DOI: https://doi.org/10.54393/pbmj.v9i10.1410

PAKISTAN BIOMEDICAL JOURNAL
https://www.pakistanbmj.com/journal/index.php/pbmj/index
ISSN (E): 2709-2798, (P): 2709-278X
Volume 9, Issue 10 (October 2026)

Original Article

A Comparative Evaluation of Perioperative Analgesic Use in Orthopaedic and General Surgery Departments

Bayazeed[1], Zahir Khan[2*], Mustafa Javaid[3], Rumman[4] and Muhammad Luqman[5]

[1]Department of Surgery, Medical Teaching Institution, Mardan Medical Complex, Mardan, Pakistan
[2]Department of Orthopaedic Surgery, Medical Teaching Institution, Mardan Medical Complex, Mardan, Pakistan
[3]Department of Internal Medicine, Oxford University Hospitals NHS Foundation Trust, United Kingdom
[4]Department of Pharmacovigilance Center, Medical Teaching Institution, Mardan Medical Complex, Mardan, Pakistan
[5]Department of Pharmacology, Peshawar Medical College, Peshawar, Pakistan

ARTICLE INFO

Keywords:
Perioperative Analgesia, Orthopaedic Surgery, General Surgery, Opioids, Multimodal Analgesia, Postoperative Pain

How to Cite:
Bayazeed, ., Khan, Z., Javaid, M., Rumman, ., & Luqman, M. (2026). A Comparative Evaluation of Perioperative Analgesic Use in Orthopaedic and General Surgery Departments: Perioperative Analgesic Use in Orthopaedic and General Surgery Departments. Pakistan BioMedical Journal, 9(10), 10-16. https://doi.org/10.54393/pbmj.v9i10.1410

Corresponding Author:
Zahir Khan
Department of Orthopaedic Surgery, Medical Teaching Institution, Mardan Medical Complex, Mardan, Pakistan
zahir.ortho@gmail.com

Received Date: 14th August, 2026
1st Revision Received: 30th September, 2026
2nd Revision Received: 16th October, 2026
3rd Revision Received: 21st October, 2026
Acceptance Date: 26th October, 2026
Published Date: 31st October, 2026

ABSTRACT

The need for perioperative analgesia varies based on surgical specialty, and medication-related risks arise when inappropriate opioids are used. **Objective:** To compare perioperative analgesic utilization and postoperative pain between orthopaedic and general surgery patients. **Methods:** This prospective comparative observational study included 266 patients, with 133 each from Orthopaedic and General Surgery departments at Medical Teaching Institution, Mardan Medical Complex (MTI-MMC). Demographic, surgical, analgesic, dose, opioid exposure, and postoperative Numerical Rating Scale (NRS) pain data were collected from medical records. Independent-samples t-test, Mann–Whitney U test, and Chi-square/Fisher's exact test were used to compare groups. **Results:** Opioid use was significantly higher in orthopaedics than in general surgery patients (p=0.037), as were opioid exposure (p=0.018) and the number of analgesic classes (p=0.031). Orthopaedic patients had higher NRS pain scores at 2, 6, and 12 hours (p=0.009, 0.014, and 0.025, respectively), while the 24-hour difference was non-significant (p=0.052). Rescue opioid use was also higher in orthopaedics (p=0.048), whereas overall rescue analgesia was not significant (p=0.062). **Conclusions:** It was concluded that orthopaedic patients had greater perioperative opioid utilization, opioid exposure, postoperative pain scores, and rescue opioid requirements than general surgery patients. These findings highlight differences in analgesic requirements between surgical specialties and support the need for procedure-specific multimodal analgesic strategies with appropriate opioid-sparing approaches to achieve effective pain control while minimizing unnecessary opioid exposure.

