

Empowering Patients with Fractures Through Relaxation and Distraction Techniques for Self-Management of Pain

Putri Mega Wiyanti Agustin

Universitas Nurul Jadid, Indonesia

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Corresponding Author:

Putri Mega Wiyanti Agustin

Universitas Nurul Jadid

Email:

putrimegawujayanti@unuja.ac.id

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ABSTRACT

Background: Fractures are musculoskeletal injuries frequently accompanied by acute pain resulting from tissue damage, inflammatory responses, and muscle spasm. Inadequately controlled pain may interfere with mobility, sleep, daily activities, and patient comfort. Alongside pharmacological treatment, relaxation and distraction are simple non-pharmacological strategies that can be taught to patients to support pain self-management.

Objectives: This community service program aimed to improve the knowledge and practical skills of patients with fractures in applying deep-breathing relaxation and distraction techniques for pain management.

Methods: Thirty patients with fractures participated in health education, demonstration, and guided practice of deep-breathing relaxation and distraction techniques. The program covered pain recognition, Numerical Rating Scale assessment, slow deep breathing, and visual, auditory, and simple activity-based distraction. Evaluation included pre-test and post-test knowledge assessments, a skills checklist, and pain-intensity measurement using the Numerical Rating Scale before and after the program.

Results: The mean knowledge score increased from 55.7 to 86.3. Participants correctly performing relaxation and distraction techniques increased from 36.7% to 90.0%. Mean pain intensity decreased from 5.1 to 3.0. Participants also demonstrated improved ability to assess their pain and independently apply non-pharmacological pain-management strategies.

Conclusions: Education combined with guided relaxation and distraction practice was followed by improved patient knowledge, practical skills, and lower pain intensity. These techniques may complement pharmacological treatment and strengthen patient participation in pain management.



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Introduction

Fractures represent a substantial cause of injury-related disability worldwide. The Global Burden of Disease 2019 analysis estimated approximately 178 million new fractures globally in 2019, with 455 million people experiencing acute or long-term consequences and approximately 25.8 million years lived with disability attributable to fractures. Although age-standardized fracture rates declined modestly over several decades, the absolute burden increased substantially because of population growth and ageing (GBD 2019 Fracture Collaborators, 2021).

Pain is one of the most common clinical consequences of fracture. Injury to bone, periosteum, surrounding soft tissue, and blood vessels initiates inflammatory responses and may be accompanied by muscle spasm, swelling, and mechanical instability. In the source clinical case, fracture was associated with tissue injury, inflammatory responses, pain, and loss of function; the patient reported pain that increased with movement and interfered with mobility and activities of daily living. case further demonstrated that pain affected toileting, eating, repositioning, sleep, and independence.

Effective acute pain management is therefore an important component of fracture care. Current orthopedic trauma guidance recommends a multimodal approach combining appropriate pharmacological therapy with physical, cognitive, and psychosocial strategies rather than relying on a single intervention (Hsu et al., 2019). Similarly, clinical guidance for acute non-low-back musculoskeletal injury emphasizes evidence-based pharmacological and non-pharmacological management tailored to the clinical condition and patient preferences (Qaseem et al., 2020).

Pharmacological analgesia remains important, particularly for moderate-to-severe acute pain. However, non-pharmacological interventions may provide additional comfort, reduce distress, and increase patients' sense of participation in their own care. A systematic review of interventions following orthopedic surgery identified relaxation, guided imagery, music, and audiovisual distraction as potentially beneficial complementary approaches, although heterogeneity among studies limits definitive conclusions regarding individual techniques (Fan & Chen, 2020).

Slow deep breathing represents one accessible relaxation strategy. It generally involves deliberately slowing the respiratory rate, taking controlled deeper breaths, and maintaining attention on the breathing cycle. A systematic review and meta-analysis of randomized controlled trials found that slow deep breathing was associated with lower acute clinical pain scores compared with control conditions, although heterogeneity among the included studies was substantial (Joseph et al., 2022). The technique is inexpensive, requires minimal equipment, and can be practiced independently once patients understand the procedure.

