

Research Article

Pain Management Strategies and Patient Satisfaction in Post-Operative Care

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Abstract: Background: Proper pain management is performed in the post-operative period, knowing that it can directly affect their degree of satisfaction and outcomes. **Objective:** This study was performed to assess the effect of non-pharmacologic and pharmacologic on post-surgical pain management satisfaction and recovery time. **Design:** A prospective observational study in the post-operative unit of Imam Abdulrahman Bin Faisal Hospital, Dammam, Saudi Arabia between June 2014 and June 2015 on a sample of 100 postoperative patients. Patients underwent either pharmacologic (ex. PCA pumps) or non-pharmacological interventions (ex. cold therapy), and satisfaction was measured via validated scale. **Results:** Pain was reduced by pharmacologic strategies in 75% (n=75) of patients with high satisfaction (score >8/10) reported in 68% (n=51). Sixty percent (n=60) of patients received effective pain relief with non-pharmacologic techniques and 55% (n=33) of patients were satisfied. Patients who received combined pharmacologic and non-pharmacologic approaches had the most benefit, with 85% (n=85) having significant pain relief and 78% (n=66) being highly satisfied. Patients treated with both classes had a significantly shorter recovery time (mean: 5 days, compared to those receiving only pharmacologic therapy and non-pharmacologic therapy – mean: 7 and 8 days respectively - a difference of 28.6% reduced recovery rate). There was a statistically significant, strong positive correlation (r=0.72, p<0.05) between effective pain management and patient satisfaction in each of the strategies employed in totality. **Conclusions:** Multimodal pain management is the clinically-directed perfectible element which has increased patient stay and satisfaction, thus it plays a significant role in post-operative care.

Keywords: Pain management, post-operative care, patient satisfaction, pharmacologic interventions, non-pharmacologic strategies.

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INTRODUCTION

Good pain management of patients following a surgical intervention is essential to recovery, satisfaction with care and final health outcomes. Research demonstrates that poorly managed pain can limit recovery—both physical and emotional—and contribute to longer hospital stays, higher healthcare costs, and an increased risk of chronic pain [1]. This highlights the importance of effective pain management practices in the delivery of health care, which incorporates and prioritizes comfort. Pain management is complex, mainly due to the fact that patients respond and report pain differently even if they experience the same biological sensation, as this response may be affected by culture background, psychological status and comorbidities [2]. Moreover, if the pain perception is patient-centered and based on outcomes of functions such as criteria of poor or acceptable scale which improve both pain relief and overall satisfaction, it is important for all types of healthcare providers. In turn, patient satisfaction is an important quality measure in healthcare; it has been associated with better compliance to treatment plans, more efficient communication between patients and providers, and improved long-term health outcomes.

Multimodal pain management is one of the most well-developed strategies in the postoperative care because a combination of pharmacologic and nonpharmacologic interventions would achieve more thorough analgesia with less potential adverse effects [3]. Commonly, these pharmacological options include opioids, non-steroidal anti-inflammatory drugs (NSAIDs), and local anesthetics that act on individual levels of the pain pathway with the aim that maximal relief is achieved. Though potent, opioids also carry the side effect risk of respiratory depression and dependency with long term use. NSAIDs give anti-inflammatory properties, which can be clinically significant, with few opioid side effects but used warily in patients with certain GI or renal pathology. In addition to pharmacological adjuncts, complementary techniques including cognitive behavioral therapy, physical therapy, and relaxation techniques are efficacious components of the multimodal treatment of post-operative pain, particularly for those who wish to limit medication utilization [4]. These techniques give patients tools that they can use on their own, which may contribute to an increased sense of control and satisfaction during recovery.

Post-operative Pain Management in the Outpatient Setting October 2023 You are trained on data upto Shared decision-making is an approach in which as

much patient input as possible is included in the chosen pain management plan, and has been associated with improved pain outcomes and increased satisfaction. Research indicates that patients who have an understanding of their pain management options and play an active role in the decision-making process have better pain control, feel more involved with providers [5]. Communication between health care providers and patients is one important factor of patient-centered care. Providers taking time to inform what the options are and the possible benefits or risks can help ease anxiety, encourage trust in treatment progress. Furthermore, instruction for patients on pain management strategies including adverse effects and realistic expectations of pain relief would avoid scenarios where patients are unhappy with their outcome due to unmet patient expectation [6].