INTRODUCTION

Postoperative pain is a frequent and clinically relevant aftereffect of surgical treatment, and insufficient pain control can delay mobilization, affect functional recovery, increase length of stay, and decrease patient satisfaction [1]. Increased focus on improved recovery has transformed perioperative pain management from an opioid-based approach to a more individualized, multimodal approach that incorporates non-opioid analgesics, opioids, regional methods, and adjuvant medications [2]. The current clinical guidelines recommend acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs) as the cornerstone drugs, and multimodal analgesia has been proven to enhance pain control and decrease the need for opioids and opioid-induced adverse effects [3]. The requirements for analgesics and analgesic prescribing may vary significantly depending on the nature and extent of

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i10.1410

surgery [4]. Orthopedic procedures are often more extensive in terms of tissue and musculoskeletal damage [5]. They may therefore require a prolonged or multiple-pain regimen compared to general surgical procedures, which include a wide variety of procedures with varying pain characteristics and recovery timelines [6]. A prospective observational study of 7,839 adult surgical patients stated that 46.4% received opioids after surgery, and 25.9% continued to take opioids on postoperative day 7 [7]. The clinical practice evidence also shows significant variations in the use of analgesics by different surgical departments. Opioid exposure is clinically relevant as around 7% of patients in a large meta-analysis continued to receive opioids after 3 months post-surgery, highlighting the need for rational opioid prescribing and choice of non-opioid alternatives [8]. Although there is growing evidence in favor of multimodal and opioid-sparing analgesics, actual practice of multimodal and opioid-sparing analgesia may differ by surgical subspecialty, surgery type, institutional protocols, and prescriber preference. There has also been evidence from Pakistan highlighting a high degree of variation in the practice of postop analgesics; multimodal regimens were used in 29.9%, opioid-based in 27.6%, and analgesic monotherapy in 26.7% of 431 surgical patients [9]. A multimodal opioid-sparing protocol was shown to be highly effective in lowering opioid consumption without significant differences in most secondary outcomes in a 2022 randomized clinical trial of patients undergoing knee or shoulder arthroscopy, demonstrating the potential of opioid-sparing approaches in orthopedic surgery [10]. Likewise, an international prospective cohort study with patients receiving opioid-free or opioid-containing postoperative analgesia following common general surgical and orthopedic procedures underscored the need to consider achieving effective postoperative pain relief while ensuring opioid stewardship in various surgical specialties [11].

There is limited local data available for comparison of these parameters for orthopedic and general surgery patients. This literature gap highlights the need to compare utilization of analgesics and postoperative pain in a direct and standardized specialty-based manner. In this context, a head-to-head comparison of periopanalgesic use between orthopedics and general surgery departments can offer clinically relevant information regarding drug selection, opioid exposure, administration, and multimodal approaches. This may be useful to help define opportunities to promote safer, more rational, and procedure-appropriate prescribing of analgesics and to ensure effective postoperative pain management. Therefore, this study aimed to comparatively evaluate the pattern of perioperative analgesic use among patients undergoing orthopedic and general surgical procedures.

METHODS

This was a prospective comparative observational study conducted in the Orthopaedic Surgery and General Surgery Departments of the Medical Teaching Institution (MTI), Mardan Medical Complex, Mardan. The study was conducted from 1st March 2024 to 31st August 2025. Ethical approval was granted by the Ethical Review Board (ERB), Mardan Medical College (MMC), with ref no: 792/BKMC dated 28 December 2023. The sample size was determined using the OpenEpi Version 3.01 software based on a previous observational study; Joshi *et al.* found that 97.6% of orthopaedic patients and 92.8% of general surgery patients used paracetamol after surgery [12]. With a ratio of 1:1 between groups, a 95% confidence level, an 80% study power, and the reported proportions, the minimum sample size calculated was 266 patients (133 patients per group). A non-probability consecutive sampling technique was used. Patients of both genders, aged 18 years or older, undergoing elective surgery and emergency surgery in the Departments of Orthopaedic Surgery and General Surgery were included. Patients were eligible if their medical or medication records included documentation of perioperative analgesic therapy, and adequate information was recorded on the type, dose, route, and frequency of the analgesics administered. Patients who were given analgesics during their perioperative management and were kept under observation until the relevant post-operative assessments were included. Informed consent was obtained from each participant. Patients aged <18 years, those who were not receiving procedures in the Departments of Orthopaedic Surgery or General Surgery, and patients who had incomplete or missing perioperative medication records were excluded. Patients with documented chronic opioid therapy or pre-existing chronic pain conditions were also excluded, as these may have a significant impact on postoperative analgesia requirements. A structured, study-specific data collection proforma was developed based on the study objectives and variables reported in previous literature on perioperative analgesic utilization and postoperative pain assessment. The proforma was used to extract relevant information from patients' medical records, medication charts, anesthesia charts, surgical notes, and postoperative progress notes. The patients were divided into two groups: Orthopedic Surgery and General Surgery. The cumulative opioid exposure was measured as oral morphine milligram equivalents (MME) for patients taking opioids. For tramadol, morphine, and fentanyl, MME was computed as the sum of the total dose administered of tramadol, morphine, and fentanyl multiplied by the respective standard MME conversion factors. The time period of observation was the

