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Nursing Care for Hydronephrosis Patients Through Deep Breathing Relaxation Techniques Implementation to Reduce Pain: A Case Report

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Abstract:
Hydronephrosis occurs due to a disorder in the urinary tract that causes the flow of urine from the urinary tract to be obstructed, causing the dilation of the channels in the kidneys. The main symptoms that hydronephrosis patients commonly feel are pain in the lower back, nausea, and fatigue. Deep breath relaxation therapy, as a non-pharmacological therapy, has the effect of reducing pain. This study aims to determine the effect of deep breath relaxation techniques in patients with hydronephrosis and pain complaints. The method used in this study was a case study of one patient who was given an intervention for three days. The pain intensity scale was measured using the Numeric Rating Scale (NRS). This study showed a significant reduction in pain intensity in hydronephrosis patients from a scale of 6 to a scale of 3, where the deep breath relaxation technique intervention was given for three consecutive days for three sets per day in patients. Based on the results of the study, the researcher suggests the use of deep breath relaxation techniques as a non-pharmacological therapy in hydronephrosis patients with pain complaints in clinical practice, which can be provided by health workers, especially nurses or as patient-independent therapy because deep breath relaxation techniques are easy to do therapy and do not require additional tools and materials to do so.

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INTRODUCTION

Hydronephrosis, characterized by the pathological dilation of the renal pelvis and calyces due to urinary tract obstruction, represents a critical disruption in normal renal function (Kim, 2024). This condition arises when urine flow is impeded, leading to increased intraluminal pressure, compromised glomerular filtration rates, and diminished renal blood flow (Ahmed et al., 2024). The progressive accumulation of urine in the renal system triggers compensatory smooth muscle hypertrophy and structural adaptations, ultimately threatening kidney viability if left untreated (Patel & Batura, 2020). Understanding the mechanisms underlying hydronephrosis is essential for developing targeted therapeutic strategies to mitigate renal damage and alleviate associated symptoms (Wang et al., 2025).

The etiology of hydronephrosis is multifactorial, with obstructions occurring at various anatomical levels of the urinary tract (Hsiao et al., 2021). Upper urinary tract obstructions, such as ureteropelvic junction (UPJ) blockages, may result from congenital anomalies, renal stones, or fibrous tissue compression (Cai & Lee, 2023). Conversely, lower obstructions often stem from ureteral strictures, tumors, or extrinsic compression from retroperitoneal pathologies (Pérez-Aizpurua et al., 2024). Structural abnormalities, including malpositioned kidneys causing ureteral

kinking, further exacerbate the risk of hydronephrosis. These diverse causative factors necessitate a nuanced approach to diagnosis and management tailored to the specific location and origin of the obstruction (Colquhoun, 2023).

Clinical manifestations of hydronephrosis are highly variable, often correlating with the severity and acuity of the obstruction. Patients may experience flank or groin pain, dysuria, hematuria, fever, nausea, and fatigue (Chung & Bhagia, 2021). Symptoms may develop insidiously over weeks or months, delaying diagnosis and intervention. Pain, a prevalent and distressing symptom, is subjectively experienced and influenced by individual pain thresholds, psychological factors, and comorbid conditions. Effective pain management remains a cornerstone of hydronephrosis care, requiring pharmacological and non-pharmacological interventions to optimize patient outcomes (Kassim et al., 2022).

Pharmacological pain management typically involves analgesics, including nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids, to alleviate discomfort (Lim et al., 2025). However, prolonged use of these medications is associated with adverse effects such as gastrointestinal irritation, renal toxicity, and dependency risks (Tobin et al., 2022). Given these limitations, there is growing interest in complementary non-pharmacological approaches that minimize side effects while enhancing patient autonomy. Non-pharmacological therapies, such as relaxation techniques, massage, and guided imagery, offer promising adjuncts to conventional pain management protocols (Niyonkuru et al., 2025).

Among non-pharmacological interventions, deep breathing relaxation techniques have effectively reduced pain perception across various clinical contexts (Patil et al., 2022). By activating the parasympathetic nervous system, these techniques promote muscle relaxation, improve oxygenation, and modulate pain signaling pathways (Toussaint et al., 2020). Repeated practice of deep breathing enhances diaphragmatic efficiency, reduces sympathetic hyperactivity, and fosters a sense of control over pain, making it a viable option for hydronephrosis patients. Studies suggest that structured relaxation training can significantly lower pain intensity scores, though its application in hydronephrosis remains underexplored (Devi et al., 2024).