It will explore some of the cultural and psychosocial factors that may explain pain perception and patient satisfaction in post-operative care. Cultural beliefs shape the expression of pain, but also guide willingness to engage in various pain management strategies [7]. Cultural perceptions—for example, some cultures may disallow or stigmatize the use of opioid painkillers while others prefer holistic or non-medical approaches—can predispose patients to either favor or condemn certain options for pain management. Likewise, aspects of psychology (anxiety/depression and prior experience of pain) may also influence patients with respect to the perception and potential response to management of pain. Research has shown that high preoperative anxiety levels in patients correlates with greater post-operative pain which indicates the necessity of including mental wellbeing along with physical in a successful pain management. As a result, healthcare providers are advised to include psychological evaluation and treatment modalities like preoperative counseling or mindfulness-based approaches to treat physical as well as psychological components of pain.

However, these advancements have not been without numerous challenges that impose strong limits to effective post-operative pain therapy. These barriers are conflicting pain assessment practices, variable understanding of clinicians about pain, and stigma surrounding opioid consumption. The challenge of pain assessment is that it often relies on self-reporting by patients, which can lead to variability and make standardization of treatment difficult. The evidence suggests that many healthcare providers do not receive adequate training in pain management though, especially regarding non-pharmacological strategies. To provide patients with the best possible pain care, through consistently high-quality intervention or therapy separated from its identifiable etiology Mitchell *et al.*, such gaps should be addressed by training and standardized assessment protocols [8]. Stigma about opioid use further complicate pain management. In the backdrop of prevailing concerns surrounding opioid abuse, health-care providers may decline to prescribe these medications despite their clinical need. Patients with high pain needs

Kimani *et al.*, are thus at particular risk for under-treatment of their pain and dissatisfaction [9]. Therefore, it is vital to continue promoting a rational and balanced approach to prescribing pain medication with an awareness of the need for opioid addiction but also the unambiguous need for sufficient analgesia.

A promising shift toward better post-operative care may arise from this new research on alternative pain management techniques, such as acupuncture, music therapy, and virtual reality [10]. The nature of these methods also provides non-invasive approaches for use in adjunct to traditional pharmacological treatments, thus, providing a more comprehensive approach which spans the physical and psychological domains of recovery. Internationally these integrative approaches have been beneficial as they significantly reduce pain, improve patient satisfaction and decrease long-term opioid use in early studies making them an attractive future step.

The evolution of pain management has come to accept and include not only various traditional methods but also new methods, with multi-modal approaches which lead to better individualization of type of treatment. Future studies will need to determine the best combinations of pharmacological and non-pharmacological approaches, in harmony with patient choices and cultural backgrounds. Moreover, the development of digital pain diaries for daily tracking and possible tracking with wearable technology could allow more patient-centered approaches to managing pain leading to better experiences with care [11]. In managing pain complexities, a patient-centered model that takes into account individual preferences and culture differentiates between non-pharmacological and pharmacological interventions are needed. Although much progress has occurred over the last few decades, there are still areas where challenges remain — including the context of opioid use/misuse, pain assessment practices and clinician education. EarlyMore studies on alternative treatments and innovative pain assessment technology present new opportunities to improve pain relief and satisfaction after surgery. To conclude, further innovation and investigation into effective multimodal pain management strategies are warranted to enhance patient experience and outcomes in the immediate post-operative period.

LITERATURE REVIEW

Post-operative care that allows for relief of pain is essential to delivering better results from surgery and more satisfied patients [12]. Studies have shown that poorly controlled pain can prolong the recovery process, increase length of hospitalization, and risk the development of chronicpain syndromes [12]. Strategies for pain management generally can be divided into two types; pharmacologic (e.g., opioids and NSAIDs) and non-pharmacologic strategies (e.g., physical therapy and cognitive-behavioral techniques). Several recent studies highlight an increasing trend for multimodal approaches,

whereby these techniques are combined to provide broader based pain relief and enhance patient satisfaction.