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i10.1410

perioperative period defined as analgesic use during the pre-, intra-, and post-operative periods up to 24 hours after surgery, according to the standard opioid conversion guidance used: 0.1 MME/mg for tramadol, 1.0 MME/mg for morphine, and 0.13 MME/mcg for parenteral fentanyl [13]. Postoperative pain was evaluated on the Numerical Rating Scale (NRS) ranging from 0 (no pain) to 10 (the worst pain imaginable). Baseline and postoperative pain scores were completed at 2, 6, 12, and 24 hours. Pain was categorized as mild (1–3), moderate (4–6), and severe (7–10) [14]. Analgesic use in the perioperative period was described as given in the pre-operative, intra-operative, or post-operative period. Monotherapy was defined as using any one of the classes of analgesics. Opioid use was defined as the use of any opioid in the perioperative period, and opioid-free analgesia was the lack of opioid use in the perioperative period. The total dose of an Analgesic administered during the observation period was called the cumulative dose. Rescue analgesics were defined as any analgesic use for breakthrough or poorly controlled pain. Clinically important pain was defined as an NRS score ≥4, and adequate pain control was defined as an NRS score ≤3 [15]. The participant flow diagram was illustrated (Figure 1).

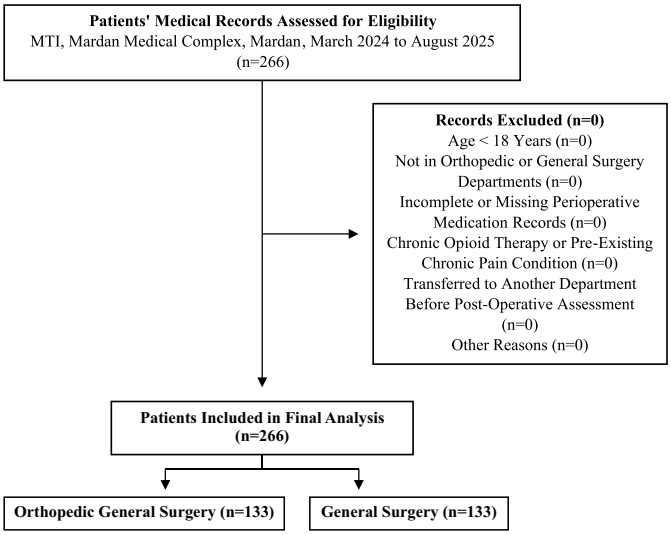


Figure 1: Participant Flow Diagram Showing Screening, Eligibility Assessment, and Inclusion of Patients in the Orthopedic and General Surgery Groups

The data were input, coded, and analyzed with IBM SPSS Statistics version 26.0. All continuous variables were tested for normality using the Shapiro-Wilk test and reported as mean ± SD for normally distributed data and as median (IQR) for non-normally distributed data. Categorical variables were presented as frequencies and percentages. The independent-samples t-test was used to compare normally distributed continuous variables between the Orthopedic and General Surgery groups, while the Mann–Whitney U test was used for non-normally distributed variables. The Chi-square test and Fisher's exact test were used to compare categorical variables. A p-value of <0.05 was regarded as statistically significant.

RESULTS

A total of 266 patients were analyzed, with 133 patients in each group. The demographic characteristics were comparable between the Orthopaedic Surgery and General Surgery groups, with no statistically significant difference in age (p=0.166), age ≥50 years (p=0.312), or gender (p=0.218) (Table 1).

