analgesia; NSAIDs – Nonsteroidal anti-inflammatory drugs; NPS – Numerical Pain Scale; VAS – Visual Analog Scale; VCS – Verbal Rating Scale; GNPIS – Graphic Numeric Pain Intensity Scale; PACU – Post-anesthesia care unit; IV – intravenous; IM – intramuscular. Source: Prepared by the author.

Table 3. Continued....

Authors/Location	Type of study* and sample	Objective	Surgical intervention	Intervention in the PACU for pain management	Outcomes of interest
Costalino[27] **Brazil**	Qualitative research n=8 professionals	To ascertain nursing professionals' perceptions of patients' post-operative pain and the ways in which they deal with the patient's complaint.	Does not apply.	Comfort-related measures (warmth, decubitus changes, bladder distension management) + Measures by consulting a doctor (drugs). Assessment of pain by verbal communication, without the use of an instrument.	For patient care in the PACU to be effective, all team members must be involved in the whole process.
Biachi et al.[6] **Brazil**	Systematic literature review n=6 studies 18 to 65 years old	To analyze the evidence available in the literature on the effect of aromatherapy for the management of postoperative pain in the PACU.	Abdominal surgery, lower limb fracture surgery and urological surgery.	Aromatherapy with essential oils: lavender, lemon, sweet orange, clary sage and damask rose + usual care Or Placebo + usual care. Pain assessment using the VAS* or the NPS*.	Aromatherapy was effective in relieving pain.

*PCA – Patient-controlled analgesia; PCA – Patient-controlled epidural analgesia; NSAIDs – Nonsteroidal anti-inflammatory drugs; NPS – Numerical Pain Scale; VAS – Visual Analog Scale; VCS – Verbal Rating Scale; GNPIS – Graphic Numeric Pain Intensity Scale; PACU – Post-anesthesia care unit; IV – intravenous; IM – intramuscular. Source: Prepared by the author.

DISCUSSION

All included studies sought to explore the management of postoperative pain through interventions, using strategies to prove the effectiveness or otherwise of each applied intervention. As mentioned, the interventions were divided into pharmacological: opioid infusion in patient-controlled analgesia (PCA)[12,16,23,26], patient-controlled epidural analgesia (PCEA)[26] and nurse-controlled analgesia[25]; intravenous[16-18,21-25], oral[19] or intramuscular[16,18,24] opioids; oral analgesics[19]; intravenous non-steroidal anti-inflammatory drugs[18,19]; and non-pharmacological interventions[6,12,18-20,22,27].

Surgeries performed in the sample studied were in the fields of gynecology, orthopedics, hepatology, otorhinolaryngology, urology, neurosurgery, thoracic and general surgery. Pain management in these areas is different. Authors[28] conducted a prospective postal study to examine the pain profile of three types of surgery in terms of intensity and duration. Based on this study, the authors highlighted that each surgery has a unique pattern of pain experience, influenced by the extent of the trauma, the severity of the procedure and pre-existing illnesses[29], which should be considered by the nursing team throughout the perioperative period, but with special attention to the postoperative period, in order to intervene based on the level of pain expected for the patient.

It's important to put into context that there are differences in the nurses duties in the PACU depending on the country. In some countries, for example, the United States, qualified nurses can perform anesthesia and prescribe analgesics. In Brazil, on the other hand, nurses act on the basis of the medical prescription determined by the anesthesiologist[27], who can make decisions on whether or not to administer an analgesic prescribed for pain, depending on the level of pain and the healthcare establishment's policy.

Thus, when analyzing the data from this study, it is important to reiterate that in some situations (or countries) the decision rests with the nursing staff at different levels: whether in terms of procedures and prescriptions, or administration. A study carried out in Brazil[27] portrays the view of nursing professionals who are dissatisfied with their own conduct in the PACU, attributing this perception to a lack of adequate training, an overload attributed to the size of the team and the unavailability of anesthesiologists, highlighting the gap between theory and practice of nursing in the PACU.

