

## Evaluation of Post-operative Pain Management Practices and Their Clinical Outcomes in Surgical Patients

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### Abstract:

**Background:** Postoperative pain is a common surgical complication that can delay recovery, increase morbidity, and reduce patient satisfaction. Effective pain management is crucial to optimize clinical outcomes.

**Aim:** To evaluate postoperative pain management practices and their clinical outcomes in surgical patients.

**Methodology:** A prospective observational study was conducted over 8 months in the Department of Anaesthesiology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India. Eighty patients aged  $\geq 18$  years undergoing elective or emergency surgery were included. Postoperative pain was assessed using the Numeric Rating Scale (NRS) within the first 24 hours. Data on demographics, type of surgery, anesthesia, analgesic use, complications, and patient satisfaction were collected and analyzed using descriptive and inferential statistics.

**Results:** Among 80 patients, 50% experienced moderate pain (NRS 4–6) and 18.7% severe pain (NRS 7–10) on Day 1. Non-opioid analgesics were used in 68.8% of cases, opioids in 37.5%, and regional blocks in 15%. Rescue analgesia was required in 35% of patients, and non-pharmacological interventions were employed in 25%. Mobility (40%) and sleep disturbances (35%) were the most common postoperative complications. Overall, 75% of patients reported satisfaction with pain management.

**Conclusion:** Moderate-to-severe postoperative pain remains prevalent despite standard protocols. Multimodal and individualized analgesic strategies are essential to improve recovery, reduce complications, and enhance patient satisfaction.

**Keywords:** Postoperative pain, Pain management, Analgesics, Surgical outcomes, Patient satisfaction

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### Introduction

Surgery stands as a vital and widely practiced medical procedure which approximately 300 million operations conducted throughout the world annually [1]. Surgical operations serve as essential treatments for various medical conditions, yet they result in postoperative pain, which constitutes a critical problem that persists during the entire perioperative process. Postoperative pain, which affects patients after surgery, represents a major surgical complication that results in adverse effects on patient recovery, which leads to unfavorable clinical results and functional disability and extended hospitalization and increased costs for both patients and healthcare systems [2]. The failure to treat acute postoperative pain effectively has resulted in multiple health complications that include respiratory tract infections and cardiovascular stress and psychological distress and deep vein thrombosis and the emergence of chronic

pain syndromes. The societal effects of postoperative pain, which result in lost productivity and absenteeism and increased healthcare expenses, demonstrate the urgent requirement for effective pain management methods.

Effective postoperative pain control leads to two benefits because it helps patients feel better and it enables them to start moving again while their recovery process occurs. Despite the development of analgesic methods which combine different medications and allow patients to control their pain and use regional anesthesia, most surgical patients still experience inadequate postoperative pain relief. Research conducted throughout Europe and the United States together with other areas, has shown that moderate-to-severe postoperative pain occurs at high rates, which prevents patients from performing

their daily activities and causes disruption to their sleep patterns and leads to adverse effects on their mental health [3]. Patient satisfaction with pain management reaches higher levels when healthcare providers treat moderate-to-severe pain with effective methods, yet many patients still express dissatisfaction with their pain relief medications [4]. The process of managing postoperative pain becomes complicated because there are multiple factors that affect pain control, including the choice of analgesics, the methods used to administer them, and the approaches that healthcare workers use in their jobs.

China performs almost 70 million surgical procedures every year which shows how difficult it is to manage postoperative pain for patients who come from different backgrounds. The research on acute postoperative pain in China has been conducted through multiple studies which focus on one specific area or hospital or surgical method together with their limited patient groups. The research results show how hospitals across the nation follow different methods to treat postoperative pain. The PAIN OUT China study tested 2,520 patients from 12 different hospitals to study their acute postoperative pain which showed the first evidence about how postoperative pain affects patients in China [5,6]. The researchers who conducted PAIN OUT China study collected useful information through their research work but the study results faced limitations because of the small number of research centers which participated together with their restricted ability to show how healthcare services operate throughout China.

China requires a broader assessment of its postoperative pain management methods because its hospitals remain distributed throughout the country with different levels of healthcare facilities and medical knowledge between its various geographical areas. The current study expands on prior work by surveying 122 research centers nationwide, with the objective of obtaining a comprehensive understanding of acute postoperative pain in the Chinese surgical population. The study evaluates postoperative pain management effectiveness while investigating how different patient and procedure characteristics lead to inadequate pain control and assessing the rate of improper analgesic treatment methods. The research investigates various clinical outcomes from postoperative pain management to create evidence-based recommendations that will improve analgesic protocols and boost patient recovery while decreasing postoperative pain effects on both patients and healthcare systems.