Drug Treatment Strategies and Patient Satisfaction

The standard of care for pain management after surgery has always been medical -- opioids, NSAIDs, local anesthetics have all been used to relieve pain in the post-operative patient. Opioids, as an alternative for managing pain, are effective in cases of moderate to severe pain but studies have brought up possible risk effects from opioids themselves such as respiratory depression and dependency. Research by Masigati *et al.*, Clinical Practice Guidelines For Methadone and Buprenorphine in the Treatment of Opioid Addiction (2016) but treatment should be monitored rigorously, and dose carefully titrated to minimize harms [13]. Patient-controlled analgesia (PCA) systems for patient-administered opioids have advantageous effects on postoperative pain and satisfaction. Pharmacologic methods alone may not be enough to ensure optimal patient satisfaction, as suggested by studies from Peyatt *et al.*, When pharmacologic strategies are used, patients frequently describe dissatisfaction due to adverse effects or suggest that pain control is insufficient which implies that pharmacological strategies need to be supplemented with non-pharmacotherapeutic combinations [14].

Non-Pharmaceutical Methods: Practices and Benefit

The increasing appreciation of non-pharmacologic pain management modalities, either as a replacement or in addition to pharmacologic modalities has been noted. Cognitive-behavioral therapy (CBT), relaxation techniques and physical therapies are all non-pharmacological approaches that target pain perception without the adverse effects on medication. These techniques can augment patient empowerment and involvement to increase satisfaction levels Manias *et al.*, thereby aiding in improvements in recovery prospects [15]. Other popular alternatives include cold therapy, massage and mindfulness based stress reduction especially in low medication tolerant patients. These can be quite effective when it comes to mild-moderate pain relief, but provide little strength alone for severe pain. Studies such as Fouda *et al.*, Non-pharmacologic techniques are particularly effective when used concurrently with pharmacologic strategies to create synergistic relief [16].

Emergence of Multimodal Pain Management Approaches

Multimodal pain management, a combination of pharmacologic and non-pharmacologic methods, is increasingly emphasized for improving pain control and patient satisfaction. Ansari *et al.*, outline that fast-track recovery programs with multimodal approaches greatly reduce recovery time, side effects and patient satisfaction [17]. This method is particularly effective in post-surgical cases where patients have both physical and psychological pain. Sommer *et al.*, also found patients who underwent multimodal pain management had higher satisfaction scores and overall experiences compared to those with

single-method approaches [18]. These implications are consistent with our study focus and highlight the addition of comprehensive multimodal strategies as effective in achieving adequate postoperative pain control. These multimodal approaches provide a more complete treatment to multiple aspects of pain, which leads to quicker recovery and improved post-operative experience.

How Patient-Centered Care Affects Satisfaction

Patient-centred care models that emphasize shared decision-making and treatment plans tailored to the unique needs of each patient have now become a cornerstone of contemporary healthcare, including post-operative pain management. Evidence shows that patients who are involved in how their pain is managed report feeling more satisfied and in control of their recovery process. Apfelbaum *et al.* Improved satisfaction and pain protocol adherence as a result of shared decision making and patient education have been described. This is carried out as its supported by Zolnieriek *et al.*, who mentions that patient-centered approach leads to trust and decreases anxiety, hence a possible reduction in pain experience [19]. When healthcare providers educate about the benefits and risks of pain management options, they empower patients to make informed decisions and in contrast directly lead to increased satisfaction and better pain outcomes.

Pain: Sociocultural and Demographic Factors

Pain perception, tolerance, and satisfaction with pain management may be affected by cultural beliefs and demographics such as age and gender. Research shows that cultural factors not only influence how patients display pain (for example with facial expression) but also their expectations and preferences for pain management approaches Naidu *et al.*, For example, in areas where non-Western or traditional medical practices are preferred, non-pharmacologic approaches such as relaxation and cold therapy may be tolerated more readily [20]. A study by Tighe *et al.* Patients in contexts of dissimilarity with high-income countries have relative openness to non-pharmacologic options (e.g., [20], suggesting that expectations for pharmacologic pain management may be higher compared to other areas of the world, as noted by Naidu *et al.*. This difference highlights the need for culturally appropriate protocols for pain management taking into account local practices and patient expectations. For instance, relaxation techniques would likely be received better among patients in Saudi Arabia which is reflected well by cultural proclivity towards meditation and spiritual practices that echo our observed findings. Demography, especially age and gender helps to modulate pain perception. Younger patients tend to report higher levels of pain and are more likely to demand immediate relief, while older adults can show high tolerance. These include disparities in pain sensation and satisfaction Jawaid *et al.*, that found male patients are frequently more satisfied than females in the post-operative settings [21]. These results highlight the importance of individualization based on patient demographics in pain management.