In this sense, reference authors[10], in a study carried out in Greece, showed that pain management care is among the most frequently omitted in the PACU by nursing staff. In addition, they wanted to understand the reasons for these outcomes and found a relationship with the high flow of Intensive Care Unit patients who require more care, inadequate staffing, unexpected changes in the level of care required by patients and the high flow of patients on admission and discharge from the unit. Thus, these aspects seem to directly influence pain management in the PACU and have to be considered.

It is also important to bear in mind that there are differences in institutional protocols. Regardless of legal aspects regarding the duties of the multidisciplinary team, the choice of drug to be administered must first be based on an assessment of the patient's pain[27,30]. For the studies in this review's sample, this assessment should have been carried out using standardized instruments, including the Visual Analogue Scale[6,12,16,21,22,26], and numerical scales[6,18-20,25], which make it possible to assess the intensity of the pain, although it is also essential to explore the quality and location of the pain[31]. In contrast, one study[27] shows that nursing staff do not use validated instruments to assess pain, which remains a challenge to be overcome.

Pharmacological interventions carried out by the nursing team throughout the studies predominantly used opioids. With emphasis on this aspect, the World Health Organization (WHO) recommends that moderate to severe pain should be treated with opioid drugs[32]. In line with the WHO recommendation and the level of pain expected in the PACU, according to the procedure carried out, the predominance of this class of drugs in the protocols applied by the nurses found in this study is justified.

Another important issue regarding pharmacological intervention is the route of administration. The intravenous route was predominant, as it is known to have an immediate effect and is an effective route for managing acute postoperative pain. In the study[19], the oral route was present in combination with the intravenous route, and corroborated by other authors[23], highlighting the oral route, which requires a level of consciousness allowing the patient to swallow safely, which can limit its use in some cases.

Infusion by PCA pump was reported in four studies[12,16,23,26], demonstrating efficacy in pain control. In contrast, one of them[16] reported that patients preferred to tolerate part of the pain, not achieving complete relief, in order to avoid adverse effects from the drugs. These data need to be analyzed with caution, both because of the date of publication and because of the importance of considering care measures related to patient education, which can influence decision-making, which is the responsibility of nursing team[33].

The PCEA pump has been shown to be effective in controlling moderate pain in patients undergoing hepatectomy, but the authors[26] infer that there is a lack of nursing mastery of the device to promote optimal pain control. However, the analysis of this data also requires caution, given the different realities of services and countries. The care given to PCA and PCEA pumps is the responsibility of the nursing team, which includes educating and guiding the patient and caregiver about how they work, how to use them and the pain control mechanism, as well as monitoring and documenting pain[34]. These authors[34] also pointed out that the safety and efficacy of using these mechanisms was directly influenced not only by the nursing team, but also by the device itself and especially by the patient. The study[34] also showed that health education on PCA should include training patients and caregivers in its use, identifying adverse effects and the possible consequences of misuse.

Nurse-controlled analgesia was carried out using a well-established protocol[25], which promoted earlier analgesia, acting to prevent negative physiological effects and stress caused by pain, as well as greater autonomy for nurses in the PACU. The authors[25] also pointed out that nurse-controlled analgesia is a widespread practice worldwide, and that nurses are qualified to do it.

Among the non-pharmacological practices, music therapy was used in three articles from the sample, applied in the preoperative[20,22] or intraoperative[12] period and then applied in the PACU to reduce postoperative pain levels. Authors[20] showed a reduction in pain levels on discharge from the PACU for the intervention group compared to the control group. Other authors[12,22] found no significant effects. A review of some studies on this subject showed that music introduced after the patient was admitted to the PACU was not effective in reducing postoperative pain[35]. Even if assuming that the preference of musical genres chosen by patients plays an important role in their feelings at a vulnerable time[12], fostering a sense of belonging[20], no significant effect was found. Although music therapy was not effective in reducing pain, it was effective in promoting relaxation and distraction, which contributes directly to the control of pain[36], since pain is made up of different domains besides the physical[20,37].