The source KIA provides a direct clinical foundation for this intervention. It describes deep-breathing relaxation as slow inhalation and exhalation performed in a comfortable manner and presents relaxation as a non-pharmacological strategy for reducing pain. During the documented nursing implementation, deep-breathing relaxation was performed repeatedly alongside pharmacological analgesia, and subsequent evaluation noted a reduction in pain complaints.

Distraction represents another complementary strategy. Rather than directly altering the tissue injury causing pain, distraction redirects attention toward competing sensory or cognitive stimuli. Distraction may involve visual stimuli, listening to music or other audio, conversation, counting, reading, or simple activities. A review examining distraction according to sensory modality found evidence that auditory, visual, tactile, and multimodal distraction can reduce the perception of acute pain in adults, although effects vary by intervention and clinical context (Bascour-Sandoval et al., 2019).

Music-based distraction has been studied particularly extensively in surgical and orthopedic populations. A systematic review and meta-analysis reported reductions in postoperative pain among orthopedic patients receiving music interventions (Lin et al., 2020), while another review involving orthopedic surgical patients found reductions in both pain and anxiety (Patiyal et al., 2021). More recent perioperative evidence also suggests that music interventions may reduce postoperative

pain and anxiety, supporting their use as adjunctive rather than replacement strategies (Li et al., 2024).

Patient education is important because effective pain management requires patients to communicate their pain accurately and understand what strategies can be safely used. Health literacy has been associated with several dimensions of pain self-management, including pain knowledge, medication adherence, and pain-management behavior (Kim et al., 2022). Education is therefore more useful when it incorporates practical skills and patient participation rather than simply providing verbal information.

Pain assessment must also be incorporated into self-management education. The Numerical Rating Scale (NRS) enables patients to describe pain intensity from 0 to 10 and is widely used because of its simplicity and practicality. A systematic review comparing commonly used adult pain scales concluded that the NRS, Visual Analogue Scale, and Verbal Rating Scale are valid and reliable, with the NRS offering practical advantages for routine clinical assessment (Karcioglu et al., 2018). The source likewise uses the NRS classification of 0 for no pain, 1–3 for mild pain, 4–6 for moderate pain, and 7–10 for severe pain.

Based on these considerations, a community service program was developed combining pain education, standardized pain assessment, deep-breathing relaxation, distraction, demonstration, and guided practice. The program aimed to improve patients' knowledge and practical skills in applying non-pharmacological pain-management strategies and to describe changes in pain intensity following the intervention.

Methods

Program Design/Approach

This community service program used a patient-empowerment and skills-training approach. Health education was combined with demonstration, guided practice, return-demonstration, and feedback. The program was designed to strengthen both patients' understanding of pain and their practical ability to use simple non-pharmacological strategies independently.

The intervention was not intended to replace pharmacological pain treatment or orthopedic management. Relaxation and distraction were presented as complementary pain-management strategies to be used alongside prescribed analgesia, fracture stabilization, medical monitoring, and other clinically indicated interventions.

The educational process followed:

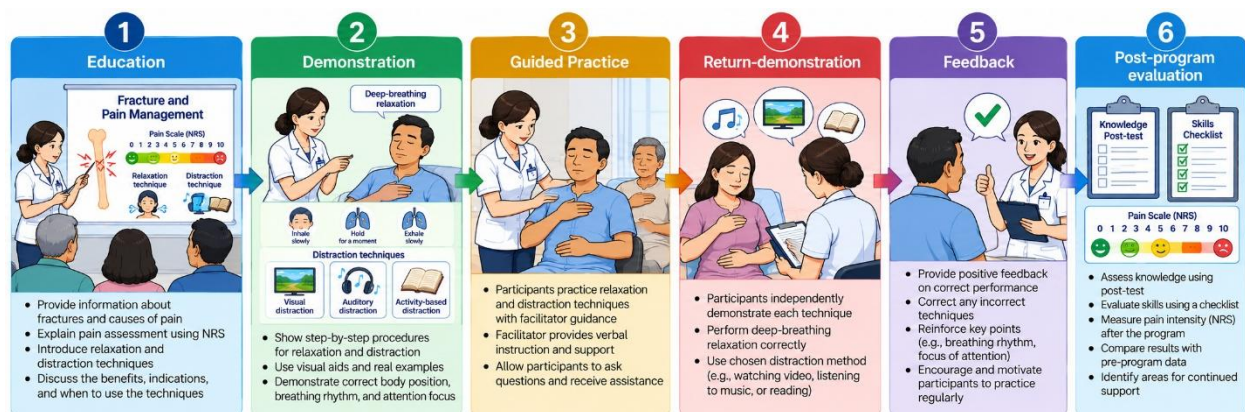


Figure 1. Educational and skills-training process for relaxation and distraction techniques in fracture pain self-management.

The program was conducted through six sequential stages: education, demonstration, guided practice, return-demonstration, feedback, and post-program evaluation. Participants received information on fracture-related pain, pain assessment using the Numerical Rating Scale, deep-breathing relaxation, and distraction techniques. They then practiced the techniques under facilitator

guidance, independently demonstrated the procedures, received corrective feedback, and completed post-program evaluation of knowledge, practical skills, and pain intensity.

Community Partner and Target Population

The program involved 30 patients with fractures who required support in understanding and independently applying simple non-pharmacological pain-management techniques. The program content was developed based on identified clinical needs related to fracture-associated pain, particularly pain during movement and limitations in daily activities. These needs were informed by a previous nursing case involving a female patient with a closed humeral fracture treated at RSUD Sidoarjo, who experienced movement-related pain and functional limitations. The case was used solely as a clinical reference for identifying relevant educational needs and was not included as part of the 30-participant community service sample.

Community Service Intervention/Activities

The program was organized around pain awareness, pain assessment, relaxation, distraction, and independent practice. Participants first received education regarding the causes and characteristics of fracture-related pain, factors that may exacerbate pain, appropriate communication of symptoms, the importance of prescribed analgesia, and the role of non-pharmacological approaches.

Participants were then introduced to the Numerical Rating Scale, with scores ranging from 0 for no pain to 10 for the worst pain perceived. They practiced identifying and communicating their current pain intensity so that changes could be evaluated consistently.

For deep-breathing relaxation, the facilitator demonstrated a comfortable position followed by slow controlled inhalation, brief attention to the breathing cycle, and gradual exhalation. Participants were encouraged to relax unnecessary muscle tension and maintain a calm, regular respiratory rhythm. The procedure was subsequently practiced under supervision.

For distraction, participants were introduced to several simple options that could be selected according to preference and clinical condition. Visual distraction included focusing attention on an image, television program, or other comfortable visual stimulus. Auditory distraction included listening to preferred music or calming audio. Simple activity-based distraction included conversation, counting, reading, or another safe activity that redirected attention away from pain.

Following demonstration, participants practiced the techniques under guidance. They then performed the techniques independently through return-demonstration while facilitators assessed procedural accuracy and provided corrective feedback.

Table 1. Components of the Relaxation and Distraction Pain Self-Management Program

Program Component	Main Content	Educational Strategy	Expected Competency
Understanding fracture pain	Causes, characteristics, exacerbating factors	Health education	Understand fracture-related pain
Pain assessment	Numerical Rating Scale 0–10	Explanation and guided assessment	Identify and report pain intensity
Deep-breathing relaxation	Slow inhalation and controlled exhalation	Demonstration and guided practice	Perform relaxation independently
Visual distraction	Focusing on comfortable visual stimuli	Demonstration and practice	Redirect attention from pain
Auditory distraction	Preferred music or calming audio	Guided practice	Use auditory stimuli appropriately
Activity-based distraction	Conversation, counting, reading, simple activities	Discussion and practice	Select a suitable distraction method
Return-demonstration	Independent performance	Observation using checklist	Demonstrate correct technique
Feedback	Reinforcement and technique correction	Individual feedback	Improve accuracy and confidence
Evaluation	Knowledge, skills, and NRS	Pre/post assessment	Demonstrate program outcomes

Instruments and Program Evaluation

Program evaluation addressed three outcomes: knowledge, practical skills, and pain intensity. Knowledge was assessed before and after the educational intervention. The mean knowledge score increased from 55.7 at pre-test to 86.3 at post-test. Practical skills were assessed using a relaxation and distraction skills checklist. Before the program, 36.7% of participants could correctly perform the techniques. After demonstration, guided practice, and feedback, 90.0% demonstrated correct performance. Pain intensity was evaluated using the Numerical Rating Scale. The mean pain score was 5.1 before the program and 3.0 after the program. The NRS is appropriate for routine adult pain assessment and allows changes in perceived pain to be monitored using a straightforward 0–10 scale (Karcioğlu et al., 2018).