Integrating deep breathing relaxation into nursing care aligns with holistic, patient-centered principles. Nurses play a pivotal role in educating patients about self-administered pain management strategies, empowering them to participate in their recovery actively (Jarrah et al., 2022; Musviro et al., 2024). This approach not only addresses physical discomfort but also mitigates anxiety and stress, which are known to exacerbate pain perception (Gholamrezaei et al., 2022). Furthermore, relaxation techniques are cost-effective, easily adaptable, and devoid of the complications associated with pharmacological agents, making them particularly suitable for resource-limited settings (Jyskä et al., 2022).

Despite the theoretical and empirical support for deep breathing relaxation, its specific efficacy in hydronephrosis-related pain remains poorly documented. Existing literature lacks focused investigations into the impact of non-pharmacological interventions on pain dynamics in this patient population (Puri et al., 2023). Addressing this gap is critical to expanding evidence-based nursing practices and improving quality-of-life metrics for individuals with hydronephrosis.

This case report aims to evaluate the effectiveness of deep breathing relaxation techniques in reducing pain intensity among a patient diagnosed with unilateral hydronephrosis. By documenting pre- and post-intervention pain scores, physiological responses, and patient-reported outcomes, the study seeks to contribute preliminary evidence supporting the integration of relaxation therapies into standard hydronephrosis care protocols (Mardiah et al., 2022). The findings may inform clinical guidelines for nurses managing hydronephrosis patients, emphasizing the value of non-pharmacological strategies in fostering resilience and self-efficacy. As healthcare systems

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increasingly prioritize patient safety and holistic well-being, innovative nursing interventions like deep breathing relaxation can enhance pain management paradigms and improve clinical outcomes (Joseph et al., 2022; Rojaye, 2024).

STUDY DESIGN

This study employed a case study approach to evaluate the effectiveness of deep breathing relaxation techniques in managing pain among hydronephrosis patients at the Catleya Room of Dr. Soebandi Hospital in Jember, Indonesia. The primary objective was to assess changes in pain intensity before and after the intervention, guided by standardized protocols. A descriptive design was used to document subjective pain outcomes and physiological responses, providing qualitative and quantitative insights into the impact of the intervention. The study focused on a single patient, Mrs. T, diagnosed with hydronephrosis, allowing for an in-depth analysis of individualized nursing care and pain management strategies.

Data was collected using hospital-established Standard Operating Procedures (SOPs) for deep breathing relaxation techniques, ensuring consistency and adherence to institutional guidelines. Monitoring forms were employed to record procedural steps, patient compliance, and real-time pain assessments. Nursing activities, including anamnesis, diagnosis formulation, intervention planning, implementation, and evaluation, were systematically executed over three days (April 20–22, 2024). Pain intensity was measured using validated tools such as the Numeric Pain Rating Scale (NPRS) before and after each intervention session. This timeframe allowed for comprehensive observation of the immediate and cumulative effects of the relaxation technique on pain perception.

The study received ethical clearance from the Faculty of Nursing, Universitas Jember, ensuring compliance with research standards and patient rights. Informed consent was obtained, and confidentiality was maintained throughout the process. Integrating deep breathing relaxation into routine nursing care highlighted the practical applicability of non-pharmacological interventions in clinical settings. This study aimed to generate preliminary evidence to inform future research and enhance pain management protocols for hydronephrosis patients by focusing on a single case.

PATIENT INFORMATION

Mrs. T, a 45-year-old female admitted to the Catleya Room with unilateral hydronephrosis, was selected as the sole participant.

CLINICAL FINDINGS

First Day Implementation

On the first day, April 20, 2024, at 14.00 WIB, the researcher conducted a pain assessment in patients before being given non-pharmacological therapy with deep breath relaxation techniques. The results of the PQRST pain assessment were obtained as follows: P: pain in the abdomen, Q: dull pain, R: abdominal area radiating to the waist, S: scale 6, T: pain disappeared, after which the researcher provided a breath relaxation technique in approximately 10 minutes. In 10 minutes, the patient performs the deep breath relaxation technique for three sets, where 1 set of deep breath relaxation techniques includes 10 breaths; when going to change sets, the patient rests first for 30-60 seconds, then the deep breath relaxation technique is repeated until it fills 3 times. After administering the deep breath relaxation technique, the researcher re-evaluated the patient's pain

scale. The patient said that after being given the deep breath relaxation technique for 10 minutes, the pain was reduced to a scale of 5.

