



ORIGINAL ARTICLE

Postoperative Pain Management Practices Among Surgical Patients

Zainab Mubashir^{1*} | Faiza Kamran¹

¹Department of General Surgery, Sharif Medical City hospital, Lahore, Pakistan

*Correspondence: Zainab Mubashir (dr.zainabawmed@gmail.com)

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ABSTRACT

Background: Postoperative pain management is crucial for successful recovery, minimal complications, and optimal surgical outcomes. In this study, the postoperative management of pain was assessed in surgical patients, and potential factors related to good postoperative pain control and rescue analgesia were identified. **Methods:** This cross-sectional observational study used consecutive sampling technique, with a total of 275 patients with surgical history included. A structured data collection proforma was used to collect data related to demographic characteristics, surgical type, use of analgesics, pain assessment, and requirement for rescue analgesics. Descriptive statistics and Chi-square test were used for data analysis and $p < 0.05$ was considered statistically significant. **Results:** Most participants were 40–59 years (40.7%), 57.1% were males, and 66.5% underwent elective surgery. The most common methods of pain management were multimodal analgesia (44.0 %), intravenous administration of analgesics (63.3 %), and the Numeric Rating Scale (88.4 %). Elective surgery, the use of multimodal analgesia, and the use of routine NRS were all significantly associated with adequate pain control ($p < 0.05$). There was a significant association with the nature of surgery, type of anesthesia, analgesic regimen and the use of NRS ($p < 0.05$) for rescue analgesia requirement. **Conclusions:** Multimodal analgesia, timely administration of analgesics and routine evaluation of pain with the Numeric Rating Scale was correlated with better postoperative pain management and less need for rescue analgesics.

Keywords: postoperative pain, pain management, multimodal analgesia, rescue analgesia, Numeric Rating Scale, surgical patients.

INTRODUCTION

Postoperative pain is one of the most frequent complications after surgical interventions, and it is still a great challenge despite the progress of anesthesia and perioperative care ¹. Nearly 70-80% of surgical patients report moderate to severe pain after surgery and many of these patients do not receive adequate pain relief ². If pain is not adequately managed after surgery, it may slow the healing process, compromise lung function, extend hospital stays, raise health care expenses, and impact the quality of life and recovery of the patient ³. Patients may also experience poor pain management that can lead to chronic postsurgical pain and diminished satisfaction ⁴. Thus, proper pain management after surgery is considered to be a vital part of quality surgical care and an improvement of the recovery after the surgery (ERAS) ⁵.

The current guidelines suggest a multimodal strategy for postoperative pain alleviation, which involves the use of several different analgesics with different mechanisms of action to achieve better pain management and minimize opioid-related side effects ⁶. Nonsteroidal anti-inflammatory drugs (NSAIDs), paracetamol, opioids, and regional anesthetic techniques are regularly used analgesics ⁷. Previous studies have demonstrated that multimodal analgesia offers superior pain control, earlier mobilization and lower postoperative complication rates than single agent analgesics ⁸. Also, adequate pain assessment using a validated instrument (Numeric Rating Scale – NRS) and timely administration of analgesics is crucial to assess effectiveness of treatment and to give rescue analgesics as needed ⁹.

Although there are guidelines to follow, there is still a wide variation in how postoperative pain is managed in different healthcare environments. Multiple studies have found variations in the prescription of analgesics, the use of multimodal approaches to pain management, when analgesics are administered, and the routine assessment of pain ¹⁰. Such differences are especially apparent in developing nations, where the lack of resources, institutional procedures, and inconsistent clinical practices may impact the quality of pain management ¹¹. As a result, many patients have inadequate pain control after surgery when there are effective strategies to control pain.

Evaluation of current pain management practices is critical to enhance surgical care, especially because of the importance of optimal postoperative pain management and the lack of evidence in the local setting. Analyzing medications prescribed, pain assessment and factors that may contribute to inadequate pain management can identify areas of interest for improvement and help guide the implementation of evidence-based pain management protocols. Hence, the present study was designed to assess the postoperative pain management practices among the surgical patients and factors associated with satisfactory pain management and the need for rescue analgesics in a tertiary care teaching hospital.