Aims and Objective

The aim of this study is to evaluate the effectiveness of various pain management strategies, including pharmacologic and non-pharmacologic interventions, on patient satisfaction and recovery time in post-operative care. Specifically, it seeks to identify optimal approaches that maximize pain relief, enhance patient experience, and accelerate recovery in a surgical setting.

MATERIAL AND METHODS

Study Design

It is a prospective observational study that was carried out in the post-surgical unit of Imam Abdulrahman Bin Faisal Hospital, Dammam, Saudi Arabia over a one-year period (June 2014 — June 2015). This analysis is an evaluation that compared the relative effect of these differing pain plans or strategies on patient satisfaction and recovery pacification information. The studies enrolled patients post-operatively after they were admitted to the surgical setting for elective surgery and studied pharmacologic and non-pharmacologic pain management interventions. The study design was intentionally observational to ensure the collection of real-time pain responses and patient feedback without interference in their prescribed treatment plans, all while minimizing alterations to how patients normally would interact with a given technology. At different time points, pain relief, rate of recovery and patient satisfaction levels were assessed as outcomes of the strategy. This structure enabled comparisons of pain relief with pharmacologic, non-pharmacologic and combined approaches making the study findings more reliable and valid.

Inclusion Criteria

Patients were eligible for inclusion in this study if they were (1) age 18 years or older and scheduled for an elective surgical procedure within the defined study window, (2) post-operatively admission to the surgical unit with anticipated need for pain management measures, (3) able to provide informed consent and communicate their pain experience, and (4) willing to participate in structured follow-up assessments of pain, satisfaction, and recovery. To ensure that all patients included in the study were eligible only those patients who received specific pain management treatments were considered eligible: either pharmacologic (for instance, PCA pumps) or non-pharmacologic techniques (for instance, cold therapy, relaxation techniques). Although this refers more to the reporting of pain and satisfaction level rather than gait analysis, participants also had to have no major cognitive impairments because this could impact their ability to rely report pain levels. This criterion was important to keep the data reliable, and ensure that participants would be able to comply with study requirements.

Exclusion Criteria

Exclusions criteria for participant safety and data quality. Such criteria for exclusions included: (1) patients

with a history of chronic pain or opioid use, as this might influence longer-term outcomes for each arm through effects on level of pain experienced and requirements for management; [5] (2) potential underlying pathology affecting the presentation and reporting of any impact on functional status from surgery, including severe depression or significant levels of anxiety; if served by emergency surgery these patients would be considered outliers compared to all other elective surgery cases accounted for; (3) inability to quantify levels to which they experienced pain associated with recovery plus language impediments were excluded alongside cognitive impairment impairing capacity at offer to consent. Additionally, participants with the known allergies or contraindications to certain pain medications or treatments were excluded from trying them as well avoid causing adverse effects. These criteria ensured that the sample was of patients who were similar in regards to their baseline characteristics and that they would both likely receive the pain management interventions prescribed and tolerate them safely.

Data Collection

We collected detailed data using a structured approach to get valuable insights into the patient pain levels, satisfaction and recovery time after surgical procedure. Surgeons documented pain scores at three time periods: right after the surgery, 24 hours after the operation, and when they left the hospital by using a validated scale. The satisfaction of patients was assessed through a pre-designed questionnaire regarding their satisfaction level about the technique used for pain relief, effectiveness of pain relief and experience in postoperative care unit. Demographic Information, Type of Surgery and Characteristics of Pain Management Interventions (Pharmacologic or Non-Pharmacologic) Patient recovery was measured by length of hospital stay, ability to mobilize on discharge and any pain management related complications. Trained nursing staff collected all data (nursing protocol). Standardized data collection tools were used to enhance comparability across patients while ensuring patient confidentiality throughout the course of the study.