Data Collection

Data collection followed the sequence of baseline assessment, intervention, and post-program evaluation. Participants completed the knowledge assessment, underwent skills assessment, and rated pain using the NRS before receiving the intervention. They then participated in health education, demonstration, guided practice, return-demonstration, and feedback. Knowledge, skills, and pain intensity were reassessed following program completion.

Data Analysis

Program outcomes were analyzed descriptively. Mean values were used for knowledge and pain scores, whereas percentages were used to summarize participants demonstrating correct relaxation and distraction skills. Absolute pre–post changes were calculated to facilitate interpretation. No inferential statistical test, confidence interval, or effect size is reported because these analyses were not included in the author-provided program dataset. Accordingly, the findings should be interpreted as descriptive changes following the program, rather than statistically proven intervention effects.

Results

Program Implementation

Thirty patients with fractures participated in health education and practical training on relaxation and distraction techniques. Participants learned to recognize and quantify their pain, perform deep-breathing relaxation, select appropriate distraction methods, and apply these techniques independently as complementary strategies.

Changes in Knowledge

The mean knowledge score increased from 55.7 before the program to 86.3 after the program, representing an absolute increase of 30.6 points.

Table 2. Knowledge Scores Before and After the Program

Indicator	Pre-program	Post-program	Absolute Change
Mean knowledge score	55.7	86.3	+30.7

The increase reflected improved understanding of pain recognition, pain assessment, deep-breathing relaxation, distraction, and the role of non-pharmacological strategies within comprehensive pain management.

Changes in Practical Skills

The proportion of participants able to correctly perform relaxation and distraction techniques increased from 36.7% before the program to 90.0% after the program, representing an increase of 53.3 percentage points.

Table 3. Relaxation and Distraction Skills Before and After the Program

Indicator	Before Program	After Program	Absolute Change
Participants correctly performing techniques	36.7%	90.0%	+53.3 percentage points

Participants demonstrated improved ability to regulate breathing, perform relaxation independently, choose suitable distraction strategies, and use these approaches when experiencing pain.

Changes in Pain Intensity

The mean NRS pain score decreased from **5.1 before the intervention to 3.0 after the intervention**, corresponding to an absolute reduction of **2.1 points**.

Table 4. Pain Intensity Before and After the Program

Indicator	Before Program	After Program	Change
Mean NRS pain score	5.1	3.0	-2.1

The result demonstrates a descriptive reduction in perceived pain following the educational and practical intervention. However, because concurrent analgesic use and other clinical variables have not yet been confirmed, the reduction should not be attributed solely to relaxation and distraction.

Discussion

The community service program was followed by a substantial improvement in participant knowledge, with the mean score increasing from 55.7 to 86.3. This result suggests that structured education helped patients better understand pain assessment and non-pharmacological pain-management options. Patient knowledge is particularly important because pain is subjective and effective management depends partly on patients' ability to recognize, communicate, and respond appropriately to their symptoms. Research examining health literacy and pain self-management indicates that better understanding of pain and treatment may support pain-related knowledge, adherence, and self-management behaviors (Kim et al., 2022).

The improvement in practical skills from 36.7% to 90.0% highlights the importance of using active teaching methods. Relaxation is a behavioral skill rather than a concept that can be mastered through verbal information alone. Demonstration allows patients to observe the procedure, guided practice permits immediate assistance, and return-demonstration enables nurses to determine whether patients can perform it independently. This practical approach is particularly relevant in nursing because patients may need to use the technique outside the immediate presence of healthcare professionals.