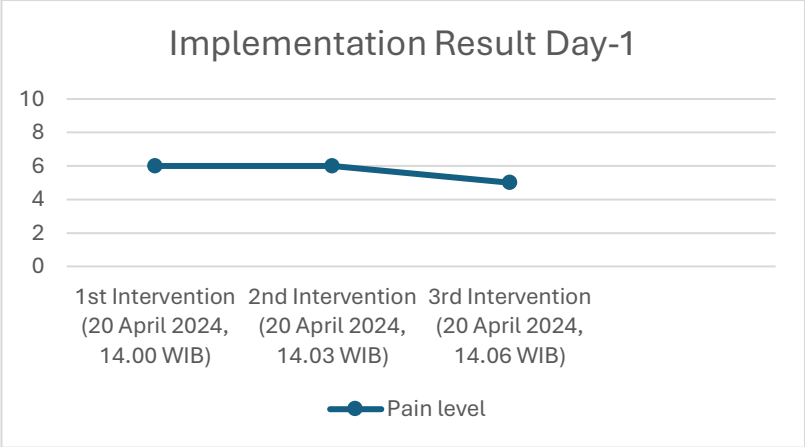

Diagram 1. Evaluation of pain level on the first day using the Numeric Rating Scale (NRS) before the intervention and after the intervention

The second day of implementation

On the second day, April 21, 2024, at 14.00 WIB, the researcher conducted a reassessment of the patient's pain before being given non-pharmacological therapy with deep breath relaxation techniques. The results of the PQRST pain assessment were obtained as follows: P: pain in the abdomen, Q: dull pain, R: abdominal area radiating to the waist, S: scale 5, T: pain that disappeared, after which the researcher provided breathing relaxation techniques in 3 sets as before. The researcher re-evaluated the pain scale after the deep breath relaxation technique was completed, and it was found that the patient's pain scale decreased to a scale of 4. The patient also said he would independently relax the deep breaths if the pain felt severe.

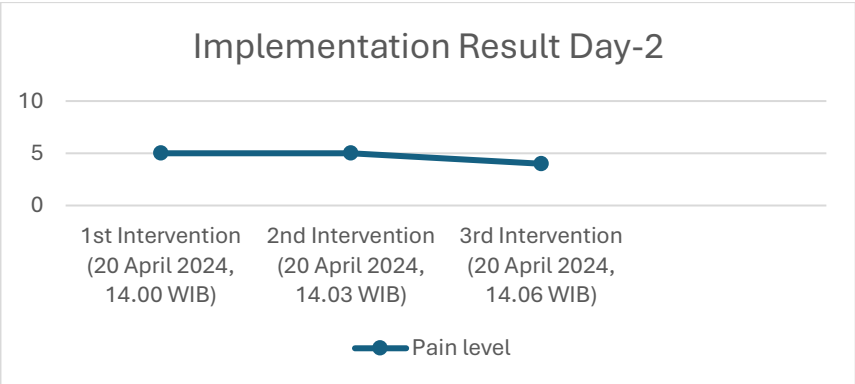

Diagram 2. Evaluation of pain level on the second day using the Numeric Rating Scale (NRS) before the intervention and after the intervention

The third day of implementation

On the third day, April 22, 2024, at 14.00 WIB, the researcher conducted a reassessment of the patient's pain before being given non-pharmacological therapy with deep breath relaxation techniques. The results of the PQRST pain assessment were obtained as follows: P: pain in the abdomen, Q: dull pain, R: abdominal area radiating to the waist, S: scale 4, T: pain disappeared, after which the researcher provided breathing relaxation techniques in 3 sets as before. The

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researcher re-evaluated the pain scale after the administration of the deep breath relaxation technique was completed, and it was found that the patient's pain scale decreased to a scale of 3. The patient said that the pain was still there, but not as severe as when he was first admitted to the hospital.

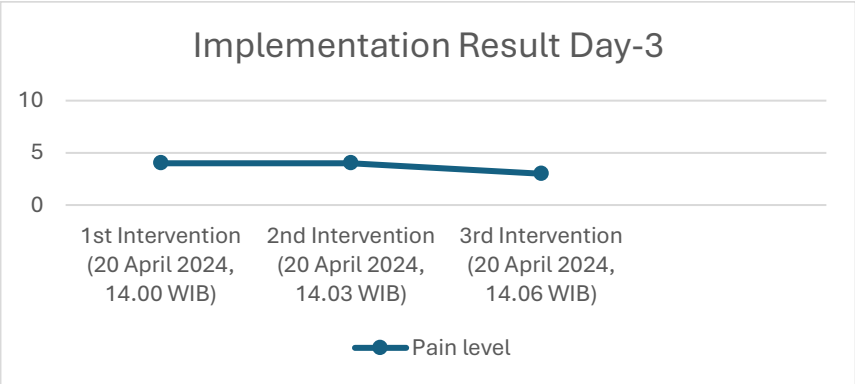

Diagram 3. Evaluation of pain level on the third day using the Numeric Rating Scale (NRS) before the intervention and after the intervention

