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Effect of Nurse-Led Multimodal and Non-Pharmacological Pain Management Interventions on Postoperative Pain Outcomes in Secondary Health Facilities in Cross River State, Nigeria

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Abstract: Postoperative pain remains inadequately managed in many low-resource settings, contributing to delayed recovery and reduced patient satisfaction. Nurse-led multimodal and non-pharmacological pain management strategies have been proposed as effective, context-appropriate approaches to improving postoperative outcomes. This study examined the effect of nurse-led multimodal and non-pharmacological pain management interventions on postoperative pain outcomes in selected secondary health facilities in Cross River State, Nigeria. A quasi-experimental, non-randomised pre-test and post-test control group design was adopted. The study involved registered nurses working in postoperative care units of selected secondary health facilities. A sample of 280 nurses was determined using Yamane's formula and selected through a multistage sampling technique. Data were collected using a validated structured questionnaire and observational checklist. Reliability testing yielded a Cronbach's alpha coefficient of 0.82. The intervention comprised nurse-led training and supervised implementation of multimodal and non-pharmacological pain management strategies over four weeks. Data were analysed using SPSS version 25, with descriptive and inferential statistics applied. Statistical significance was set at $p < 0.05$. Findings showed a statistically significant improvement in postoperative pain outcomes following the intervention. Patients in the intervention group reported reduced pain intensity, improved functional recovery, and higher satisfaction with pain management compared with pre-intervention scores and the control group. Nurse-related outcomes, including pain assessment practices and utilisation of non-pharmacological interventions, also improved significantly. Nurse-led multimodal and non-pharmacological pain management interventions are effective in improving postoperative pain outcomes in secondary health facilities. Integrating structured nurse-led pain management programmes into routine postoperative care may enhance recovery and

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patient satisfaction, particularly in resource-constrained settings.

Keywords: Postoperative pain, nurse-led interventions, multimodal pain management, non-pharmacological strategies, secondary health facilities, Nigeria.

Introduction

Postoperative pain remains a significant clinical concern globally and continues to pose a major challenge to effective patient recovery, particularly in low- and middle-income countries. Inadequately managed postoperative pain is associated with a wide range of adverse outcomes, including delayed wound healing, increased risk of complications, prolonged hospitalisation, psychological distress, reduced functional recovery, and decreased patient satisfaction with care (Apfelbaum, Chen, Mehta & Gan, 2003; Kehlet & Dahl, 2003). Effective pain management is therefore recognised as a fundamental component of quality surgical and nursing care.

Conventional postoperative pain management has largely relied on pharmacological approaches, particularly opioid and non-opioid analgesics. Although these medications are effective, their use is often accompanied by undesirable side effects such as nausea, vomiting, constipation, sedation, respiratory depression, and the risk of dependence and misuse, especially with opioids (Gan, Habib, Miller, White & Apfelbaum, 2014). In many secondary health facilities in Nigeria, the effectiveness of pharmacological pain management is further constrained by limited drug availability, inconsistent pain assessment practices, inadequate monitoring, and shortages of specialised pain management personnel (Aziato & Adejumo, 2014).

Nurses play a pivotal role in postoperative pain management, as they are primarily responsible for continuous pain assessment, implementation of pain relief interventions, patient education, and evaluation of treatment outcomes. Nurse-led pain management interventions involve structured, evidence-based strategies initiated and coordinated by nurses within their professional scope of practice. These interventions are particularly relevant in secondary health facilities where nurses constitute the largest segment of the healthcare workforce and often provide round-the-clock postoperative care (McCaffery & Pasero, 2011).

Multimodal pain management has gained increasing attention as an effective approach to postoperative pain control. This strategy involves the use of multiple

complementary interventions targeting different pain pathways to enhance analgesic effectiveness while minimising reliance on pharmacological agents (Kehlet & Dahl, 2003). Non-pharmacological pain management interventions—including relaxation techniques, deep breathing exercises, guided imagery, therapeutic positioning, early mobilisation, massage, cold and heat application, music therapy, and patient education—have been shown to significantly reduce pain intensity, anxiety, and analgesic consumption in postoperative patients (Tick et al., 2018; Gelinas et al., 2013). These interventions are cost-effective, safe, and culturally adaptable, making them particularly suitable for resource-limited healthcare settings.

In Nigeria, secondary health facilities manage a substantial proportion of surgical procedures, including general, obstetric, gynaecological, and orthopaedic surgeries. Despite this, evidence suggests that postoperative pain in these settings is frequently under-assessed and poorly managed due to high patient workloads, limited training on contemporary pain management strategies, absence of standardised pain management protocols, and overreliance on pharmacological methods (Ogboli-Nwasor, Makusidi, Yusufu & Ewa, 2013). Patients commonly report moderate to severe postoperative pain, indicating persistent gaps in the quality of pain management practices.

The integration of nurse-led multimodal and non-pharmacological pain management interventions presents a viable strategy for improving postoperative pain outcomes in secondary health facilities. Such interventions promote holistic, patient-centred care, empower nurses in clinical decision-making, enhance patient involvement in pain management, and potentially reduce healthcare costs and postoperative complications (Registered Nurses' Association of Ontario, 2013). However, despite growing international evidence supporting these approaches, there remains a paucity of empirical studies examining their effectiveness within Nigerian secondary health facilities, particularly in Cross River State.

Against this backdrop, this study seeks to examine the effect of nurse-led multimodal and non-pharmacological pain management interventions on postoperative pain outcomes in secondary health facilities in Cross River State, Nigeria. Generating context-specific empirical evidence will contribute to strengthening nursing practice, informing institutional pain management policies, and improving the overall quality of postoperative care in similar resource-constrained settings.

Statement of the Problem

Effective postoperative pain management is a critical determinant of patient recovery, functional restoration, and overall quality of surgical care. Adequate pain control facilitates early mobilisation, reduces postoperative complications, and improves patient satisfaction with healthcare services (Apfelbaum et al., 2003; Kehlet & Dahl, 2003). Despite advances in pain management knowledge and the availability of evidence-based clinical guidelines, postoperative pain remains inadequately managed in many healthcare settings, particularly in low- and middle-income countries such as Nigeria (Ogboli-Nwasor et al., 2013; Rawal, 2016). Empirical evidence consistently indicates that a substantial proportion of postoperative patients continue to experience moderate to severe pain, reflecting persistent gaps between recommended best practices and actual clinical implementation (Apfelbaum et al., 2003; Gan et al., 2014).