Slow deep breathing was one of the principal techniques included in the program. Joseph et al. (2022) found that slow deep breathing was associated with lower acute pain scores across randomized studies, although considerable heterogeneity means that the magnitude of effect varies between populations and settings. The present program therefore appropriately treats breathing relaxation as an adjunct rather than a substitute for clinical analgesia.

This interpretation is also consistent with the original KIA. The individual patient received deep-breathing relaxation in combination with ketorolac rather than as isolated treatment. Following repeated implementation, the patient reported that pain was becoming less intense and was partially relieved. KIA PUTRI MEGA WIJAYANTI_2 This clinical experience provides a reasonable foundation for teaching the method to a wider group while also demonstrating why pharmacological treatment must remain part of comprehensive care.

Distraction may help reduce the attentional resources devoted to painful stimuli. Bascour-Sandoval et al. (2019) reported that auditory, visual, tactile, and mixed distraction modalities can influence acute pain perception, although the evidence varies between modalities and clinical populations. Allowing participants to select a comfortable method may also make the approach easier to incorporate into daily care.

Auditory distraction through music has particularly relevant evidence in orthopedic populations. Lin et al. (2020) found reductions in postoperative orthopedic pain with music-based interventions, and Patiyal et al. (2021) reported reductions in pain and anxiety after orthopedic surgery. A broader meta-analysis also supports a beneficial effect of perioperative music on

postoperative pain and anxiety (Li et al., 2024). These findings support the inclusion of simple auditory distraction within a multimodal pain-management program.

The decrease in mean pain intensity from 5.1 to 3.0 represents an important program outcome. Based on the Numerical Rating Scale (NRS), scores of 1–3 are categorized as mild pain, 4–6 as moderate pain, and 7–10 as severe pain. Accordingly, the mean pain score shifted from the moderate-pain range before the program to the mild-pain range after the intervention. This descriptive reduction suggests an improvement in participants' immediate pain experience following education and guided practice of relaxation and distraction techniques.

Nevertheless, the reduction should be interpreted cautiously. Patients with fractures may concurrently receive analgesics, immobilization, positioning, surgical treatment, rest, and other interventions. Acute pain can also vary according to time since injury, movement, fracture location, treatment stage, anxiety, and individual pain sensitivity. Consequently, the present pre–post design cannot establish that relaxation and distraction alone caused the 2.1-point reduction.

This limitation reinforces the concept of multimodal pain management. Orthopedic trauma guidelines recommend combining pharmacological, physical, cognitive, and psychosocial strategies according to patient needs rather than treating these methods as mutually exclusive (Hsu et al., 2019). Non-pharmacological techniques are therefore best presented to patients as additional tools that may increase comfort and self-efficacy while appropriate medical analgesia continues.

Another benefit of the program is the potential to strengthen patient participation in pain management. Fracture-related pain may temporarily reduce independence by interfering with mobility, sleep, eating, toileting, and personal care. Clinical observations have shown that movement-related pain can increase dependence on family assistance for several daily activities. Teaching patients simple relaxation and distraction techniques that can be initiated independently may therefore enhance their sense of control and active involvement in pain management during recovery.

Implications, Sustainability, and Limitations

The findings support incorporating brief relaxation and distraction training into nursing pain-management education for fracture patients. Nurses can first assess pain, explain the complementary nature of non-pharmacological strategies, demonstrate a selected technique, observe patient return-demonstration, correct errors, and reassess pain afterward.

Sustainability can be supported by providing simple written or visual instructions, encouraging patients to repeat the techniques when appropriate, involving family members when assistance is needed, and reinforcing the skills during subsequent nursing encounters. Patients should also be taught that increasing or severe pain, new swelling, neurovascular changes, unexpected numbness, worsening movement limitation, or other concerning symptoms require professional reassessment rather than repeated self-management alone.

Several limitations should be acknowledged. The program used a single-group descriptive pre-test/post-test evaluation and therefore cannot determine causal effectiveness. The available data do not indicate whether analgesic timing, fracture type, surgical status, or time since injury was standardized before the NRS measurements. Follow-up was short, so the persistence of improved knowledge and skills is unknown. The program also did not evaluate analgesic consumption, mobility recovery, sleep outcomes, length of stay, or long-term pain.