Table 1: Demographic, Clinical and Surgical Characteristics of Study Participants

Variables	Orthopaedic Surgery (n=133), n (%) / Mean ± SD	General Surgery (n=133), n (%) / Mean ± SD	Effect Size / 95% CI	p-value
Age (years)	46.8 ± 16.2	44.1 ± 15.7	Mean difference = 2.70 (−1.13 to 6.53)	0.169
Age ≥50 Years	61 (45.9%)	53 (39.8%)	OR = 1.28 (0.79–2.08)	0.322
Sex				
Male	82 (61.7%)	72 (54.1%)	OR = 1.36 (0.84–2.22)	0.214
Female	51 (38.3%)	61 (45.9%)	—	—
Comorbidity present	39 (29.3%)	34 (25.6%)	OR = 1.21 (0.70–2.07)	0.492
Surgical Status				
Elective	101 (75.9%)	108 (81.2%)	OR = 0.73 (0.41–1.32)	0.296
Emergency	32 (24.1%)	25 (18.8%)	—	—
Type of Anesthesia				
General Anesthesia	48 (36.1%)	91 (68.4%)	—	<0.001
Spinal/Regional Anesthesia	79 (59.4%)	31 (23.3%)	—	
Local/MAC	6 (4.5%)	11 (8.3%)	—	
Duration of Surgery (minutes)	118.4 ± 48.7	96.2 ± 42.5	Mean difference = 22.20 min (11.21–33.19)	<0.001
Operative Category				
Major Surgery	76 (57.1%)	69 (51.9%)	OR = 1.09 (0.67–1.78)	0.389
Minor/Moderate Surgery	57 (42.9%)	64 (48.1%)	—	—

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i10.1410

The overall use of multimodal analgesia was very common in both departments. Opioid usage was found to be significantly different between groups, with no other differences in analgesic usage being statistically significant: NSAIDs, other adjuvants, multimodal analgesics, or rescue analgesics. No significant differences between the different groups of individual analgesic agents were found (Table 2).

Table 2: Perioperative Analgesic Utilization and Commonly Used Individual Analgesics

Variables	Orthopaedic Surgery (n=133), n (%)	General Surgery (n=133), n (%)	Effect Size / 95% CI	p-value
Analgesic Category: Paracetamol	121 (91.0%)	124 (93.2%)	OR = 0.74 (0.34–1.62)	0.495
Analgesic Category: NSAIDs	87 (65.4%)	101 (75.9%)	OR = 0.60 (0.34–1.04)	0.059
Opioids	78 (58.6%)	61 (45.9%)	OR = 1.67 (1.03–2.72)	0.037
Other Adjuvants	29 (21.8%)	24 (18.0%)	OR = 1.27 (0.65–2.47)	0.443
Multimodal Analgesia	105 (78.9%)	96 (72.2%)	OR = 1.53 (0.83–2.80)	0.199
Monotherapy	28 (21.1%)	37 (27.8%)	–	–
Opioid-Free Regimen	55 (41.4%)	72 (54.1%)	OR = 0.60 (0.37–0.97)	0.037
Rescue Analgesia Required	63 (47.4%)	48 (36.1%)	OR = 1.59 (0.98–2.60)	0.062
Individual Analgesics				
Paracetamol 1 g IV/PO	121 (91.0%)	124 (93.2%)	–	–
Diclofenac 75 mg	54 (40.6%)	63 (47.4%)	–	–
Ketorolac 30 mg	28 (21.1%)	32 (24.1%)	–	–
Ibuprofen 400 mg	18 (13.5%)	22 (16.5%)	–	–
Tramadol 50–100 mg	55 (41.4%)	43 (32.3%)	–	–
Morphine 2–5 mg	18 (13.5%)	11 (8.3%)	–	–
Fentanyl	31 (23.3%)	37 (27.8%)	–	–
Other Adjuvants	29 (21.8%)	24 (18.0%)	OR = 1.27 (0.65–2.47)	0.443

Cumulative analgesic exposure and postoperative pain showed no significant difference between the groups. However, opioid exposure and analgesic classes used were higher for orthopaedic patients. The pain scores were also elevated in the orthopaedic group during the early postoperative period, with statistically significant differences at 2, 6 and 12 hours, and the difference at 24 hours was not statistically significant. These differences were not statistically significant (Table 3).