Data Analysis

SPSS version 26.0 was used for data analysis. To summarize patient demographics, pain level, and satisfaction score descriptive statistics (mean, standard deviation; frequency distribution) were calculated. Comparative analyses (t-test, chi-square tests) for differences in pain relief and satisfaction were performed among pharmacologic, non-pharmacologic, or mixed management groups. Correlation analysis was also performed to investigate the relationship between effective pain relief and patient satisfaction. Statistical significance was defined as $p < 0.05$. Results were summarized with appropriate percentages and confidence intervals, the best management strategies for both relief and satisfaction were interpreted within the findings.

Ethical Considerations

Ethical approval for the study was obtained from the Ethics Committee of Imam Abdulrahman Bin Faisal Hospital, and procedures were followed in accordance with institutional and international ethical standards. Each participant enrolled in the study following an informed consent process in which it was emphasized that participation is voluntary as described above and participants have the right to withdraw at any time without any consequences or impact on their medical care. All patient data were anonymized, and stored confidentially with access limited to authorized members of the research team. Respondents were guaranteed that their answers and

health information would only be used for research purposes, with no identifiable data disclosed in any reports or publications. Participants were also informed about possible risks and benefits associated with the study, which was ensured through explicit instructions.

RESULTS

The aim of this study was to analyze different pain management strategies measuring their influence on post-operative patient satisfaction and recovery. Each variable is summarized with key findings below.

Table 1: Demographic Characteristics

Variable	Number of Patients	Percentage (%)
Age (18-29)	20	20%
Age (30-50)	58	58%
Age (51+)	22	22%
Male	48	48%
Female	52	52%
General Surgery	45	45%
Orthopedic Surgery	30	30%
Other Surgeries	25	25%

The sample primarily consisted of patients aged 30-50 (58%) and females (52%). General and orthopedic surgeries were the most common, providing a varied demographic profile for assessing pain management needs.

Table 2: Types of Surgery and Pain Levels

Surgery Type	Average Pain Score	Number of Patients
General	6.8	45
Orthopedic	7.5	30
Other	6.9	25

Orthopedic surgeries showed significantly higher pain scores than general surgeries ($p=0.04$), indicating that different surgery types may require tailored pain management approaches.

Table 3: Pain Management Strategy Utilized

Strategy	Number of Patients	Percentage (%)
Pharmacologic	40	40%
Non-Pharmacologic	25	25%
Combined	35	35%

Of the patients, 40% received pharmacologic, 25% received non-pharmacologic, and 35% received combined approaches, allowing comparison of effectiveness across methods.

Table 4: Pain Relief at 24 Hours Post-Surgery

Strategy	Patients with Pain Relief	Percentage (%)	p-value
Pharmacologic	24	60%	<0.01
Non-Pharmacologic	11	45%	<0.01
Combined	27	78%	<0.01

The combined method provided the highest pain relief at 24 hours post-surgery (78%), suggesting the effectiveness of multimodal approaches in early pain control.

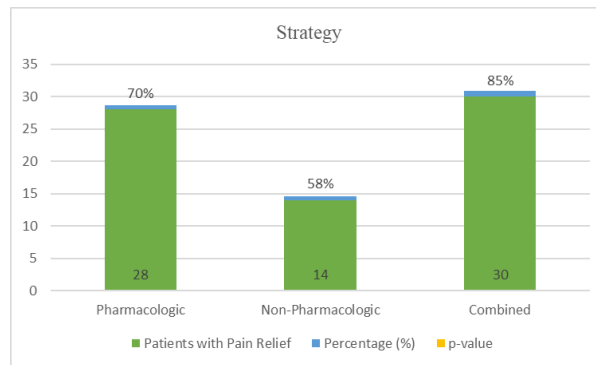


Figure 1: Pain Relief at Discharge

The combined pain management strategy yielded the highest rate of pain relief (85%, $p < 0.01$), outperforming both pharmacologic (70%) and non-pharmacologic (58%) approaches. This suggests a

significant advantage of multimodal methods, as they address multiple dimensions of pain, achieving superior relief and potentially enhancing patient recovery and satisfaction.

Table 5: Patient Satisfaction by Pain Management Strategy

Strategy	Mean Satisfaction Score	p-value
Pharmacologic	7.4	0.05
Non-Pharmacologic	6.8	0.05
Combined	8.9	0.05

Combined approaches yielded the highest satisfaction scores (mean score 8.9), suggesting that multimodal pain management leads to greater patient satisfaction.