Relevance for Practice

Relaxation and distraction can be incorporated into a broader multimodal approach to fracture pain management because they are low-cost, teachable, and can be initiated by patients once competency has been established. A practical nursing sequence is to assess pain using the NRS, provide concise education, demonstrate slow deep breathing and an appropriate distraction method, supervise patient practice, evaluate return-demonstration, provide feedback, and reassess pain. These techniques should remain complementary to prescribed analgesia, fracture stabilization, surgical or conservative treatment, and ongoing clinical assessment.

Conclusion

The community service program combining pain education, deep-breathing relaxation, distraction, demonstration, and guided practice was followed by improved knowledge and practical pain-management skills among patients with fractures. The proportion of participants able to correctly perform relaxation and distraction increased substantially, and mean pain intensity decreased from 5.1 to 3.0. These outcomes support the use of structured patient education and practical non-pharmacological training as complementary components of fracture pain management. Continued reinforcement and integration with appropriate pharmacological and orthopedic treatment are recommended.

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Author Contribution

Putri Mega Wiyanti Agustini contributed to the conceptualization of the community service program, needs assessment, program planning, implementation of pain-management education and relaxation and distraction skills training, data collection, pain assessment, program evaluation, literature review, data interpretation, and preparation of the original manuscript.

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Declaration of Conflicting Interest

The authors declare no conflict of interest related to the implementation of this community service program or the publication of this manuscript.

Declaration of Use of AI in Scientific Writing

The authors declare that generative AI and AI-assisted technologies were used solely to support language editing, grammatical refinement, and improvement of the clarity and readability of the manuscript. The authors reviewed, verified, and revised all AI-assisted content and remain fully responsible for the accuracy, integrity, interpretation, and final content of the manuscript.

References

- Acar, K., & Aygin, D. (2019). Efficacy of guided imagery for postoperative symptoms, sleep quality, anxiety, and satisfaction regarding nursing care: A randomized controlled study. *Journal of PeriAnesthesia Nursing*, 34(6), 1241–1249. doi:10.1016/j.jopan.2019.05.006.
- Bascour-Sandoval, C., Salgado-Salgado, S., Gómez-Milán, E., Fernández-Gómez, J., Michael, G. A., & Gálvez-García, G. (2019). Pain and distraction according to sensory modalities: Current findings and future directions. *Pain Practice*, 19(7), 686–702. doi:10.1111/papr.12799.
- Carpenter, J. J., Hines, S. H., & Lan, V. M. (2017). Guided imagery for pain management in postoperative orthopedic patients: An integrative literature review. *Journal of Holistic Nursing*, 35(4), 342–351. doi:10.1177/0898010116675462.
- Eymir, M., Unver, B., & Karatosun, V. (2022). Relaxation exercise therapy improves pain, muscle strength, and kinesiophobia following total knee arthroplasty in the short term: A randomized controlled trial. *Knee Surgery, Sports Traumatology, Arthroscopy*, 30(8), 2776–2785. doi:10.1007/s00167-021-06657-x.
- Fan, M., & Chen, Z. (2020). A systematic review of non-pharmacological interventions used for pain relief after orthopedic surgical procedures. *Experimental and Therapeutic Medicine*, 20(5), 36. doi:10.3892/etm.2020.9163.
- GBD 2019 Fracture Collaborators. (2021). Global, regional, and national burden of bone fractures in 204 countries and territories, 1990–2019: A systematic analysis from the Global Burden of Disease Study 2019. *The Lancet Healthy Longevity*, 2(9), e580–e592. doi:10.1016/S2666-7568(21)00172-0.
- Hsu, J. R., Mir, H., Wally, M. K., & Seymour, R. B. (2019). Clinical practice guidelines for pain management in acute musculoskeletal injury. *Journal of Orthopaedic Trauma*, 33(5), e158–e182. doi:10.1097/BOT.0000000000001430.
- Joseph, A. E., Moman, R. N., Barman, R. A., Kleppel, D. J., Eberhart, N. D., Gerberi, D. J., Murad, M. H., & Hooten, W. M. (2022). Effects of slow deep breathing on acute clinical pain in adults: A systematic review and meta-analysis of randomized controlled trials. *Journal of Evidence-Based Integrative Medicine*, 27, 2515690X221078006. doi:10.1177/2515690X221078006.
- Kaplun, A., Lubovsky, O., Proso, I., Sagi, A., & Kalichman, L. (2026). Effect of brief guided imagery on short-term outcomes in patients undergoing first elective total knee arthroplasty: Randomized controlled trial. *International Journal of Environmental Research and Public Health*, 23(3), 340. doi:10.3390/ijerph23030340.
- Karcioglu, O., Topacoglu, H., Dikme, O., & Dikme, O. (2018). A systematic review of the pain scales in adults: Which to use? *The American Journal of Emergency Medicine*, 36(4), 707–714. doi:10.1016/j.ajem.2018.01.008.