In secondary health facilities in Cross River State, postoperative pain management practices are predominantly pharmacologically driven, with minimal integration of multimodal and non-pharmacological interventions. This reliance on analgesic medications is often compounded by systemic challenges, including inconsistent pain assessment practices, inadequate nurse training in contemporary pain management strategies, high patient-to-nurse ratios, limited institutional pain management protocols, and insufficient monitoring and evaluation of pain outcomes (Ogboli-Nwasor et al., 2013; Kizza et al., 2016). Consequently, postoperative patients may be exposed to avoidable pain, delayed ambulation, increased risk of postoperative complications, prolonged hospital stays, and diminished satisfaction with nursing care (Kehlet & Dahl, 2003; Gan et al., 2014).

Although nurses play a central role in postoperative pain assessment, intervention delivery, and patient education, their potential to lead structured, multimodal, and non-pharmacological pain management interventions remains underutilised in many secondary healthcare settings. Evidence from international studies suggests that nurse-led pain management interventions, including relaxation techniques, patient education, positioning, cold and heat therapy, and guided mobilisation, can significantly improve pain control, reduce opioid consumption, and enhance postoperative recovery outcomes (McCaffery & Pasero, 2011; Chou et al., 2016). However, there remains a notable paucity of empirical, context-specific studies examining the effectiveness of nurse-led multimodal and non-pharmacological pain management interventions within Nigerian secondary healthcare facilities, particularly in Cross River State.

The absence of robust local evidence limits the capacity of healthcare managers, policymakers, and nursing leaders to design, implement, and sustain effective pain management protocols that are responsive to the realities of secondary health facilities. Without empirical data to support the integration of nurse-led multimodal approaches, postoperative pain management is likely to remain suboptimal, thereby perpetuating unnecessary patient suffering and undermining the quality of surgical care delivery (Rawal, 2016; Chou et al., 2016).

Therefore, there is a critical need to empirically examine the effect of nurse-led multimodal and non-pharmacological pain management interventions on postoperative pain outcomes in secondary health facilities in Cross River State, Nigeria. Addressing this gap will generate evidence to inform nursing practice, strengthen clinical guidelines, support policy formulation, enhance professional training, and ultimately improve postoperative patient outcomes.

Research Objectives

1. To assess postoperative pain outcomes including pain intensity, functional recovery and patient satisfaction before and after the implementation of nurse-led multimodal and non-pharmacological pain management interventions.
2. To determine the effect of nurse-led multimodal and non-pharmacological pain management interventions on postoperative pain intensity and functional outcomes among postoperative patients in secondary health facilities in Cross River State.
3. To identify challenges encountered by nurses in the implementation of multimodal and non-pharmacological pain management interventions in secondary health facilities in Cross River State.

Research Questions

1. What are the postoperative pain outcomes in terms of pain intensity, functional recovery and patient satisfaction before and after the implementation of nurse-led multimodal and non-pharmacological pain management interventions?
2. What effect do nurse-led multimodal and non-pharmacological pain management interventions have on postoperative pain intensity and functional outcomes among postoperative patients in secondary health facilities in Cross River State?
3. What challenges do nurses encounter in the implementation of multimodal and non-pharmacological pain management interventions in secondary health facilities in Cross River State?

Research hypotheses

H_{01}: Nurse-led multimodal and non-pharmacological pain management interventions have no significant effect on postoperative pain outcomes, including pain intensity, functional recovery and patient satisfaction among postoperative patients in secondary health facilities in Cross River State.

H_{02}: Nurse-led multimodal and non-pharmacological pain management interventions have no significant effect on postoperative pain intensity and functional outcomes among postoperative patients in secondary health facilities in Cross River State.

H_{03}: There are no significant challenges affecting the implementation of nurse-led multimodal and non-pharmacological pain management interventions in secondary health facilities in Cross River State.

Literature Review

Concept of Postoperative Pain

Postoperative pain refers to the acute pain experienced following surgical procedures, arising primarily from tissue trauma, inflammation, and nerve injury. It is a complex physiological phenomenon that also has psychological and emotional dimensions, influenced by factors such as anxiety, previous pain experiences, and patient expectations. When poorly managed, postoperative pain can lead to delayed wound healing, reduced mobility, increased risk of complications (such as deep vein thrombosis and pulmonary infections), prolonged hospital stay, and diminished patient satisfaction (Apfelbaum et al., 2003; Kehlet & Dahl, 2003).

Effective management of postoperative pain requires routine assessment using validated pain measurement tools, such as the Numerical Rating Scale (NRS), Visual Analogue Scale (VAS), or Wong-Baker Faces Pain Rating Scale. Consistent pain assessment enables nurses and clinicians to evaluate the severity of pain, monitor treatment effectiveness, and adjust interventions appropriately. Consequently, pain assessment is considered a foundational component of postoperative care and a key determinant of clinical outcomes (Apfelbaum et al., 2003; Kehlet & Dahl, 2003).

Pain assessment practices in Nigerian hospitals are often inconsistent and inadequately implemented, with numerous studies documenting gaps in nurse knowledge, use of validated tools, and clinical application. For example, a cross-sectional study among nurses in Benin City, Edo State found that more than two-thirds of respondents demonstrated poor knowledge of postoperative pain assessment despite reporting

occasional use of tools such as the McGill Pain Questionnaire, highlighting deficiencies in professional preparation and continuing education (Ehwarieme, Josiah, & Abiodun, 2023). Similarly, broader evaluations of pain assessment knowledge among nurses in the same region showed limited utilisation of standardised pain assessment instruments, underscoring the need for enhanced educational interventions (Akpojaro et al., 2024).

Evidence from Cross River State corroborates these national findings. A recent descriptive study conducted in selected secondary and tertiary health facilities in Calabar and Ogoja revealed that pain assessment practices were inconsistently applied in postoperative wards, with less than half of nurses routinely using validated pain scales such as the Numerical Rating Scale or Visual Analogue Scale (Brown & Okon, 2023). Many nurses relied instead on subjective patient reports without systematic documentation, contributing to under-recognition of moderate to severe pain and delaying appropriate intervention.

In addition, a survey of postoperative patients in Cross River State found that over 60% reported experiencing moderate to severe pain during their first 48 hours after surgery, yet only a minority recalled being asked about their pain using a structured tool (Ikpe, Etim, & Udo, 2022). This disconnect between patient experience and clinical assessment practices highlights a critical gap in care delivery and underscores the need for systematic pain assessment training tailored to the local context.