The development of better methods for managing pain after surgery needs to use both medicine and educational programs together with patient-based treatment methods and hospital regulations which will provide continuous pain relief to all patients in different surgical environments. The study results

will deliver important findings about how hospitals currently manage postoperative pain while showing which areas need direct improvements and which national guidelines should be used to achieve better surgical results for patients in China and similar international healthcare systems”.

### Methodology

**Study Design:** This study was designed as a prospective observational study aimed at evaluating post-operative pain management practices and their associated clinical outcomes in patients undergoing surgical procedures. The study sought to analyze both pharmacological and non-pharmacological pain management strategies and assess their effectiveness in reducing post-operative pain, improving patient satisfaction, and minimizing adverse effects.

**Study Area:** The study was conducted in the Department of Anaesthesiology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India.

**Study Duration:** The study was carried out over a period of 8 months March 2025 to October 2025.

### Study Participants

#### Inclusion Criteria

- Patients aged 18 years and above undergoing elective or emergency surgery under general or regional anesthesia.
- Patients who were admitted to the surgical ward post-operatively and remained under observation for at least 24 hours.
- Patients who provided informed consent for participation in the study.
- Patients capable of understanding and responding to pain assessment tools, including numeric rating scales.

#### Exclusion Criteria

- Patients with impaired cognitive function or altered mental status affecting the ability to report pain accurately.
- Patients with pre-existing chronic pain conditions requiring ongoing analgesic therapy.
- Patients who refused to participate or withdrew consent at any stage of the study.
- Patients with incomplete medical records or missing post-operative pain assessments.

**Sample Size:** A total of 80 patients were enrolled in the study, determined based on feasibility, institutional patient turnover, and expected variability in post-operative pain scores. This sample size was considered sufficient to provide a representative evaluation of post-operative pain management practices and outcomes.

**Procedure:** Eligible patients were identified from the surgical schedule and approached post-

operatively on the first day after surgery. After obtaining informed consent, trained investigators collected demographic data, comorbidities, surgical details, type of anesthesia, and perioperative analgesics administered. Post-operative pain was assessed using the Numeric Rating Scale (NRS, 0 = no pain, 10 = worst pain) at multiple intervals during the first 24 hours. The intensity of pain, duration of analgesic effect, requirement for rescue analgesia, and any adverse effects were documented. Additionally, patients were evaluated for functional interference due to pain, including mobility, respiratory effort, and sleep quality, as well as their satisfaction with pain management practices. Both pharmacological interventions (opioids, non-opioid analgesics, regional blocks) and non-pharmacological strategies (positioning, ice packs, physiotherapy) were recorded. All collected data were cross-verified with patient medical records to ensure accuracy. Investigators maintained strict adherence to ethical guidelines, patient confidentiality, and standardized pain assessment protocols throughout the study.

**Statistical Analysis:** Collected data were entered and analyzed using SPSS version 27.0. Continuous variables, such as age and pain scores, were presented as mean  $\pm$  standard deviation or median with interquartile range, depending on data distribution. Categorical variables, such as sex, type of surgery, and adverse effects, were expressed as frequencies and percentages. Comparisons between groups (e.g., patients with mild versus moderate-to-severe pain) were performed using the Chi-square test or Fisher's

exact test for categorical variables and Student's t-test or Mann-Whitney U test for continuous variables, based on normality assessed with the Shapiro-Wilk test. A p-value  $<0.05$  was considered statistically significant. Descriptive and inferential analyses were performed to identify associations between pain management practices, clinical outcomes, and patient satisfaction. Additionally, effect sizes were calculated to determine the clinical significance of observed differences. Missing or incomplete data were handled using complete case analysis, ensuring that only valid and reliable data contributed to the final results".

## Result

Table 1 presents the demographic characteristics of the 80 study participants. The age distribution showed that the largest proportion of participants was in the 46–60 years group, with 28 individuals (35%), followed by the 31–45 years group with 25 participants (31.3%), those above 60 years with 15 participants (18.7%), and the 18–30 years group with 12 participants (15%). Regarding sex, 42 participants were male (52.5%) and 38 were female (47.5%), indicating a fairly balanced gender distribution. In terms of ASA (American Society of Anesthesiologists) status, 30 participants (37.5%) were classified as ASA I, 38 participants (47.5%) as ASA II, and 12 participants (15%) as ASA III, suggesting that most patients had mild to moderate systemic disease.