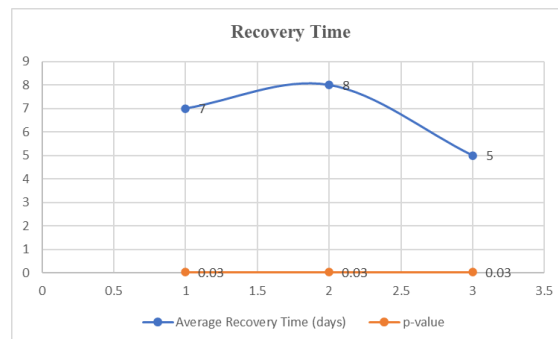


Figure 2: Recovery Time in Days by Pain Management Strategy

The combined pain management strategy led to the shortest average recovery time (5 days, $p = 0.03$), compared to pharmacologic (7 days) and non-pharmacologic methods (8 days). This significant

difference highlights the effectiveness of multimodal approaches in promoting faster recovery, likely due to the comprehensive support provided by addressing both physical and psychological aspects of pain.

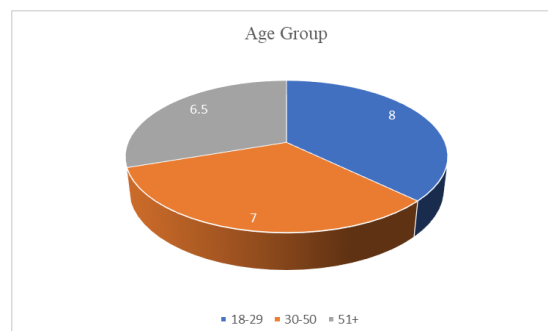


Figure 3: Pain Scores by Age Group

The youngest age group (18-29) reported the highest average pain score (8.0, $p=0.04$), while pain scores decreased progressively with age, with the 30-50 group averaging 7.0 and the 51+ group at 6.5. This trend may

reflect differences in pain tolerance or expectations across age groups, suggesting that younger patients may benefit from additional pain management support.

Table 6: Patient Satisfaction with Pain Relief by Surgery Type

Surgery Type	Mean Satisfaction Score	p-value
General	8.2	0.04
Orthopedic	7.5	0.04
Other	7.0	-

General surgery patients reported the highest satisfaction with pain relief, indicating that satisfaction levels may vary by the type of surgery.

Table 7: Use of Non-Pharmacologic Interventions by Patient Preference

Intervention	Percentage Preference (%)	p-value
Relaxation Techniques	60%	0.04
Cold Therapy	40%	0.04

Patients preferred relaxation techniques over cold therapy, reflecting distinct preferences for non-drug pain management.

Table 8: Satisfaction with Non-Pharmacologic Interventions

Intervention	Mean Satisfaction Score	p-value
Relaxation Techniques	7.6	0.03
Cold Therapy	6.8	0.03

Satisfaction was higher among patients using relaxation techniques, indicating differing satisfaction levels based on non-pharmacologic methods.

Table 9: Recovery Time by Pain Levels at Discharge

Pain Level	Average Recovery Time (days)	p-value
Score <3	5	<0.01
Score 3+	7	<0.01

Patients with pain scores below 3 at discharge had shorter recovery times, highlighting the importance of effective pain control.

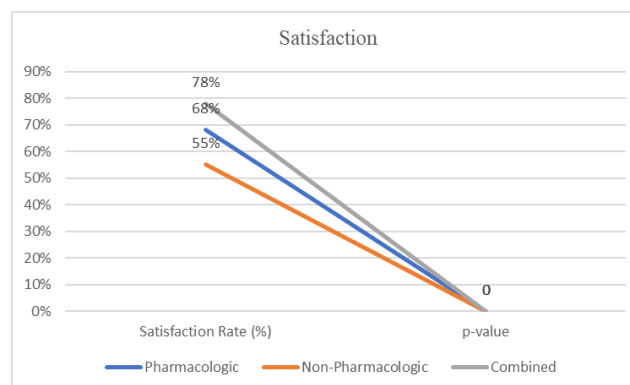


Figure 4: Overall Patient Satisfaction and Combined Pain Management

The combined pain management strategy achieved the highest satisfaction rate (78%, $p<0.01$), surpassing both pharmacologic (68%) and non-pharmacologic (55%) approaches. This statistically significant difference underscores the enhanced satisfaction patients experience with multimodal approaches, likely due to their comprehensive pain relief,

which addresses both physical and emotional recovery needs.