Table 3: Analgesic Dose, Cumulative Exposure and Postoperative Pain Scores

Variables	Orthopaedic Surgery (n=133), n (%) / Mean ± SD / Median (IQR)	General Surgery (n=133), n (%) / Mean ± SD / Median (IQR)	Effect Size / 95% CI	p-value
Analgesic Dose And Cumulative Exposure				
Paracetamol Cumulative Dose (mg)	3,420 ± 1,180	3,310 ± 1,090	Mean difference = 110 mg (–163 to 383)	0.430
NSAID Cumulative Dose (mg)	150 (75–225)	150 (75–225)	–	0.681
Opioid Exposure (MME)	18 (10–30)	12 (6–24)	–	0.018
Number of Analgesic classes	2.3 ± 0.8	2.1 ± 0.7	Mean difference = 0.20 (0.02–0.38)	0.031
Number of Analgesic Doses	5 (4–7)	5 (3–6)	–	0.074
Postoperative Pain Assessment				
Baseline NRS	1.8 ± 1.2	1.5 ± 1.1	Mean difference = 0.30 (0.02–0.58)	0.034
NRS at 2 Hours	4.8 ± 1.9	4.2 ± 1.8	Mean difference = 0.60 (0.16–1.04)	0.009
NRS at 6 Hours	4.1 ± 1.7	3.6 ± 1.6	Mean difference = 0.50 (0.10–0.90)	0.014
NRS at 12 Hours	3.3 ± 1.5	2.9 ± 1.4	Mean difference = 0.40 (0.05–0.75)	0.025
NRS at 24 Hours	2.5 ± 1.3	2.2 ± 1.2	Mean difference = 0.30 (–0.00–0.60)	0.052
Worst Postoperative NRS	5 (4–7)	4 (3–6)	–	0.006
NRS ≥4	82 (61.7%)	68 (51.1%)	OR = 1.55 (0.95–2.53)	0.083
NRS ≥7	27 (20.3%)	16 (12.0%)	OR = 1.86 (0.90–3.86)	0.064

In overall pain severity, the proportions of mild, moderate, and severe pain were different between the two departments, with moderate pain predominant in the orthopaedics department and mild pain in the general surgical department. There was no difference in the proportion who reported adequate pain control among the different patient groups, but it was higher in general surgery (Table 4).

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i10.1410

Table 4: Pain Severity and Rescue Analgesia

Variables	Orthopaedic Surgery, n (%)	General Surgery, n (%)	Effect Size / 95% CI	p-value
Worst Postoperative Pain				
Mild (NRS 1–3)	51 (38.3%)	65 (48.9%)	OR = 0.65 (0.40–1.06)	0.083
Moderate (NRS 4–6)	55 (41.4%)	52 (39.1%)	—	—
Severe (NRS 7–10)	27 (20.3%)	16 (12.0%)	OR = 1.86 (0.90–3.86)	0.064
Adequate Pain Control (NRS ≤3)	51 (38.3%)	65 (48.9%)	OR = 0.65 (0.40–1.06)	0.083
Clinically Significant Pain (NRS ≥4)	82 (61.7%)	68 (51.1%)	OR = 1.55 (0.95–2.53)	0.083
Rescue Analgesia Required	63 (47.4%)	48 (36.1%)	OR = 1.59 (0.98–2.60)	0.062
Rescue Opioid Required	35 (26.3%)	22 (16.5%)	OR = 1.80 (0.99–3.28)	0.048

Longer operative time and general anesthesia were independently predicted to be associated with opioid use. Likewise, the association with an opioid-free treatment was no longer statistically significant. At 2 and 6 hours, the orthopaedic group had significantly higher adjusted NRS scores for postoperative pain compared to the other groups, but not at other times (Table 5).

Table 5: Multivariable Regression Analysis of Opioid Use and Postoperative Pain Outcomes