METHODOLOGY

This cross-sectional observational study (March 2022 to March 2023) from the General Surgery Department of an affiliated Tertiary Care Teaching Hospital in Lahore used a consecutive sampling technique and the sample size calculation formula, $n = Z^2P(1-P)/d^2$, for enrollment of a total of 275 post-surgical period patients. Patients aged 18 years and older who received treatment for an elective or emergency surgical procedure and were treated for postoperative pain during their hospital stay were included. Patients admitted to intensive care units, those with cognitive impairment or communication difficulties who were unable to assess pain, patients with chronic pain disorders who were on long-term opioid therapy and patients with incomplete clinical records were excluded from this study. Institutional Ethical Review Committee of the hospital participated in the study, and ethical approval was secured prior to the start of the study. All participants gave informed consent and anonymity of patient data was ensured during the study, according to the Declaration of Helsinki.

A structured data collection form was designed on the basis of hospital postoperative pain management protocols and literature and used to collect data. Demographic data included age and gender, clinical data included type of surgery and nature of surgery (elective or emergency) and type of anesthesia (general, spinal/epidural, local/regional). Data related to postoperative pain management included first choice of analgesic (NSAIDs only, opioids only, paracetamol only or multimodal), route of administration of the analgesic, time to first postoperative administration and need for rescue analgesia. The pain was evaluated using the Numeric Rating Scale (NRS) which is a validated 11-point scale on a continuum from 0 (no pain) to 10 (worst possible pain). Assessment of pain carried out as per the normal ward routine, at intervals (every 4 hours, 6 hours or 8-12 hours) or when patients complained of pain. Analgesic administration with a score on the NRS ≤ 3 at the end of the surgery was deemed as adequate pain control and score > 3 or need for additional pain management was considered inadequate pain control for analytical purposes. Any additional analgesic medication that was used following the initial postoperative analgesic regimen which would not provide adequate pain relief is considered rescue analgesia.

The data was entered and analyzed by Statistical Package for the Social Sciences (SPSS) version 25.0 (Released 2021; IBM Corp., Armonk, NY, USA). Categorical variables were analyzed using descriptive statistics: frequencies, percentages. The Chi-square test was used to determine the associations between adequate pain control, between rescue analgesia requirement and between any demographic or clinical variables. P-values of < 0.05 were deemed statistically significant.

RESULTS

There were 275 surgical patients who had undergone surgery and were included in the study. The demographic and clinical features of the participants were summarized using descriptive statistics. Demographic and clinical baseline characteristics of the study participants are shown in **Table I**, which includes age, gender, type of surgery, nature of surgery, and type of anesthesia. Most of the participants were aged between 40–59 years (40.7%) and 57.1% were males. The majority of patients received elective surgery 183 (66.5%), under general anesthesia 178 (64.7%) with general surgery being the most prevalent surgical specialty.

Table I: Baseline Demographic and Clinical Characteristics of the Participants (n = 275)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–39	95	34.5
40–59	112	40.7
≥60	68	24.7
Gender		
Male	157	57.1
Female	118	42.9
Type of Surgery		
General Surgery	106	38.5
Orthopedic Surgery	71	25.8
Gynecological Surgery	48	17.5
Urological Surgery	28	10.2
Other Surgical Procedures	22	8.0
Nature of Surgery		
Elective	183	66.5
Emergency	92	33.5
Type of Anesthesia		
General Anesthesia	178	64.7
Spinal/Epidural Anesthesia	81	29.5
Local/Regional Anesthesia	16	5.8

Postoperative pain management practices of the participants were evaluated by assessing the prescribed analgesic regimen, the method of administration, the time of the first dose of the analgesic, and the need for rescue analgesics. The postoperative pain management practices adopted for the surgical patients included in the study are summarized in **Table II**. The most common pain management technique 121 (44.0%) was multimodal analgesia, and most was given intravenously (63.3%). Of the patients, over half 149 (54.2%) were administered their first dose of an analgesic within 30 minutes of surgery and 91 (33.1%) needed rescue analgesia.

Table II: Postoperative Pain Management Practices Among Surgical Patients (n = 275)

Variable	Frequency (n)	Percentage (%)
Primary Analgesic Regimen		
NSAIDs Only	74	26.9
Opioids Only	41	14.9
Paracetamol Only	39	14.2
Multimodal Analgesia	121	44.0
Route of Analgesic Administration		
Intravenous	174	63.3
Intramuscular	42	15.3
Oral	59	21.5

Time to First Analgesic Administration		
≤30 minutes	149	54.2
31–60 minutes	84	30.5
>60 minutes	42	15.3
Rescue Analgesia Required		
Yes	91	33.1
No	184	66.9

To assess pain assessment practice, the Numeric Rating Scale (NRS) was used and the frequency of pain assessment in patients after routine was evaluated. **Table III** shows the pain assessment and monitoring during hospital stay for patients who had undergone surgery. In 275 (88.4%) of patients, the Numeric Rating Scale was used for pain assessment. Most commonly reported monitoring practice was routine pain assessment every 4 hours 118 (42.9%), while only 22 (8.0%) of patients were assessed only if they reported pain.