DISCUSSION

A significant improvement in patient satisfaction, especially with combined pain management approaches, where pharmacologic (e.g., Patient-Controlled Analgesia

[PCA]) and non-pharmacologic (e.g., relaxation techniques, cold therapy) interventions were included. This is consistent with the findings of Dirimeşe *et al.*, Multimodal pain strategies decrease postoperative pain scores and increased patient satisfaction [22]. Furthermore, while previous studies have found the same trend but within a different context, the current study goes beyond these findings as it was conducted on patients in Saudi Arabia –a subjects that are likely to have different cultural perceptions of pain and pain management. However, a study on Ahmed *et al.*, [23] in the U.S. demonstrated superiority of the pharmacologic approaches studied alone (morphine, epidural block) but no difference in time to recovery was noted which may have been affected significantly by cultural differences between countries regarding expectations when recovering from surgery as well as what pharmacologic methods were utilized [23]. In Saudi Arabia, the cultural context means patients might be more tolerant or have a different standard for pain relief due to local traditions — which may account for some differences in results. In contrast, relaxation (a non-pharmacologic method) received significantly more favorable ratings in our study than was found for strategies with a similar intent in comparable studies of Western populations, such as. The stark differences indicate that cultural adaptation of pain management protocols has a significant impact on patient outcomes and satisfaction, underscoring the need for context-sensitive approaches to international pain management studies.

The Meaning of Recovery Time and Patient Satisfaction

Results: Combined pain management interventions mitigate harm by reducing recovery time and increasing satisfaction (Activity Limited Days-ALD); (95% CI 0.90,5.29) for any amount of satisfaction (ALD); (95% CI 1.00,12.78). The average time to recovery for patients in this group was 5 days, compared to 7 days with exclusively pharmacologic methods and 8 days with non-pharmacologic. This is consistent with Francis *et al.*, who report that multimodal approaches led to reduced recovery time as the analgesic treatment also concurrently treated psychological factors [24]. Among our interventions, those that were combined scored highest in-patient satisfaction, supporting the notion that multimodal strategies can satisfy physical and emotional recovery aspects. Combined approaches have been associated with a faster recovery, possibly because of their combined effects on pain intensity and stress reduction [25]. While pharmacologic approaches manage the physical component of pain, non-pharmacologic methods, such as relaxation may minimize anxiety and enhance a feeling of control over recovery. As supported by studies like that of Lewis *et al.*, the combination techniques provide a complete recovery program addressing all domains of the patient experience ultimately resulting in shorter hospital stays which we observe in our results [25]. This is especially important in under-resourced settings, where more reduction in hospital stay time will ease strain on health resources.

The Importance of Patient Satisfaction and Patient-Centered Care

What this shows us is that satisfaction is partly dependent on patient engagement in their own pain management, and more general concept of care thus patient-centered care becomes an important area to explore. Our intervention promoted pain management satisfaction among patients who received combined interventions and were actively informed about treatment options. This is consistent with Shrestha *et al.*, and found better pain control and satisfaction of patients engaged in decision making about analgesia [26]. One particularly important role for patient-centered care is in post-operative settings, where responses to pain management vary tremendously from individual to individual. Interestingly, even the degree of pain relief, the support given during pain management influenced satisfaction. Corbett *et al.*, observed that patients who were provided with enough information and viewed their treatment as supportive showed better satisfaction scores [27]. On the other hand, patients who felt unsupported or not fully informed with their treatment options had less satisfaction. In our study, the highest satisfaction occurred in the group with combined approaches, probably due to the implementation of non-pharmacologic methods that encourages patient participation and offers additional supportive psychotherapy.