Outcomes / Predictors	Adjusted Effect Estimate	95% CI	p-value
Perioperative Opioid Use			
Orthopaedic Vs General Surgery	OR = 1.48	0.88–2.49	0.136
General Anesthesia	OR = 1.92	1.12–3.29	0.018
Duration of Surgery (Per 10-Min Increase)	OR = 1.08	1.03–1.13	0.001
Age (Per 10-Year Increase)	OR = 1.04	0.91–1.18	0.581
Male Sex	OR = 1.17	0.72–1.91	0.526
Comorbidity Present	OR = 1.21	0.70–2.08	0.494
Opioid-Free Regimen			
Orthopaedic vs General Surgery	OR = 0.69	0.41–1.16	0.162
General Anesthesia	OR = 0.52	0.30–0.90	0.020
Duration Of Surgery (Per 10-Min Increase)	OR = 0.94	0.90–0.98	0.004
NRS at 2 Hours			
Orthopaedic vs General Surgery	β = 0.47	0.07–0.87	0.021
NRS at 6 Hours			
Orthopaedic vs General Surgery	β = 0.39	0.02–0.76	0.039
NRS at 12 Hours			
Orthopaedic vs General Surgery	β = 0.32	–0.02–0.66	0.066
NRS at 24 Hours			
Orthopaedic vs General Surgery	β = 0.25	–0.05–0.55	0.103
Clinically Significant Pain (NRS ≥4)			
Orthopaedic vs General Surgery	OR = 1.42	0.84–2.40	0.190
General Anesthesia	OR = 1.63	0.96–2.78	0.071
Duration Of Surgery (Per 10-Min Increase)	OR = 1.06	1.02–1.11	0.006
Rescue Opioid Required			
Orthopaedic vs General Surgery	OR = 1.63	0.91–2.92	0.101
General Anesthesia	OR = 1.89	1.04–3.44	0.037
Duration Of Surgery (Per 10-Min Increase)	OR = 1.07	1.02–1.13	0.005

DISCUSSION

The present study showed that the requirement for analgesics during the perioperative period varied between patients undergoing orthopaedic surgery and patients undergoing general surgery, especially for opioid use and postoperative pain. A recent prospective study by Huang *et al.* of more than 50,000 hospital admissions found that opioids were administered to 71.1% of patients undergoing major or orthopaedic surgery, highlighting the substantial opioid requirement associated with these procedures [16]. In the current study, opioid utilization was significantly higher among orthopedic patients than general surgery patients, and orthopedic patients also demonstrated significantly greater cumulative opioid exposure. In addition, a 2021 study examining postoperative opioid prescribing after orthopedic surgery found substantial differences in opioid management among patients undergoing joint replacement, emphasizing the importance of standardized prescribing approaches [17]. In the same way, Pirzada et al. reported that the use of an enhanced recovery opioid-prescribing protocol decreased the amount of opioids prescribed after arthroplasty by 47% and after arthroscopy by 33% [18]. Interestingly, rescue opioid use was significantly greater among orthopedic patients, which further indicates a higher acute pain burden in this patient group. An opioid-sparing multimodal approach to posterior lumbar fusion (PLF) was specifically assessed in a randomized trial for its ability to decrease the amount of opioids used without compromising the results of the surgery [19]. A recent randomized study of total knee arthroplasty (TKA) showed no significant difference in pain or morphine usage when oxycodone was added to a pre-established multimodal pain pathway, further emphasizing the need to optimize the pain pathway as a whole, rather than merely supplementing with opioids [20]. The current results have implications for perioperative pain management. The greater exposure to opioids, higher pain scores, and increased requirement for rescue opioids in orthopedic surgery patients indicate that a multimodal approach to the management of pain in orthopedic surgery, where a combination of scheduled Paracetamol, appropriately selected NSAIDs, regional or local analgesia where appropriate, and carefully restricted rescue opioids, may be beneficial for this population. Among those undergoing general surgery procedures, the increased

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i10.1410

utilization of non-opioid treatment regimens suggests continued advancement of non-opioid routes to care. A strategy that is supported by current evidence is that standardized multimodal protocols can decrease exposure to opioids without the trade-off of poor pain control [21].

This study had several limitations. The results may not be generalizable to other surgical departments or to other tertiary-care centers. A non-probability consecutive sampling from a single institution limits the generalizability of the results. Multiple statistical comparisons were made regarding analgesic use, cumulative use, and postoperative pain. Further research is needed using prospective, multicenter, larger patient cohorts to validate the findings of different types of analgesics used and subsequent pain experienced in orthopedic versus general surgery patients.

CONCLUSIONS

The use of peri-operative analgesics was different between orthopedic and general surgery patients. Opioid exposure, number of analgesic classes used, postoperative pain, and number of rescue opiates were higher among orthopedic patients. Both groups were equally likely to receive paracetamol; multimodal analgesia and opioid-free regimes were used more in general surgery patients.