Together, these studies suggest that inconsistent and suboptimal pain assessment practices are not unique to particular regions but are evident across Nigerian healthcare settings, including in Cross River State, where formalised pain assessment protocols are often lacking. This inconsistency may contribute to inadequate pain control, delayed functional recovery, and lower overall patient satisfaction with postoperative care. As a result, there is an urgent need for targeted capacity building, standardised assessment protocols, and supportive clinical governance structures to enhance postoperative pain assessment and management in secondary health facilities.

Nurse-Led Pain Management Interventions in Cross River State

In Cross River State, postoperative care is predominantly delivered by nurses, who are responsible for monitoring pain, administering analgesics, and providing basic comfort measures. Despite this central role, evidence suggests that structured nurse-led pain management programmes, particularly those combining multimodal and non-pharmacological approaches, are not widely implemented in secondary health facilities

within the state. This gap is significant because postoperative pain remains a major clinical challenge that affects patient recovery and satisfaction.

A study conducted in Cross River State found that postoperative patients frequently reported moderate to severe pain, and that pain assessment practices were inconsistent across secondary health facilities (Eja, Ukwayi, & Ojong, 2021). The study highlighted poor documentation of pain scores and irregular use of standard pain assessment tools, indicating weak institutional pain management protocols and limited nurse training on contemporary pain management strategies (Eja et al., 2021). These findings suggest that despite nurses being at the forefront of postoperative care, their capacity to implement structured pain interventions is constrained by systemic challenges.

In another investigation within Cross River State, the implementation of nurse-led postoperative care protocols was found to improve patient comfort and early mobilisation, although the study did not specifically evaluate multimodal or non-pharmacological pain interventions (Ukwayi, Eja, & Ojong, 2022). The results nonetheless support the premise that nurse-led initiatives can positively influence postoperative recovery outcomes when they are properly structured and supported by hospital management.

Furthermore, research on nursing practices in Cross River State indicates that nurses often rely heavily on pharmacological approaches due to limited access to non-pharmacological resources, insufficient training, and high patient-to-nurse ratios (Eja & Ukwayi, 2020). These constraints reduce opportunities for nurses to implement complementary interventions such as relaxation techniques, guided breathing, physiotherapy exercises, and patient education, which are essential components of multimodal pain management.

The evidence from Cross River State indicates a strong need for structured nurse-led multimodal and non-pharmacological pain management programmes. The existing studies highlight gaps in pain assessment, documentation, and the use of standard protocols, suggesting that postoperative pain outcomes could be improved through enhanced nurse training, institutional support, and the integration of multimodal strategies into routine postoperative care.

Postoperative pain management in Cross River State remains a significant clinical challenge, largely due to weak institutional protocols and limited implementation of structured nurse-led pain interventions. The available literature suggests that nurses, despite being the primary caregivers for postoperative patients, often lack the necessary training

and resources to effectively implement multimodal and non-pharmacological pain management strategies (Eja, Ukwayi, & Ojong, 2021).

A study examining pain assessment practices in secondary health facilities within Cross River State reported inconsistent use of validated pain scales and poor documentation of pain scores (Eja et al., 2021). These findings indicate that routine pain monitoring is not systematically integrated into postoperative care, which undermines the effectiveness of pain management. The authors argued that inadequate training and low institutional emphasis on pain assessment contribute to these shortcomings, emphasising the need for structured nurse-led interventions to standardise care.

In addition, evidence from nursing practice studies in Cross River State indicates that postoperative pain management is predominantly pharmacological, with limited use of non-pharmacological methods such as relaxation, guided breathing, physiotherapy, and patient education (Eja & Ukwayi, 2020). This suggests that nurses rely heavily on analgesic medications due to resource limitations and lack of training in multimodal pain management. The study further highlighted high nurse–patient ratios as a major barrier, which limits nurses' ability to provide personalised care and implement non-pharmacological strategies effectively.

Research focusing on structured nursing protocols in Cross River State suggests that nurse-led initiatives can improve postoperative outcomes, particularly in patient comfort and early mobilisation (Ukwayi, Eja, & Ojong, 2022). Although the study did not directly evaluate multimodal pain interventions, its findings support the broader literature indicating that structured nursing care improves recovery outcomes. This underscores the potential value of implementing nurse-led multimodal and non-pharmacological pain management programmes in secondary health facilities.

Collectively, these studies demonstrate a clear pattern: nurse-led pain management in Cross River State is underdeveloped, primarily due to limited training, weak pain assessment systems, and poor institutional support. The literature highlights the need for empirical research to evaluate nurse-led multimodal interventions that combine pharmacological and non-pharmacological strategies, as well as the need to assess the impact of such interventions on postoperative pain outcomes.

Multimodal Pain Management

Multimodal pain management combines different analgesic agents and techniques to achieve superior pain relief while minimising side effects. The rationale is based on the

concept that pain transmission involves multiple physiological pathways, and therefore targeting different pathways simultaneously produces synergistic effects (Kehlet & Dahl, 2003). Multimodal strategies typically include combinations of opioids, non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, regional anaesthesia, and non-pharmacological measures such as physiotherapy and relaxation techniques.

Globally, multimodal analgesia is recommended as best practice for postoperative pain management because it reduces reliance on opioids, limits adverse effects such as nausea and respiratory depression, and supports early mobilisation (Chou et al., 2016). In Nigeria, however, multimodal approaches are inconsistently applied due to weak institutional protocols, limited resources, and variable staff training (Eja et al., 2021). A study in South-West Nigeria reported that combined pharmacological and non-pharmacological strategies significantly improved postoperative pain relief and patient satisfaction after abdominal surgery (IJRSI, 2025). The findings align with global evidence but highlight the need for more local studies to assess the feasibility and effectiveness of multimodal protocols in Nigerian settings.

In Cross River State specifically, there is limited published evidence on the implementation of structured multimodal analgesia in secondary health facilities. Existing studies from the region have primarily focused on pain assessment and general nursing practices rather than on multimodal strategies (Eja & Ukwayi, 2020; Ukwayi et al., 2022). Nonetheless, the literature suggests that multimodal analgesia is an underutilised practice in the region, mainly due to inadequate training and limited availability of analgesic options.

The inconsistent adoption of multimodal pain management in Nigeria is further complicated by challenges such as inadequate supply of essential analgesics, weak postoperative monitoring systems, and poor adherence to clinical guidelines (Adebayo & Yusuf, 2024). These gaps emphasise the need for research that evaluates nurse-led multimodal protocols, particularly within secondary health facilities where surgical care is often limited by staffing and resource constraints.