Table III: Pain Assessment and Monitoring Practices Among Surgical Patients (n = 275)

Variable	Frequency (n)	Percentage (%)
Pain Assessment Using Numeric Rating Scale (NRS)		
Yes	243	88.4
No	32	11.6
Frequency of Pain Assessment		
Every 4 hours	118	42.9
Every 6 hours	96	34.9
Every 8–12 hours	39	14.2
Only When Patient Complained	22	8.0

Inferential analysis was carried out by Chi-square test to find the association between selected clinical variables and adequate postoperative pain control. The relationship between selected clinical parameters and postoperative pain management was examined for surgical patients and is shown in **Table IV**. The type of surgery ($p = 0.002$); the type of primary analgesics ($p < 0.001$); and the use of Numeric Rating Scale ($p = 0.008$) were all significantly associated with adequate pain control.

Table IV: Factors Associated with Adequate Pain Control Among Postoperative Surgical Patients (n = 275)

Variable	Adequate Pain Control n (%)	Inadequate Pain Control n (%)	χ^2	p-value
Nature of Surgery				
Elective (n=183)	138 (75.4)	45 (24.6)	9.42	0.002*
Emergency (n=92)	54 (58.7)	38 (41.3)		
Primary Analgesic Regimen				
Multimodal Analgesia (n=121)	98 (81.0)	23 (19.0)	18.36	<0.001*
Single-agent Therapy (n=154)	94 (61.0)	60 (39.0)		
Pain Assessment Using NRS				
Yes (n=243)	181 (74.5)	62 (25.5)	7.15	0.008*
No (n=32)	11 (34.4)	21 (65.6)		

Chi-square test; statistically significant at $p < 0.05$.

Multimodal analgesia and elective surgery patients showed improved postoperative analgesia. In addition, a chi-square analysis was performed to determine the factors associated with the need for rescue analgesia in the postoperative period. **Table V** shows the relationship between demographic and clinical factors and need for rescue analgesics in postsurgical surgical patients.

Table V: Factors Associated with Rescue Analgesia Requirement Among Postoperative Surgical Patients (n = 275)

Variable	Rescue Analgesia Required n (%)	Rescue Analgesia Not Required n (%)	χ^2	p-value
Age Group (years)				
18–39 (n=95)	26 (27.4)	69 (72.6)	4.72	0.094
40–59 (n=112)	35 (31.3)	77 (68.7)		
≥60 (n=68)	30 (44.1)	38 (55.9)		
Nature of Surgery				
Elective (n=183)	49 (26.8)	134 (73.2)	8.91	0.003*
Emergency (n=92)	42 (45.7)	50 (54.3)		
Type of Anesthesia				
General Anesthesia (n=178)	68 (38.2)	110 (61.8)	7.26	0.027*
Spinal/Epidural Anesthesia (n=81)	18 (22.2)	63 (77.8)		
Local/Regional Anesthesia (n=16)	5 (31.3)	11 (68.7)		
Primary Analgesic Regimen				
Multimodal Analgesia (n=121)	24 (19.8)	97 (80.2)	19.84	<0.001*
Single-agent Therapy (n=154)	67 (43.5)	87 (56.5)		
Pain Assessment Using NRS				
Yes (n=243)	74 (30.5)	169 (69.5)	9.63	0.002*
No (n=32)	17 (53.1)	15 (46.9)		

Chi-square test; statistically significant at $p < 0.05$.

The nature of surgery ($p = 0.003$), type of anesthesia ($p = 0.027$), primary analgesic regimen ($p < 0.001$), and the use of the Numeric Rating Scale ($p = 0.002$) were significantly associated with rescue analgesia. There was no statistically significant difference between age group and the need for rescue analgesia ($p = 0.094$).