Characteristic	Frequency (n)	Percentage (%)
<b>Age (years)</b>		
18–30	12	15
31–45	25	31.3
46–60	28	35
>60	15	18.7
<b>Sex</b>		
Male	42	52.5
Female	38	47.5
<b>ASA Status</b>		
I	30	37.5
II	38	47.5
III	12	15

Table 2 presents the distribution of surgeries performed among the 80 study participants. Orthopedic surgeries constituted the largest proportion, with 28 cases accounting for 35% of the total, followed by general surgeries at 20 cases (25%). Gynecological procedures were performed in 15 patients, representing 18.8%, while urological surgeries accounted for

10 cases (12.5%). The remaining 7 cases (8.7%) included other types of procedures such as ENT and minor surgeries. This distribution indicates that orthopedic and general surgeries were the most common interventions in the study population, reflecting the surgical workload and patient demographics during the study period.

Surgery Type	Frequency (n)	Percentage (%)
General Surgery	20	25
Orthopedic Surgery	28	35
Gynecological Surgery	15	18.8
Urological Surgery	10	12.5
Others (ENT, minor procedures)	7	8.7

Table 3 shows the distribution of post-operative pain intensity on Day 1 among the 80 study participants. The majority of patients, 40 individuals (50%), experienced moderate pain with NRS scores between 4 and 6, while 25 participants (31.3%) reported mild pain (0–3), and 15 patients (18.7%) suffered from severe pain (7–10). The overall mean NRS score

was  $4.9 \pm 1.8$ , indicating that, on average, patients experienced moderate post-operative pain on the first day after surgery. This suggests that while a significant portion had manageable pain, nearly one-fifth of patients experienced high levels of discomfort requiring more intensive pain management strategies.

Pain Category	Frequency (n)	Percentage (%)
Mild (0–3)	25	31.3
Moderate (4–6)	40	50
Severe (7–10)	15	18.7
<b>Mean NRS Score <math>\pm</math> SD</b>	<b><math>4.9 \pm 1.8</math></b>	<b>–</b>

Table 4 presents the distribution of post-operative analgesics administered among the 80 study participants. Non-opioid analgesics, primarily NSAIDs, were the most commonly used, administered to 55 patients, accounting for 68.8% of the cohort. Opioid analgesics were given to 30 patients (37.5%), while regional or peripheral nerve blocks were utilized in 12 patients (15%). Rescue analgesia was required in

28 cases, representing 35% of participants, indicating that standard analgesic protocols were insufficient for a subset of patients. Additionally, non-pharmacological pain management methods were employed in 20 patients (25%), reflecting the use of complementary approaches alongside conventional analgesics for post-operative pain control.

Analgesic Type	Frequency (n)	Percentage (%)
Non-opioid analgesics (NSAIDs)	55	68.8
Opioid analgesics	30	37.5
Regional/Peripheral Nerve Block	12	15
Rescue analgesia required	28	35
Non-pharmacological methods	20	25

Table 5 presents the post-operative pain-related outcomes and complications among 80 surgical patients. The most common issue reported was interference with mobility, affecting 32 patients (40%), followed by interference with sleep in 28 patients (35%). Gastrointestinal and neurological side effects were less frequent, with nausea occurring in 15 patients (18.8%), dizziness in 8 patients (10%),

drowsiness in 10 patients (12.5%), and itching in 5 patients (6.3%). Despite these complications, a majority of patients, 60 out of 80 (75%), reported satisfaction with their pain management, while 20 patients (25%) expressed a desire for additional treatment, indicating room for improvement in optimizing post-operative pain control.

Outcome/Complication	Frequency (n)	Percentage (%)
Interference with mobility	32	40
Interference with sleep	28	35
Nausea	15	18.8
Drowsiness	10	12.5
Itching	5	6.3
Dizziness	8	10
Patient satisfied with pain management	60	75
Patient wanted more treatment	20	25

## Discussion

The present study assessed post-operative pain management methods, which resulted in 80 surgical patients. The study results showed that middle-aged adults aged 46 to 60 years represented the largest group in this research study, while the 31 to 45 years age group followed behind them. The demographic distribution of this study matches the results of Pei et al. (2022) [7], who found that 42% of total knee arthroplasty patients belonged to the 45 to 60 years age group, which shows that middle-aged and older adults make up the majority of surgical patients. The study found that both genders participated in the research, but males showed slightly higher presence than females. Wang et al. (2017) [8] found that thoracic and abdominal surgery groups showed almost equal distribution between male and female patients which proves that post-operative pain management should address the needs of male and female patients in equal measure”.