Non-Pharmacological Pain Management in Nigeria

Non-pharmacological pain management involves interventions that do not rely on medication but rather focus on psychological, physical, and environmental factors to reduce pain perception. Common techniques include distraction, relaxation, guided imagery, music therapy, cold/heat application, positioning, and early mobilisation (McCaffery & Pasero,

1999). These strategies are especially important in resource-limited settings because they can be implemented with minimal cost and can complement pharmacological therapy.

Evidence from Nigerian surgical wards indicates that non-pharmacological methods are often underutilised. A survey of nurses in Benin City, Edo State revealed that distraction, positioning, and patient education were among the most frequently used non-pharmacological techniques, but overall application was inconsistent and largely dependent on individual nurse preference rather than standardised protocols (Ehwarieme et al., 2023). Similar findings were reported in a study of Nigerian tertiary hospitals, which highlighted low awareness and limited use of non-pharmacological interventions due to inadequate training and lack of institutional guidelines (Okafor et al., 2023).

In Cross River State, there is little direct research on non-pharmacological pain management, but evidence from nursing practice studies suggests that non-pharmacological methods are rarely integrated into routine postoperative care (Eja & Ukwayi, 2020). The limited use of these strategies reflects broader systemic issues such as high patient–nurse ratios, time constraints, and lack of continuous professional development opportunities.

Moreover, while non-pharmacological methods are globally recognised as effective in improving patient comfort and reducing analgesic requirements, their adoption in Nigeria remains low (McCaffery & Pasero, 1999). This gap underscores the need for structured nurse-led interventions that integrate non-pharmacological strategies into postoperative pain management protocols, especially in secondary health facilities where access to analgesics may be limited.

Patient-Centred Pain Management and Satisfaction

Patient satisfaction is a critical outcome measure for postoperative pain management, as it reflects both the quality of care and the effectiveness of pain control. Studies in Nigeria have demonstrated a persistent mismatch between analgesic use and patient-reported pain outcomes. A prospective study conducted at Ahmadu Bello University Teaching Hospital found that a large proportion of postoperative patients experienced moderate to severe pain despite analgesic administration, resulting in low satisfaction scores (Nigerian Journal of Surgery, 2020). These findings suggest that pharmacological management alone is insufficient and that pain control requires holistic, patient-centred strategies.

In Cross River State, research indicates that patient satisfaction with postoperative care is frequently compromised by poor pain assessment and limited use of comprehensive

pain management techniques (Eja et al., 2021). Patients often report inadequate pain relief, delayed mobilisation, and limited communication with nurses regarding pain management plans. These observations suggest the need for nurse-led interventions that prioritise patient education, regular pain assessment, and personalised care planning.

Patient-centred pain management approaches that integrate education, psychological support, and active participation in care decisions have been shown to improve pain outcomes and satisfaction in other Nigerian contexts (Adebayo & Yusuf, 2024). Therefore, there is a strong case for implementing similar strategies in Cross River State, particularly within secondary health facilities where structured pain protocols are currently lacking.

Challenges in Postoperative Pain Management in Nigeria

Postoperative pain management in Nigeria continues to be hindered by a range of systemic and professional barriers that affect the quality of care and patient outcomes. One major challenge is the inadequate knowledge and skills of nurses in pain assessment. Several studies have highlighted that nurses often lack proficiency in using validated pain assessment tools, which limits their ability to accurately evaluate pain severity and determine appropriate interventions. For example, research conducted in Benin City found that many nurses had poor knowledge and limited use of standardised pain assessment scales, thereby undermining effective pain management (Ehwarieme et al., 2023). Without accurate assessment, pain control becomes largely subjective and inconsistent, leading to persistent reports of moderate to severe postoperative pain.

Another significant challenge is the absence of standardised institutional protocols and guidelines for postoperative pain management. In many Nigerian health facilities, especially secondary hospitals, postoperative pain care is not guided by structured policies or evidence-based protocols. This gap results in inconsistent practices, where the management of postoperative pain depends largely on individual clinical judgement rather than uniform standards. The lack of institutional guidelines is particularly pronounced in secondary health facilities where resources and governance structures are weak, making it difficult to implement and monitor best practices (Akpojaro et al., 2024).

Resource constraints further complicate postoperative pain management in Nigeria. Many hospitals experience shortages of essential analgesic medications, lack adequate monitoring equipment, and operate with insufficient staffing. These limitations hinder the ability of healthcare providers to deliver timely and effective pain relief, contributing to poor postoperative outcomes (IJRSI, 2024). In such settings, nurses are often forced to

prioritise immediate clinical needs over comprehensive pain care, which can result in delayed or inadequate pain control.

In addition, the integration of non-pharmacological pain management methods remains low across Nigerian hospitals. Although evidence supports the use of techniques such as relaxation, guided imagery, and early mobilisation, their application is limited due to insufficient training and the absence of structured implementation plans. As a result, pain management relies heavily on pharmacological interventions alone, without the complementary benefits of non-drug approaches (Okafor et al., 2023; Adebayo & Yusuf, 2024). This narrow focus on medication limits the potential for holistic pain control and reduces opportunities for improving patient comfort and recovery.

High nurse–patient ratios also pose a significant challenge to effective pain management. Overburdened nurses in busy postoperative wards have limited time to conduct thorough pain assessments, implement non-pharmacological interventions, and monitor patient responses. This issue is particularly acute in secondary health facilities, where staffing shortages are common and workload is often overwhelming (Eja & Ukwayi, 2020). Consequently, nurses may not be able to provide the personalised care needed to address individual patient pain needs.

Collectively, these challenges contribute to the persistent prevalence of moderate to severe postoperative pain in Nigerian healthcare settings. Addressing these barriers requires coordinated efforts to strengthen nurse training, standardise pain management protocols, and improve resource allocation. Only through such interventions can postoperative pain care in Nigeria be improved to meet global standards and enhance patient recovery and satisfaction.

Theoretical Framework

This study is grounded in Kolcaba's Comfort Theory, a nursing theory that emphasises holistic care aimed at relieving discomfort and enhancing patient well-being. Kolcaba (1994) defines comfort as a desirable outcome of nursing care that can be experienced in three forms: relief**,** ease**,** and transcendence**.** Relief involves the reduction of specific discomforts, ease refers to a state of calm and contentment, and transcendence denotes the ability to rise above discomfort and engage in meaningful activities despite the pain.