DISCUSSION

The current study aimed to assess postoperative pain management in surgical patients and to identify factors related to effective pain control and the need for rescue analgesia. The results showed that multimodal analgesia was the most commonly used method of postoperative pain management and the intravenous route of administration was the most common form of pain delivery. The majority of the patients had the first

dose of an analgesic within 30 minutes of surgery, and most participants routinely used the Numeric Rating Scale (NRS) for assessing their pain. In addition, an adequate level of pain control was significantly associated with elective surgery, multimodal analgesia and routine use of an NRS, which was also associated with a reduced requirement for rescue analgesia. These results highlight the need for a systematized postoperative pain management approach to achieve effective pain management. Similar results were observed in recent studies that found multimodal analgesia with pain assessment protocols leads to better postoperative pain management and lower requirement for analgesia ¹².

The demographic characteristics of the current study revealed that the highest number of subjects were in the age range 40–59 years, with more males than females. The largest surgical specialty was general surgery, with most surgeries being elective and done under general anesthesia. Multimodal analgesia was the most common route of administration, while intravenous was the most frequently used regimen, as it is quick and easy to administer during the immediate postoperative period. Similar demographic patterns have been previously reported for surgical patients undergoing surgery, especially in surgery for general conditions ¹³. Previous studies also have shown that elective procedures tend to comprise a greater proportion of surgical admissions than emergency procedures ¹⁴. Similar results have been reported on the general anaesthetic and intravenous analgesic use in the early postoperative period ¹⁵. However, recent evidence has shown that multimodal analgesia has become the postoperative pain management of choice as a result of the combined effect of different mechanisms of action leading to effective pain relief with reduced opioid exposure ¹⁶.

Accurate assessment of postoperative pain is an integral part of postoperative management and the effectiveness of postoperative pain management is related to the intensity of the pain. The Numeric Rating Scale was used for pain assessment in the majority of patients and regular assessment every 4 hours was most often performed. Other studies have reported that standardized pain assessment tools are used extensively, e.g., the NRS, which is simple, valid, and easily interpreted in adults undergoing surgery ^{17,18}. Regularly scheduled pain supervision after surgery has been demonstrated in several investigations to help identify unmanaged pain in a timely fashion and to allow timely adjustment of analgesics. Conversely, some studies reported less use of standardized pain assessment procedures, particularly in resource-poor health care environments where pain assessment may not be standardized ¹⁹. Routine standardized pain assessment aids in timely optimization of Analgesic therapy.

The inferential analysis showed that good pain management after surgery was significantly related to elective surgery, multimodal analgesia and routine NRS use. In the same way, these variables were correlated with a decreased need for rescue analgesia, and emergency surgery and general anesthesia a higher need of rescue analgesia. Previous studies have consistently demonstrated improved pain control with multimodal analgesia than with a single agent alone, with the idea that the combination of analgesics with different mechanisms of action has a synergistic effect with the reduction of opioid consumption and adverse events ²⁰. It was also shown in previous studies that elective surgery patients had a greater level of pain management after surgery, because they had a comprehensive plan prior to surgery, an optimized analgesic regimen, and predictable surgical procedures ^{21,22}. There is emerging evidence that standardized pain assessment tools can be used routinely as a means to detect inadequate pain relief early and adjust the intervention for pain relief before it becomes clinically significant ²³. Similar results have been found for systematic pain assessment, which has been demonstrated to reduce analgesia use during rescue as a result of earlier intervention and individual approach to pain ²⁴. All these observations reinforce the current recommendations to use multimodal analgesia and structured pain assessment as necessary elements of postoperative pain management.

Although this study provides valuable insights into postoperative pain management practices, several limitations should be acknowledged. The study was conducted in a single tertiary care teaching hospital and used a cross-sectional study design, which might restrict the generalizability of the results and limit causal inferences. Also, pain management was examined while the patient was in the hospital, but not longer-term outcomes after discharge. Multi-center prospective studies in different surgical specialties and health care settings are recommended to confirm these findings in the future. Standardization of multimodal analgesic protocols as well as structured pain assessment pathways should be assessed for efficacy in enhancing postoperative pain management and decreasing the need for rescue analgesics in various surgical patient groups, as well.

CONCLUSION

The present study showed that multimodal analgesia, early postoperative pain medication, and Numeric Rating Scale to assess the routine postoperative pain were important factors in achieving good postoperative pain management in surgical patients. Multimodal analgesia, elective surgery, routine NRS use, and better pain control were found to have significant associations with the need for rescue analgesia and with better pain control. The results underscore the need for consistent, evidence-based pain management strategies to ensure the best possible recovery outcomes and improve patient experiences in hospitals. Improving the standard practice of pain assessment and advocating multimodal pain management will further enhance outcomes of pain and reduce the overuse of analgesics in the postoperative period.

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