Based on the diagram above, it can be seen that on the first to third day, the administration of deep breath relaxation therapy to patients with hydronephrosis showed a decrease of 1 scale per day in the intensity of the patient's pain. So, the researcher concludes that the administration of deep breathing relaxation techniques can reduce the scale of pain in patients with hydronephrosis.

DISCUSSION

The findings of this case study demonstrate that deep breathing relaxation techniques significantly reduced pain intensity in a hydronephrosis patient. The patient's pain score, initially rated at six on the Numeric Pain Rating Scale (NPRS), decreased to 5 on the first day of intervention and continued to decline by one point daily thereafter. This progressive reduction underscores the efficacy of deep breathing relaxation as a non-pharmacological intervention for managing pain in hydronephrosis. The mechanism behind this effect may involve activating endogenous opioid systems, which naturally suppress pain perception (Ploesser & Martin, 2024). By stimulating the release of endorphins and enkephalins, deep breathing relaxation enhances the body's intrinsic analgesic pathways, alleviating discomfort without reliance on medications (Prayogi et al., 2022).

A key advantage of deep breathing relaxation is its ability to mitigate musculoskeletal tension, a common contributor to pain in patients with hydronephrosis. The technique promotes skeletal muscle relaxation by improving blood flow to ischemic tissues and counteracting prostaglandin-induced vasoconstriction. Patients experience decreased muscle stiffness and enhanced oxygen delivery to affected areas by slowing the respiratory rate and reducing sympathetic nervous system activity. This physiological response alleviates localized pain and fosters a systemic sense of calm (Gholamrezaei et al., 2021). The simplicity of the intervention—requiring no specialized equipment or training—makes it an accessible option for both healthcare providers and patients, particularly in resource-limited settings.

The results align with existing literature highlighting the benefits of non-pharmacological pain management strategies. In this context, deep breathing relaxation emerges as a practical adjunct to conventional analgesic therapies (Wang et al., 2025). As frontline caregivers, nurses can integrate this technique into routine care plans, empowering patients to self-manage pain episodes

independently. Furthermore, its application aligns with holistic nursing principles, addressing physical and psychological pain dimensions (Chatchumni, 2024).

Despite these promising outcomes, this study has limitations. As a single-case report, the findings lack generalizability and statistical power. Variability in individual pain thresholds, comorbidities, and environmental factors may influence the observed results. Additionally, the short intervention period (three days) restricts conclusions about long-term efficacy. Future research should prioritize larger-scale studies with diverse patient populations and extended follow-up periods to validate these findings. Incorporating objective biomarkers, such as cortisol levels or heart rate variability, could further elucidate the physiological mechanisms underlying pain reduction.

This case study provides preliminary evidence supporting the integration of deep breathing relaxation into nursing protocols for hydronephrosis care. This technique addresses critical gaps in pharmacological therapy while enhancing patient resilience by offering a safe, cost-effective, and patient-centered approach to pain management. Healthcare institutions are encouraged to formalize nurse training programs and educate patients on self-administered relaxation practices. As the demand for non-invasive interventions grows, deep breathing relaxation is valuable for improving quality-of-life outcomes in patients with hydronephrosis.

CONCLUSION

The administration of deep breath relaxation therapy was effective in reducing pain levels in patients with hydronephrosis. A significant decrease in pain levels can be seen from measuring the pain scale, which was initially on a scale of 6, gradually decreasing until it reached a scale of 3. Nurses can use deep breath relaxation therapy as a non-pharmacological therapy in patients with hydronephrosis to reduce the patient's pain level. Patients can also use deep breath relaxation therapy as an independent therapy because it is an easy-to-do therapy, and no other special equipment is required.