- Kim, K., Yang, Y., Wang, Z., Chen, J., Barandouzi, Z. A., Hong, H., Han, H. R., & Starkweather, A. (2022). A systematic review of the association between health literacy and pain self-management. *Patient Education and Counseling*, 105(6), 1427–1440. doi:10.1016/j.pec.2021.09.037.
- Lee, H. Y., Nam, E. S., Chai, G. J., & Kim, D. M. (2023). Benefits of music intervention on anxiety, pain, and physiologic response in adults undergoing surgery: A systematic review and meta-analysis. *Asian Nursing Research*, 17(3), 138–149. doi:10.1016/j.anr.2023.05.002.
- Li, G., Yu, L., Yang, Y., Deng, J., Shao, L., & Zeng, C. (2024). Effects of perioperative music therapy on patients with postoperative pain and anxiety: A systematic review and meta-analysis. *Journal of Integrative and Complementary Medicine*, 30(1), 37–46. doi:10.1089/jicm.2022.0803.
- Lin, C. L., Hwang, S. L., Jiang, P., & Hsiung, N. H. (2020). Effect of music therapy on pain after orthopedic surgery: A systematic review and meta-analysis. *Pain Practice*, 20(4), 422–436. doi:10.1111/papr.12864.
- Moon, M., Oh, E. G., Baek, W., & Kim, Y. M. (2021). Effects of nurse-led pain management interventions for patients with total knee/hip replacement. *Pain Management Nursing*, 22(2), 111–120. doi:10.1016/j.pmn.2020.11.005.
- Ozdemir, A., Gunes, H., & Saritas, S. (2023). The effect of guided imagery on postoperative pain and comfort of geriatric orthopaedic patients: A randomized controlled trial. *ANZ Journal of Surgery*, 93(5), 1207–1213. doi:10.1111/ans.18333.
- Patiyal, N., Kalyani, V., Mishra, R., Kataria, N., Sharma, S., Parashar, A., & Kumari, P. (2021). Effect of music therapy on pain, anxiety, and use of opioids among patients underwent orthopedic surgery: A systematic review and meta-analysis. *Cureus*, 13(9), e18377. doi:10.7759/cureus.18377.
- Pishgooie, S. A. H., Akbari, F., Shahrestanaki, S. K., Rezaei, M., Nasiri, M., & Momen, R. (2020). Effects of relaxation techniques on acute postlaminectomy pain: A three-arm randomized controlled clinical trial. *Journal of PeriAnesthesia Nursing*, 35(5), 533–538. doi:10.1016/j.jopan.2020.02.004.
- Qaseem, A., McLean, R. M., O’Gurek, D., Batur, P., Lin, K., & Kansagara, D. L. (2020). Nonpharmacologic and pharmacologic management of acute pain from non-low back, musculoskeletal injuries in adults: A clinical guideline from the American College of Physicians and American Academy of Family Physicians. *Annals of Internal Medicine*, 173(9), 739–748. doi:10.7326/M19-3602.
- Zengin Aydın, L., & Doğan, A. (2023). The effect of guided imagery on postoperative pain management in patients undergoing lower extremity surgical operations: A randomized controlled trial. *Orthopaedic Nursing*, 42(2), 105–112. doi:10.1097/NOR.0000000000000929.