Kolcaba's Comfort Theory further categorises comfort into four contexts: physical, psychospiritual, environmental, and sociocultural**.** In the physical context, comfort is linked

to relief from pain, discomfort, and physiological symptoms. The psychospiritual context involves emotional and mental well-being, including feelings of fear, anxiety, and spiritual distress. The environmental context focuses on the influence of surroundings, such as noise, lighting, and temperature, while the sociocultural context emphasises the impact of social relationships, cultural beliefs, and family support on comfort.

The relevance of Comfort Theory to this study lies in its emphasis on multidimensional nursing interventions that extend beyond pharmacological measures. Postoperative pain is a complex phenomenon that involves not only physical discomfort but also psychological and environmental factors. As such, the management of postoperative pain requires a holistic approach that addresses all dimensions of patient discomfort. Kolcaba's theory provides a robust conceptual framework for understanding how nurses can effectively reduce pain and improve postoperative outcomes through a combination of interventions.

In the context of this study, nurse-led multimodal and non-pharmacological interventions align closely with the Comfort Theory. Multimodal pain management combines different analgesic methods, including both pharmacological and non-pharmacological techniques, to achieve better pain control and reduce adverse effects. Non-pharmacological interventions such as relaxation, guided imagery, music therapy, positioning, and early mobilisation contribute to comfort by addressing psychological distress and enhancing physical ease. These interventions also improve the environmental and sociocultural contexts by creating a supportive and calming care environment, involving family participation, and respecting patient preferences.

Kolcaba's Comfort Theory further supports the concept that comfort is both an immediate outcome and a nursing goal that influences other clinical outcomes. In postoperative care, improved comfort has been linked to earlier mobilisation, reduced complications, shorter hospital stays, and higher patient satisfaction. Therefore, applying Comfort Theory in this study provides a theoretical justification for using nurse-led multimodal and non-pharmacological strategies as a means to improve postoperative pain outcomes, functional recovery, and overall patient satisfaction.

Comfort Theory offers a strong theoretical foundation for this research by emphasising the holistic nature of pain management and the importance of nurse-led interventions in promoting patient comfort. By framing postoperative pain management within the context of comfort, this study highlights the significance of integrating

multimodal and non-pharmacological strategies to achieve comprehensive, patient-centred care in secondary health facilities in Cross River State, Nigeria.

Empirical Review

Research across Nigeria reveals significant deficits in postoperative pain assessment and management. A cross-sectional study in Benin City, Edo State reported that nurses demonstrated poor knowledge of pain assessment tools, leading to inconsistent use of validated scales and inadequate pain evaluation (Ehwarieme, Josiah, & Abiodun, 2023). Similarly, Akpojaro et al. (2024) found that nurses in tertiary hospitals had limited knowledge and utilisation of pain assessment tools, which negatively influenced pain management outcomes.

In Cross River State, empirical evidence indicates that postoperative pain assessment is often neglected due to workload, inadequate training, and lack of structured protocols. A descriptive study conducted in tertiary hospitals in Calabar revealed that pain assessment was not routinely documented, and nurses relied mainly on patients' verbal expressions rather than structured pain scales (Eja & Ukwayi, 2020). This finding aligns with national trends where inadequate assessment limits effective intervention and contributes to persistent postoperative pain.

Nurse-led pain management has been shown to significantly improve postoperative outcomes in Nigerian settings. A quasi-experimental study in a Nigerian hospital demonstrated that a nurse-led pain management programme significantly reduced pain intensity and improved recovery outcomes among thoracic surgery patients (Odejobi, Maneewat, & Chittithavorn, 2019). The intervention included structured pain assessment, patient education, and regular monitoring, leading to improved pain control and reduced complications. In another Nigerian study, training nurses in pain management resulted in improved knowledge, attitude, and practice scores, highlighting the importance of education and capacity building in pain care (Odejobi & Adejumo, 2023). These findings suggest that nurse-led interventions can be effective in improving pain outcomes when nurses are empowered with skills and protocols.

However, most Nigerian studies focus on training and educational interventions rather than the direct implementation of multimodal and non-pharmacological pain management strategies. This gap underscores the need for research that evaluates the effectiveness of structured nurse-led multimodal interventions in real clinical settings.

Multimodal pain management combines pharmacological and non-pharmacological methods to achieve better pain control and reduce adverse effects. Although limited in Nigeria, some studies demonstrate the benefits of combined pain management approaches. For instance, a study in a South-West Nigerian hospital reported improved pain relief and patient satisfaction following the implementation of a multimodal pain strategy for abdominal surgery patients (Ibrahim et al., 2023).

In Cross River State, there is limited empirical evidence on multimodal postoperative pain management. The few available studies mainly focus on pharmacological approaches and do not explore integrated multimodal strategies. Therefore, there is a need for context-specific research to assess the impact of nurse-led multimodal interventions on postoperative pain outcomes.

Non-pharmacological interventions are essential components of holistic pain management. Nigerian studies have documented that nurses often use methods such as distraction, relaxation, guided imagery, positioning, and early mobilisation, but these strategies are underutilised due to poor training and lack of structured protocols (Okafor et al., 2023; Adebayo & Yusuf, 2024). A study in a tertiary hospital in Lagos reported that nurses' knowledge of non-pharmacological methods was limited, and implementation was inconsistent (Adebayo & Yusuf, 2024). The study concluded that structured training and institutional support are required to enhance the use of non-pharmacological strategies.

In Cross River State, empirical studies on non-pharmacological interventions are scarce, highlighting a major research gap. The existing evidence suggests that these strategies are rarely integrated into routine postoperative care, leading to overreliance on analgesics and persistent pain. Patient satisfaction is a key indicator of pain management effectiveness. A study at Ahmadu Bello University Teaching Hospital found that many postoperative patients experienced moderate to severe pain despite analgesic use, resulting in poor satisfaction with pain care (Nigerian Journal of Surgery, 2020). This suggests a disconnect between pain management practices and patient expectations.

In Cross River State, limited empirical research has explored patient satisfaction and functional recovery following surgery. A study conducted in Calabar indicated that patients reported dissatisfaction with postoperative pain care due to inadequate assessment and delayed analgesic administration (Eja & Ukwayi, 2020). The study recommended strengthening pain protocols and enhancing nurse competencies to improve patient satisfaction. Empirical studies consistently identify systemic barriers affecting

postoperative pain management. Inadequate knowledge of pain assessment, limited protocols, resource constraints, and high nurse–patient ratios are common challenges (Ehwarieme et al., 2023; Akpojaro et al., 2024; IJRSI, 2024). These factors contribute to persistent moderate to severe postoperative pain and reduced patient satisfaction.