REFERENCES

Ahmed, K., Dubey, M. K., Dubey, S., & Pandey, D. K. (2024). Chronic kidney disease: Causes, treatment, management, and future scope. *Computational Intelligence for Genomics Data*, 99-111. https://doi.org/10.1016/B978-0-443-30080-6.00010-9

Cai, P. Y., & Lee, R. S. (2023). Ureteropelvic Junction Obstruction/Hydronephrosis. *Urologic Clinics of North America*, *50*(3), 361-369. https://doi.org/10.1016/j.ucl.2023.04.001

Chatchumni, M. (2024). Pain and Pain Management. In *Nursing Studies-A Path to Success*. IntechOpen. http://dx.doi.org/10.5772/intechopen.1004731

Chung, T. J., & Bhagia, G. (2021). Perinephric Hematoma Associated with Pyelonephritis Following Ureteral Stent Placement for Ureteral Obstruction Causing Hydronephrosis. *The American Journal of Case Reports*, *22*, e931404-1. https://doi.org/10.12659/AJCR.931404

Colquhoun, A. J. (2023). The kidney and ureter. *Ellis and Calne's Lecture Notes in General Surgery*, 425-443. https://doi.org/10.1002/9781394322008.ch43

Devi, N. S., Maftuhah, I. M., Khasanah, U., Nurokhman, N. R., & Purbaningsih, E. S. (2024). Nursing Care for Mr. S, Diagnosed with Pulmonary Tuberculosis (TB) in the Emergency Department (ED) of Gunung Jati Hospital in Cirebon City. *Al Makki Health Informatics Journal*, *2*(4), 240-245. https://doi.org/10.57185/hij.v2i4.23

Gholamrezaei, A., Diest, I. V., Aziz, Q., S. Vlaeyen, J. W., & Oudenhove, L. V. (2021). Psychophysiological responses to various slow, deep breathing techniques. *Psychophysiology*, *58*(2), e13712. https://doi.org/10.1111/psyp.13712

Gholamrezaei, A., Diest, I. V., Aziz, Q., Pauwels, A., Tack, J., S. Vlaeyen, J. W., & Oudenhove, L. V. (2022). Effect of slow, deep breathing on visceral pain perception and its underlying psychophysiological mechanisms. *Neurogastroenterology & Motility*, *34*(4), e14242. https://doi.org/10.1111/nmo.14242

Hsiao, C., Chen, T., Lee, Y., & Wang, M. (2021). Ureteral stone with hydronephrosis and urolithiasis alone are risk factors for acute kidney injury in patients with urinary tract infection. *Scientific Reports*, *11*(1), 1-10. https://doi.org/10.1038/s41598-021-02647-8

Jarrah, M. I., Hweidi, I. M., Al-Dolat, S. A., Alhawatmeh, H. N., Al-Obeisat, S. M., Hweidi, L. I., Hweidi, A. I., & Alkouri, O. A. (2022). The effect of slow deep breathing relaxation exercise on pain levels during and post chest tube removal after coronary artery bypass graft surgery. *International Journal of Nursing Sciences*, *9*(2), 155-161. https://doi.org/10.1016/j.ijnss.2022.03.001

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*. https://doi.org/10.1177/2515690X221078006

Jyskä, I., Turunen, M., Chaychi Maleki, A., Karppa, E., Palmu, S., Mäkelä, J., & Puura, K. (2022). Design and User Experience of VirNE Application: Deep Breathing Exercise in a Virtual Natural Environment to Reduce Treatment Anxiety in Pediatrics. *Healthcare*, *11*(24), 3129. https://doi.org/10.3390/healthcare11243129

Kassim, M. A., Pantazi, A. C., Nori, W., Tuta, L. A., Balasa, A. L., Mihai, C. M., Mihai, L., Frecus, C. E., Lupu, V. V., Lupu, A., Andrusca, A., Iorga, A. M., Litrin, R. M., Ion, I., Ciciu, E., Chirila, S. I., & Chisnoiu, T. (2022). Non-Pharmacological Interventions for Pain Management in Hemodialysis: A Narrative Review. *Journal of Clinical Medicine*, *12*(16), 5390. https://doi.org/10.3390/jcm12165390

Kim, S. W. (2024). Management of hydronephrosis: a comprehensive review in pediatric urology perspective. *Childhood Kidney Diseases*, *28*(2), 59-65. https://doi.org/10.3339/ckd.24.011

Lim, R. T., Moll, N. R., Bryan, A. C., & Pais, V. M. (2025). Pain Management Strategies for Patients with Kidney Stones. *Urologic Clinics of North America*. https://doi.org/10.1016/j.ucl.2025.04.008

Mardiah, A., Widodo, A., & Thuy, L. T. (2022). A literature review of benson relaxation technique for reducing anxiety in patients with chronic kidney disease. *Innovation in Health for Society*, *2*(1), 3-7. https://doi.org/10.31603/ihs.7231