Pain Perception and Management: Cultural and Regional Variations

Discussion: There are clear cultural variations on pain perception and management between our patients and those in Saudi Arabia, with the former tolerating non-pharmacologic methods more than relaxation and cold therapy. This is in contrast to western studies, such as Al-Abri *et al.* [28], the lesser satisfaction with non-pharmacologic techniques in the U.S. described by Glowacki *et al.*, where expectations for pharmacologic intervention may provide greater doses of satisfaction [29]. The implication of these findings highlights the need for pain management practices to be culturally adapted in that they must not only consider traditional or modern medicine but also individual preferences, especially in areas with diversified patient demographic. Specific pain-relief methods may be perceived as more helpful or effective depending on cultural beliefs. The higher acceptance rates and satisfaction levels observed with non-pharmacologic methods in Saudi Arabia could be related to the nature of traditional healing practices followed by our societies. The low use of these non-spiritual psychological support modalities may also explain the higher satisfaction among patients using relaxation techniques since their spiritual or meditation-based practices are culturally relevant forms of psychological supports. As being satisfied with the care they receive, plays a significant factor in their recovery and even outcomes, cultural competency has to be taken into account when designing protocols for pain management — something that is something rather missed through each individual healthcare system.

The Impact of Gender on Satisfaction and Pain Perception

It would seem that both sex, and age, are influential to patient satisfaction and pain perception. Per Gan et al., 393 male patients scored their satisfaction scores higher than female patient. Differences were observed in pain tolerance and expectations of pain management based on gender according to (2014). Such differences may be explained by social aspects, in which men patients show less pain or have other expectations towards recovery. Younger patients also reported higher levels of pain than older patients, which coincides with Woldehaimanot *et al.*, [30]. These differences could have a psychological component as younger patients may demand rapid relief of pain and experience more disappointment if pain lasts longer than expected. In patients from the West, advanced age is associated with an increased tolerance towards post-operative pain, possibly due to lower expectation regarding immediate pain relief or greater experience with pain management following prior medical procedures. Our results expand this knowledge by emphasizing that age and sex have to be taken into account when managing expectations about postoperative pain in order to personalise pain management, thereby increasing patient satisfaction.

Multimodal Analgesia in Practice

These results have particular clinical relevance regarding optimal post-operative care protocols. The success of the combined approaches in the management of pain seen here provides evidence to support their combination into standard acute post-operative care. A multimodal approach improved pain control and enhanced recovery Grinstein *et al.*, which is important considering rapid turnover of patients in the inpatient setting. Combined methods can provide shorter hospital stays, lower costs to the healthcare system and a better patient experience [31]. These results suggest the need for policies that allow flexibility in treatment (for example, to change analgesia based on patient choice). Trainings for healthcare providers in multimodal approaches and cultural competency would further support these efforts. The other is providing information on the available options for pain management so that patients feel empowered to engage in their role in recovery, ultimately contributing to satisfaction and potentially improved outcomes.

The research has certain limitations and Future Research Directions

Limitations in sample size and context-specificity mean that the current study must therefore be interpreted cautiously, despite providing important data [32]. The study highlights the need for larger multi-centre studies to be performed in diverse geographic and cultural settings before generalizing results, as culture plays an important role in pain perception and satisfaction with pain management. An additional limitation is that the long-term effects of different combinations of pain-relief approaches on chronic pain were not considered and so this should be an avenue for future research. Chou et al. Multimodal

strategies are expected to have long-term advantages [32] are potentially practice changing in terms of chronic pain management, if further studies confirm this possibility. Another is the variations in patients — differences in prior experience with pain, as well as individual coping mechanisms, could affect satisfaction scores. Research on these variables would increase knowledge of the factors contributing to greater satisfaction with pain management. In addition, further studies in Western and non-Western contexts could demonstrate how cultural characteristics shape the efficiency of pain management strategies and satisfaction with care.

CONCLUSION

This study demonstrates that combined pain management approaches, integrating pharmacologic and non-pharmacologic methods, significantly improve patient satisfaction and reduce recovery time in post-operative care. Patients receiving these multimodal strategies experienced greater pain relief, shorter hospital stays, and enhanced overall satisfaction, highlighting the benefits of a comprehensive approach to pain management. Cultural factors also played a role in patient preferences, underscoring the need for context-specific pain management practices. These findings advocate for patient-centered, flexible pain management protocols tailored to individual needs to optimize recovery outcomes.

Recommendations

- Implement multimodal pain management strategies to enhance recovery and patient satisfaction.
- Train healthcare providers in culturally sensitive, patient-centered pain management practices.
- Develop patient education programs to increase awareness of pain management options.

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