The integrative practices of reiki, therapeutic touch and foot reflexology have been explored[19] and have been shown to be effective in the case of pain and stress when combined with pharmacological treatment consisting of opioids, analgesics and non-steroidal anti-inflammatory drugs. The integrative practice of audio-guided imagination was used in 2003[20] and resulted in lower levels of pain in the group to which it was applied in conjunction with analgesics and anti-inflammatory drugs. Aromatherapy, as presented in the systematic review[6] was included in this study's sample, uses different essential oils that have shown to be effective in relieving pain, as opposed to placebo treatment and usual care.

These study outcomes reinforce the multidimensionality of pain[37], which is also influenced by the fear, stress and anxiety present in the perioperative period[38], and the benefits of associating non-pharmacological practices that act on these various dimensions with drugs that promote pain relief with a greater focus on the sensory dimension. Thus, non-pharmacological strategies can be explored to complement pain management in the PACU, impacting on its intensity, promoting comfort and well-being, reducing the need for opioids, among others. Although it was not the aim of the present study, by analyzing the studies in the sample and considering methodological rigor, aromatherapy and music therapy stand out as promising practices (although their positive effect was not unanimous in the studies). Thus, it is recommended that new studies on non-pharmacological practices be conducted with greater methodological rigor in order to increase the robustness of the generated data.

Postoperative pain management in the PACU requires efficiency and can have an impact on physiological parameters and comfort immediately, but also on intermediate and late postoperative outcomes. A descriptive exploratory study[39] showed that a lower pain score on discharge from the PACU was associated with longer periods before analgesics had to be administered in the destination unit. Another study[38] showed that psychological distress in the preoperative period predisposes to greater pain in the PACU. These outcomes reinforce the need for a continuous approach throughout the perioperative period.

Nursing plays an essential role in the management of pain[40]. All the interventions found in this study are part of targeted nursing care, together with the multidisciplinary team at the PACU, to promote pain management for admitted patients. However, pain care begins with a comprehensive perception of the patient, validation of their complaints, assessment of the pain condition and, finally, the use of personalized pharmacological and non-pharmacological interventions and, if possible, preventive interventions, as well as reassessment and education of the patient and family for continuity of care at home[19,30,40,41]. Combining this information makes it possible to

construct a practical scenario with the objective of improving pain management in the PACU, as well as helping professional nurses in their day-to-day pain management practices within the unit, highlighting their autonomy and knowledge to carry out care and coordinate the team with excellence.

One of the present review's limitations is the lack of recent publications, showing that there has been little production of knowledge in the field in the previous ten years. This highlights the need for new studies with greater methodological rigor that covers the management of postoperative pain in the PACU, exploring the autonomous role of nursing in its different contexts and highlighting non-pharmacological care as a differential for effective care done not only by nurses, but with the coordination of their entire teams.

CONCLUSION

This scoping review complied with the proposal to map nursing interventions in the PACU for the treatment of acute postoperative pain, with patients who underwent different surgical interventions and in different cultural contexts. There was a broad survey of practices that can be incorporated into care, but there was also a need for new studies with greater robustness and methodological rigor. The synthesis of the findings revealed pharmacological interventions (intravenous opioid infusion in PCA, PCEA, nurse-controlled analgesia; intravenous, oral or intramuscular opioids; intravenous non-steroidal anti-inflammatory drugs; and oral analgesics) and non-pharmacological interventions (aromatherapy, music therapy and reiki) as promising practices. The importance of new studies with greater robustness and methodological rigor on the management of postoperative pain in the PACU, especially involving non-pharmacological practices, is highlighted, in order to expand knowledge in the area and support the establishment of care protocols.

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AUTHORS' CONTRIBUTIONS

Giulia Moreira Dias: Data Collection, Conceptualization, Research, Methodology, Writing - Preparation of the Original, Writing - Review and editing, Visualization
Elizabete Cristina de Lira Santiago: Data Collection, Conceptualization, Writing - Preparation of the Original
Mani Indiana Funez: Data Collection, Conceptualization, Project Management, Research, Methodology, Writing - Preparation of the Original, Writing - Review and Editing, Supervision, Visualization