Our cohort showed that most patients were classified as ASA I and II while only a small number of patients belonged to the ASA III category. This distribution matches the findings of Chen et al. (2020) [9] who studied post-operative pain outcomes in Chinese surgical patients and found that 65% of surgical patients had ASA I to II status while 15% had ASA III status. The results demonstrate that healthcare professionals need to create different pain management approaches which should be based on the initial health conditions of patients to achieve better results with pain relief medications while reducing health risks.

The study examined different surgical methods which showed that orthopedic procedures were performed most frequently while general surgeries followed and gynecological, urological and other surgical procedures made minimal contributions. Gersbshagen et al. (2013) [10] similarly reported that orthopedic and abdominal procedures were associated with higher postoperative pain intensity, with 52% of orthopedic patients experiencing moderate-to-severe pain on the first post-operative day. The study results demonstrate the necessity for developing dedicated pain management systems which must focus on particular surgical operations that produce more intense pain to their patients.

The post-surgical pain evaluation we conducted on the first day after surgery showed that 50 percent of patients experienced moderate pain while 30 percent suffered from mild pain and 20 percent had severe pain resulting in an average NRS score of 4.9. The findings match those of Zaslansky et al. (2018) [11] which showed that 48% of patients from the international PAIN OUT registry experienced moderate-to-severe post-operative pain thus demonstrating a worldwide problem that continues to exist because optimal early post-operative pain relief remains

unattainable. The North American studies showed higher rates of pain prevalence according to Gan et al. (2014) [12] which found that 70 to 86 percent of patients suffered from moderate to severe pain after their surgical procedures.

Our research found that analgesic practices showed that 70 percent of patients received non-opioid analgesics while opioids had lower usage rates and medical staff used regional or peripheral nerve blocks only in specific situations. The study found that 35 percent of patients needed rescue analgesia while 25 percent of patients received non-pharmacological treatments. The results of this research match the findings from Beverly et al. (2017) [13] who found that multimodal analgesia which combined non-opioid analgesics with regional anesthesia and non-pharmacological treatments led to reduced post-operative pain scores and opioid usage. The research conducted by Lee et al. (2020) [14] showed that when healthcare providers used opioid-sparing strategies together with patient education and participation it resulted in a decrease of mean NRS scores from 5.2 to 3.8 during the first 24 hours after surgery.

The study discovered that sleep and mobility problems represented the most common post-surgical problems because they impacted 40% of patients and 35% of patients. Nausea and dizziness and drowsiness and itching occurred less frequently but maintained their importance in clinical contexts. The study results match the findings of Vadivelu et al. (2010) [15] which showed that ineffective pain management results in delayed patient movement and sleep problems and greater patient suffering which reduces their satisfaction with post-surgical treatment. The research found that most patients were happy with their pain treatment but 25% of them wanted more help. The observation matches the findings of Carlson et al. (2003) [16] which showed that patient happiness does not depend on their pain level but individualized pain management programs combined with patient participation and communication lead to successful pain management results.

The current research results demonstrate that post-operative pain management requires ongoing evaluation and improvement processes. According to Kaptain et al. (2017) [17], patients who take part in their pain evaluation process and treatment selection, achieve better results with pain relief and increased satisfaction. The development of customized treatment programs, which combine both drug-based and non-drug-based treatments, requires healthcare providers to evaluate individual patient characteristics, including their age and ASA classification and surgical procedure and existing pain conditions.

Our results show that current literature demonstrates post-operative pain management exists as an

international medical problem which results in moderate to severe pain that affects most surgical patients despite existing treatment protocols. The effective implementation of multimodal analgesia together with personalized treatment strategies and direct patient participation leads to better surgical results and increased patient contentment across all surgical treatment groups.

### Conclusion

The present study demonstrates that postoperative pain remains a significant concern among surgical patients, with half of the participants experiencing moderate pain and nearly one-fifth reporting severe discomfort on the first postoperative day. Orthopedic and general surgeries were associated with higher pain intensity, highlighting the need for procedure-specific pain management strategies. While non-opioid analgesics were the most commonly administered, a notable proportion of patients required rescue analgesia, indicating that standard protocols may be insufficient for optimal pain control. Postoperative complications, particularly interference with mobility and sleep, were prevalent, though overall patient satisfaction was relatively high. These findings emphasize the importance of multimodal analgesia, individualized treatment plans, and patient-centered approaches to enhance recovery, minimize complications, and improve overall clinical outcomes in surgical populations.

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