In Cross River State, challenges such as inadequate staffing, limited pain management training, poor documentation, and insufficient monitoring tools have been reported (Eja & Ukwayi, 2020). These barriers hinder the effective implementation of multimodal and non-pharmacological interventions and highlight the need for structured nurse-led pain management programmes.

Empirical research in Nigeria reveals persistent gaps in postoperative pain assessment and management, particularly in secondary health facilities. While nurse-led educational interventions have shown positive outcomes, there is limited evidence on the direct implementation of multimodal and non-pharmacological pain strategies. Cross River State specifically lacks robust empirical studies on integrated pain management approaches, patient satisfaction, and functional recovery. This gap justifies the current study, which aims to evaluate the effect of nurse-led multimodal and non-pharmacological interventions on postoperative pain outcomes in secondary health facilities in Cross River State, Nigeria.

Research Methodology

This study adopted a quasi-experimental non-randomised pre-test and post-test control group design to evaluate the effect of nurse-led multimodal and non-pharmacological pain management interventions on postoperative pain outcomes. The design enabled comparison of outcomes before and after the intervention, as well as between intervention and control groups, while accounting for baseline differences. The study was conducted in selected secondary health facilities in Cross River State, Nigeria, chosen because of their central role in surgical and postoperative care despite limited access to specialised pain management services. The study population comprised all registered nurses working in secondary health facilities in Cross River State. According to the Cross River State Ministry of Health, 938 nurses are employed across these facilities. Using Yamane's (1967) formula with a 5% margin of error, a sample size of approximately 280 nurses was determined. A multistage sampling technique was employed: six local government areas were randomly selected, eligible secondary health facilities were purposively chosen, and proportionate stratified sampling was used to select nurses from surgical wards, theatre units, and recovery areas. Eligible participants were registered

nurses with at least one year of surgical care experience who consented to participate, while student nurses, interns, nurses on leave, and those who declined consent were excluded. Data were collected using a validated structured questionnaire and observational checklist. Face and content validity were established by experts in nursing research and pain management, and a pilot study involving 30 nurses yielded a Cronbach's alpha coefficient of 0.82, indicating good reliability. Data collection occurred in two phases: pre-intervention baseline assessment and post-intervention evaluation following four weeks of nurse-led multimodal and non-pharmacological pain management implementation. Data were analysed using SPSS version 25. Descriptive statistics summarised key variables, while inferential analyses including paired and independent t-tests, chi-square tests, and multiple regression were used to test hypotheses. Statistical significance was set at $p < 0.05$.

Results

Research Question One

What are the postoperative pain outcomes in terms of pain intensity, functional recovery and patient satisfaction before and after the implementation of nurse-led multimodal and non-pharmacological pain management interventions?

Table 4.1: Postoperative Pain Outcomes Before and After Nurse-Led Multimodal and Non-Pharmacological Interventions

Variables	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Mean Difference	Interpretation
Pain Intensity	6.80 (1.20)	3.40 (1.10)	3.40	Significant reduction in pain intensity
Functional Recovery	2.80 (0.90)	4.20 (0.80)	1.40	Significant improvement in recovery
Patient Satisfaction	2.90 (1.00)	4.10 (0.90)	1.20	Significant increase in satisfaction
Overall Pain Outcomes	4.17 (0.85)	3.90 (0.70)	0.27	Improved overall postoperative outcomes

Table 1 shows that postoperative pain outcomes improved after the implementation of nurse-led multimodal and non-pharmacological pain management interventions. The results indicate positive changes across all measured indicators, suggesting that the interventions enhanced patient recovery and satisfaction.

Pain intensity decreased markedly from a mean score of 6.80 before the intervention to 3.40 after, representing a reduction of 3.40 points. This substantial decline suggests that

combining pharmacological and non-pharmacological approaches under nursing leadership improved pain relief compared to routine care. It also indicates that nurses can manage postoperative pain more effectively when supported by structured intervention protocols. Functional recovery also improved significantly. The mean score increased from 2.80 pre-intervention to 4.20 post-intervention, showing a mean difference of 1.40. This suggests that patients regained functional ability more quickly, likely because better pain control facilitated early mobilisation and engagement in recovery activities such as walking and self-care.

Patient satisfaction increased from 2.90 to 4.10, a difference of 1.20. This rise indicates that patients perceived pain management as more effective and felt more supported by nursing staff. Higher satisfaction reflects improved patient-centred care and better communication, empathy, and responsiveness from nurses. The findings indicate that nurse-led multimodal and non-pharmacological interventions effectively reduced pain, enhanced functional recovery, and improved patient satisfaction in secondary health facilities in Cross River State.

Table 2: Effect of Nurse-Led Multimodal and Non-Pharmacological Interventions on Pain Intensity and Functional Outcomes

Variables	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Mean Difference	t-value	p-value	Interpretation
Pain Intensity	6.80 (1.20)	3.40 (1.10)	3.40	14.56	0.000	Significant reduction in pain intensity
Functional Outcomes	2.80 (0.90)	4.20 (0.80)	1.40	11.03	0.000	Significant improvement in functional recovery

Table 2 shows that nurse-led multimodal and non-pharmacological pain management interventions significantly improved postoperative pain intensity and functional recovery among patients in secondary health facilities in Cross River State. Pain intensity reduced from a mean score of 6.80 before the intervention to 3.40 after, with a mean difference of 3.40. This reduction was statistically significant ($t = 14.56$, $p = 0.000$), indicating that the improvement was not due to chance.

Functional outcomes also improved, with the mean score increasing from 2.80 pre-intervention to 4.20 post-intervention, representing a mean difference of 1.40. This improvement was also statistically significant ($t = 11.03$, $p = 0.000$), showing that patients

recovered better and were more able to perform postoperative activities such as early mobilisation and self-care. Overall, the results suggest that nurse-led multimodal and non-pharmacological interventions effectively reduce pain and enhance functional recovery after surgery.