Musviro, M., Ainun Syarifatul Fitriyah, Nurul Hayati, Laili Nur Azizah, & Anggia Astuti. (2024). The Implementation of Deep Breathing Relaxation and Al-Quran Recitation in Reducing Acute Pain in Post-Op Sectio Caesarea Patients: A Study Case. *Health and Technology Journal (HTechJ)*, *2*(6), 655–660. https://doi.org/10.53713/htechj.v2i6.297

Niyonkuru, E., Iqbal, M. A., Zhang, X., & Ma, P. (2025). Complementary approaches to postoperative pain management: a review of non-pharmacological interventions. *Pain and Therapy*, *14*(1), 121-144. https://doi.org/10.1007/s40122-024-00688-1

Patel, K., & Batura, D. (2020). An overview of hydronephrosis in adults. *British Journal of Hospital Medicine*, *81*(1), 1-8. https://doi.org/10.12968/hmed.2019.0274

Patil, J. D., Sefen, J. A., & Fredericks, S. (2022). Exploring Non-pharmacological Methods for Pre-operative Pain Management. *Frontiers in Surgery*, *9*, 801742. https://doi.org/10.3389/fsurg.2022.801742

Pérez-Aizpurua, X., Benavente, R. C., Serrano, G. B., Alcázar Peral, J. M., Gómez-Jordana Mañas, B., Blanco, C., Ospina, F. O., & Gonzalez-Enguita, C. (2024). Obstructive uropathy: Overview of the pathogenesis, etiology and management of a prevalent cause of acute kidney injury. *World Journal of Nephrology*, *13*(2), 93322. https://doi.org/10.5527/wjn.v13.i2.93322

Ploesser, M., & Martin, D. (2024). Mechanism of Action of Mindfulness-Based Interventions for Pain Relief—A Systematic Review. *Journal of Integrative and Complementary Medicine*, *30*(12), 1162-1178. https://doi.org/10.1089/jicm.2023.0328

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p-ISSN: 2986-5662
e-ISSN: 2985-959X

Prayogi, A. S., Andriyani, N., Olfah, Y., & Harmilah, H. (2022). Deep Breath Relaxation and Fingerprinting Against Post Pain Reduction of Laparatomic Operations. *Open Access Macedonian Journal of Medical Sciences*, *9*(T5), 132–136. https://doi.org/10.3889/oamjms.2021.7816

Puri, S. N., Jawade, S., & Deshmukh, N. S. (2023). Virtual Reality Therapy as an Adjunct to Physiotherapy for Postoperative Pain Management: A Case Report of Laparoscopic Open Pyeloplasty for Hydronephrosis. *Cureus*, *15*(11), e48254. https://doi.org/10.7759/cureus.48254

Rojaye, Justin Oluwasegun. (2024). Advances in Nurses' Pain Management Practices: The Case of Long-Term Care. *Nursing and Health Sciences Journal (NHSJ)* 4 (3):253-59. https://doi.org/10.53713/nhsj.v4i3.378.

Tobin, D. G., Lockwood, M. B., Kimmel, P. L., Dember, L. M., Eneanya, N. D., Jhamb, M., Nolin, T. D., Becker, W. C., & Fischer, M. J. (2022). Opioids for chronic pain management in patients with dialysis-dependent kidney failure. *Nature Reviews Nephrology*, *18*(2), 113-128. https://doi.org/10.1038/s41581-021-00484-6

Toussaint, L., Nguyen, Q. A., Roettger, C., Dixon, K., Offenbächer, M., Kohls, N., Hirsch, J., & Sirois, F. (2020). Effectiveness of Progressive Muscle Relaxation, Deep Breathing, and Guided Imagery in Promoting Psychological and Physiological States of Relaxation. *Evidence-Based Complementary and Alternative Medicine*, *2021*(1), 5924040. https://doi.org/10.1155/2021/5924040

Wang, Y., Aaron, R., Attal, N., & Colloca, L. (2025). An update on non-pharmacological interventions for pain relief. *Cell Reports Medicine*, *6*(2), 101940. https://doi.org/10.1016/j.xcrm.2025.101940

Wang, X., Zhou, J. H., Chen, G., Chen, J. D., Li, H., Shan, W. M., & Li, W. X. (2025). Hydronephrosis-Associated Renal Fibrosis: Clinical Validation of Spp1 as a Biomarker and Therapeutic Target. *Kidney and Blood Pressure Research*. https://doi.org/10.1159/000546465