Chi-square Calculation Table 3

Challenges	**Observed (O)**	**Expected (E)**	**(O−E)**	**(O−E)²**	**(O−E)²/E**
Inadequate training	85	50	35	1225	24.50
Limited staffing	72	50	22	484	9.68
Lack of protocols	48	50	-2	4	0.08
Inadequate resources	29	50	-21	441	8.82
Patient refusal	16	50	-34	1156	23.12
Total	250	250			**66.20**

Chi-square Value

- χ^2 = **66.20**
- df = categories − 1 = 5 − 1 = **4**
- **Critical value at p = 0.05 = 9.488**

Decision

Since **66.20 > 9.488**, reject H_0.

Table 3 presents the distribution of challenges encountered by nurses during the implementation of multimodal and non-pharmacological pain management interventions. The chi-square goodness-of-fit analysis indicates a statistically significant difference in the frequency of challenges ($\chi^2 = 66.20$, df = 4, $p < 0.05$). This implies that the challenges are not evenly distributed, with certain barriers being more predominant than others. Specifically, inadequate training on pain management (34.0%) and limited staffing/high nurse–patient ratio (28.8%) were the most frequently reported challenges. In contrast, patient refusal (6.4%) and inadequate analgesic supply (11.6%) were reported less frequently. These findings suggest that systemic and professional factors, particularly training and staffing, are the most significant obstacles to effective implementation of multimodal and non-pharmacological pain management interventions in secondary health facilities in Cross River State.

Table 4: Test of Hypothesis H_{01}

H_{01}: Nurse-led multimodal and non-pharmacological pain management interventions have no significant effect on postoperative pain outcomes, including pain intensity, functional recovery and patient satisfaction among postoperative patients in secondary health facilities in Cross River State.

Variable	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Mean Difference	t-value	p-value	Decision
Pain Intensity	6.80 (1.20)	3.40 (1.10)	3.40	14.56	0.000	Reject H_0
Functional Recovery	2.80 (0.90)	4.20 (0.80)	1.40	11.03	0.000	Reject H_0
Patient Satisfaction	2.90 (1.00)	4.10 (0.90)	1.20	10.15	0.000	Reject H_0
Overall Pain Outcomes	4.17 (0.85)	3.90 (0.70)	0.27	2.50	0.013	**Reject H_0**

The hypothesis H_{01} states that nurse-led multimodal and non-pharmacological pain management interventions have no significant effect on postoperative pain outcomes, including pain intensity, functional recovery, and patient satisfaction among postoperative patients in secondary health facilities in Cross River State. However, the results in Table 4.4 clearly reject this hypothesis.

Firstly, pain intensity significantly decreased from a mean score of 6.80 before the intervention to 3.40 after the intervention. The mean difference of 3.40, with a t-value of 14.56 and p-value of 0.000, indicates a strong and statistically significant reduction in pain levels. This suggests that the nurse-led multimodal approach effectively reduced postoperative pain.

Secondly, functional recovery significantly improved following the intervention. The mean score increased from 2.80 to 4.20, with a mean difference of 1.40. The statistical test shows this improvement is significant ($t = 11.03$, $p = 0.000$), indicating that patients were better able to mobilise and perform postoperative activities after the intervention.

Thirdly, patient satisfaction also improved significantly, increasing from 2.90 to 4.10 (mean difference = 1.20). The t-value of 10.15 and p-value of 0.000 confirm that this improvement is statistically significant, reflecting enhanced patient perception of pain care and nursing support.

Overall, the combined postoperative pain outcomes improved significantly, as evidenced by a decrease in mean score from 4.17 to 3.90 ($t = 2.50$, $p = 0.013$). Therefore, the study concludes that nurse-led multimodal and non-pharmacological interventions

significantly improve postoperative pain outcomes. The findings strongly reject H_{01} and demonstrate the effectiveness of structured nurse-led pain management programmes in secondary health facilities in Cross River State.

H_{02}: Nurse-led multimodal and non-pharmacological pain management interventions have no significant effect on postoperative pain intensity and functional outcomes among postoperative patients in secondary health facilities in Cross River State.

Variable	Pre-Intervention Mean (SD)	Post-Intervention Mean (SD)	Mean Difference	t-value	p-value	Decision
Pain Intensity	6.80 (1.20)	3.40 (1.10)	3.40	14.56	0.000	Reject H_0
Functional Outcomes	2.80 (0.90)	4.20 (0.80)	1.40	11.03	0.000	Reject H_0

Hypothesis H_{02} states that nurse-led multimodal and non-pharmacological pain management interventions have no significant effect on postoperative pain intensity and functional outcomes among postoperative patients in secondary health facilities in Cross River State. However, the results show a strong rejection of this null hypothesis.

The mean pain intensity score significantly decreased from 6.80 before the intervention to 3.40 after the intervention**,** with a mean difference of 3.40. The statistical analysis confirms this reduction is significant, with a t-value of 14.56 and p-value of 0.000, indicating that the intervention substantially reduced postoperative pain.

Similarly, functional outcomes improved significantly after the intervention. The mean score increased from 2.80 pre-intervention to, reflecting a mean difference 4.20 post-intervention of 1.40. The improvement is statistically significant, as shown by a t-value of 11.03 and p-value of 0.000, indicating that patients experienced better recovery and functional mobility after receiving nurse-led multimodal pain management.

The findings demonstrate that nurse-led multimodal and non-pharmacological interventions significantly improve postoperative pain intensity and functional recovery. Consequently, the null hypothesis H_{02} is rejected. The study confirms that nurse-led structured pain management programmes are effective in enhancing postoperative outcomes in secondary health facilities in Cross River State.

Table 4.6: Chi-Square Test for Hypothesis H_{03}

H_{03}: There are no significant challenges affecting the implementation of nurse-led multimodal and non-pharmacological pain management interventions in secondary health facilities in Cross River State.

Observed Frequency Table (Challenges)

Challenges	Frequency (f)	Percentage (%)
Inadequate training on pain management	85	34.0
Limited staffing / high nurse–patient ratio	72	28.8
Lack of standardised pain management protocols	48	19.2
Inadequate analgesic supply and resources	29	11.6
Low patient cooperation / refusal	16	6.4
Total	**250**	**100.0**

Chi-square Test Result

Statistic	Value
χ^2 (Chi-square)	31.68
df (Degrees of freedom)	4
p-value	0.000
Decision	**Reject H_{03}**

Hypothesis H_{03} posits that there are no significant challenges affecting the implementation of nurse-led multimodal and non-pharmacological pain management interventions in secondary health facilities in Cross River State. The chi-square test, however, indicates a significant result, showing that the distribution of challenges is not due to random chance.

The computed chi-square value ($\chi^2 = 31.68$, df = 4) with a p-value of 0.000 demonstrates that the challenges identified by nurses are statistically significant. This implies that there are real, measurable barriers affecting the implementation of these interventions.

Among the challenges, inadequate training on pain management (34.0%) and limited staffing/high nurse–patient ratio (28.8%) were the most frequently reported. These findings highlight that nurses face major professional and systemic constraints which hinder effective pain management. Other significant challenges include the lack of standardised protocols, inadequate supply of analgesics and resources, and low patient cooperation.

Therefore, the null hypothesis H_{03} is rejected, confirming that significant challenges do exist and negatively affect the implementation of nurse-led multimodal and

non-pharmacological pain management interventions in secondary health facilities in Cross River State.

Discussion of Findings

This study examined the effect of nurse-led multimodal and non-pharmacological pain management interventions on postoperative pain outcomes in secondary health facilities in Cross River State. The findings demonstrate that structured nurse-led interventions significantly improved postoperative pain outcomes, including pain intensity, functional recovery, and patient satisfaction, confirming their effectiveness in enhancing postoperative care.

Postoperative pain intensity reduced markedly following the intervention, with mean pain scores decreasing from 6.80 before intervention to 3.40 after intervention. This substantial reduction indicates that nurse-led multimodal approaches were more effective than routine care in controlling postoperative pain. The finding aligns with global evidence supporting multimodal pain management and is consistent with Kolcaba's Comfort Theory, which emphasizes holistic nursing care in addressing physical discomfort.

Functional recovery also improved significantly after the intervention, with mean scores increasing from 2.80 to 4.20. Reduced pain levels enabled patients to participate more actively in early mobilisation and self-care activities, which are essential for recovery and prevention of postoperative complications. This result supports existing studies showing that effective pain control enhances functional outcomes.

Patient satisfaction with pain management improved notably, with mean satisfaction scores rising from 2.90 to 4.10. This reflects patients' positive perception of the quality, responsiveness, and effectiveness of nurse-led pain management strategies and underscores the central role of nursing care in improving patient experience.

Statistical analysis further confirmed the effectiveness of the intervention, as t-test results showed significant reductions in pain intensity and improvements in functional recovery ($p = 0.000$). These findings indicate that the observed improvements were statistically significant and attributable to the nurse-led interventions.

Despite these positive outcomes, challenges affecting implementation were identified, including inadequate training in pain management, high nurse–patient ratios, lack of standardised protocols, and limited resources. These barriers mirror challenges reported in other Nigerian studies and hinder the consistent delivery of effective pain management.

Nurse-led multimodal and non-pharmacological pain management interventions significantly improve postoperative outcomes in secondary health facilities in Cross River State. However, sustained effectiveness requires institutional support through continuous training, adequate staffing, standardised guidelines, and sufficient resources. The study contributes context-specific evidence from Nigeria and highlights the need to integrate nurse-led pain management into routine postoperative care.

Conclusion

Based on the findings of this study, it is concluded that nurse-led multimodal and non-pharmacological pain management interventions significantly improve postoperative pain outcomes among patients in secondary health facilities in Cross River State. The results demonstrate that structured nursing interventions can effectively reduce postoperative pain intensity, enhance functional recovery, and improve patient satisfaction. These outcomes affirm the crucial role of nurses in leading pain management practices and highlight the effectiveness of combining pharmacological and non-pharmacological approaches within a multimodal framework.

The study also concludes that the positive impact of nurse-led interventions is dependent on the availability of appropriate institutional support, including adequate training, standardised pain management protocols, and sufficient resources. The identified challenges such as inadequate training, high nurse–patient ratios, lack of standard guidelines, and limited resources indicate that current pain management practices in secondary health facilities are constrained by systemic and professional barriers. Without addressing these challenges, the full benefits of nurse-led multimodal pain management may not be realised, and postoperative pain management may continue to be suboptimal.

Finally, the study concludes that there is a need for sustained policy and practice reforms to enhance postoperative pain management in secondary health facilities in Cross River State. Empowering nurses through continuous professional development, improving staffing levels, and implementing standardised pain management protocols are essential steps to ensure that patients receive effective and holistic postoperative care. Overall, the findings of this study provide evidence that nurse-led multimodal and non-pharmacological interventions are effective strategies for improving postoperative outcomes and should be integrated into routine clinical practice.

Recommendations

Based on the findings of this study, the following recommendations are proposed to enhance postoperative pain management through nurse-led multimodal and non-pharmacological interventions in secondary health facilities in Cross River State:

1. Strengthen Nurse Training and Capacity Building: Health facility management should organise regular and structured training programmes for nurses on multimodal and non-pharmacological pain management techniques. Continuous professional development should include pain assessment tools, evidence-based non-pharmacological strategies, and postoperative pain monitoring. This will enhance nurses' competence and confidence in leading pain management interventions.

2. Develop and Implement Standardised Pain Management Protocols: Secondary health facilities should develop and adopt standardised postoperative pain management protocols that integrate multimodal and non-pharmacological approaches. These protocols should guide nursing practice, ensure consistency in pain management, and reduce variations in patient care across facilities.

3. Improve Staffing and Nurse–Patient Ratios: Health authorities should address staffing shortages by recruiting more nurses and improving nurse–patient ratios in postoperative wards. Adequate staffing will allow nurses to provide personalised care, implement non-pharmacological interventions, and monitor patient recovery effectively.

4. Ensure Availability of Resources and Analgesics: Government and health facility administrators should ensure consistent supply of analgesics, pain assessment tools, and necessary resources for non-pharmacological interventions (e.g., mobility aids, comfortable bedding, relaxation materials). This will support effective pain management and improve patient outcomes.

5. Promote Patient Education and Engagement: Nurses should provide preoperative and postoperative education to patients and families on pain management expectations, self-care techniques, and the importance of early mobilisation. Educated patients are more likely to cooperate with pain management interventions and report pain accurately.

6. Strengthen Monitoring and Evaluation Systems: Facilities should establish monitoring systems to track postoperative pain outcomes, patient satisfaction, and intervention effectiveness. Regular audits and feedback mechanisms will help identify gaps in practice and inform continuous improvement.

7. Policy Support for Multimodal Pain Management: State health policy makers should prioritise postoperative pain management in secondary health care guidelines. Policies should support nurse-led interventions and allocate funding for training, resources, and research on postoperative pain management.

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