Authors' Contribution

Conceptualization: B
Methodology: B, ZK, R
Formal analysis: MJ, ML
Writing and Drafting: B
Review and Editing: B, ZK, MJ, R, ML

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflict of Interest

All the authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Wardani NI, Ardiana A, Rondhianto R. Impact of Early Mobilization on Postoperative Pain and Recovery: A Scoping Review. Nursing Information Journal. 2025 Jul; 5(1): 123-39. doi: 10.54832/nij.v5i1.1167.

[2] Sezerano ML and Niyonkuru E. Personalized Multimodal and Opioid-Sparing Analgesia for Postoperative Pain Management: Enhancing Recovery and Addressing the Post-Discharge Gap. Journal of Pain Research. 2026 Dec: 597049. doi: 10.2147/JPR.S597049.

[3] Cordero-Pérez FJ, Pérez-Baena MJ, Pina Rubiralta N, Fernández-Testa A, Holgado-Madruga M. Optimizing Opioid Use in Pain Management: A Comprehensive Review of Clinical Benefits, Risks, and Dependence. In Healthcare. 2026 Feb; 14(4): 457. doi: 10.3390/healthcare14040457.

[4] Fiore JF, El-Kefraoui C, Chay MA, Nguyen-Powanda P, Do U, Olleik G *et al.* Opioid versus Opioid-Free Analgesia After Surgical Discharge: A Systematic Review and Meta-Analysis of Randomized Trials. The Lancet. 2022 Jun; 399(10343): 2280-93. doi: 10.1016/S0140-6736(22)00582-7.

[5] Xu AL, Covarrubias OG, Yakkanti RR, Sotsky RB, Aiyer AA. The Biomechanical Burden of Orthopedic Procedures and Musculoskeletal Injuries Sustained by Orthopedic Surgeons: A Systematic Review. Journal of Bone and Joint Surgery Reviews. 2023 Jan; 11(1): e22. doi: 10.2106/JBJS.RVW.22.00202.

[6] Juma SL, Ma J, Rasmussen JL, Shorts Z, Magardichian M, Gentis P *et al.* Nonopioid Pain Protocols vs. Opioid Analgesia for Postoperative Pain Control Following Arthroscopic Surgeries: A Literature Review. Cureus. 2025 May; 17(5). doi: 10.7759/cureus.83357.

[7] Ratcliffe A, Belete M, Brayne AB, Daykin H, Everson M, Hare WM *et al.* Patient - Reported Outcomes, Postoperative Pain and Pain Relief After Day - Case Surgery (POPPY): Short - Term Peri - Operative Analgesic Use. Anesthesia. 2026 Aug; 81(8): 1057-67. doi: 10.1111/anae.70211.

[8] Lawal OD, Gold J, Murthy A, Ruchi R, Bavry E, Hume AL *et al.* Rate and Risk Factors Associated with Prolonged Opioid Use After Surgery: A Systematic Review and Meta-Analysis. Journal of the American Medical Association Network Open. 2020 Jun; 3(6): e207367. doi: 10.1001/jamanetworkopen.2020.7367.

[9] Wazir S, Inayat S, Ullah MJ, Zaman G, Rehman A, Faisal *et al.* Multimodal Analgesia in Resource-Limited Settings: A Comparative Analysis of Postoperative Pain Management Strategies in Pakistan. PLOS Global Public Health. 2025 Dec; 5(12): e0005345. doi: 10.1371/journal.pgph.0005345.

[10] No Pain Investigators, Gazendam A, Ekhtiari S, Horner NS, Simunovic N, Khan M *et al.* Effect of a Postoperative Multimodal Opioid-Sparing Protocol Vs Standard Opioid Prescribing on Postoperative Opioid Consumption After Knee or Shoulder Arthroscopy: A Randomized Clinical Trial. Journal of the American Medical Association. 2022 Oct; 328(13): 1326-35. doi: 10.1001/jama.2022.16844.

[11] Tasman Collaborative. Impact of Opioid-Free Analgesia on Pain Severity and Patient Satisfaction

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

DOI: https://doi.org/10.54393/pbmj.v9i10.1410

After Discharge from Surgery: Multispecialty, Prospective Cohort Study in 25 Countries. British Journal of Surgery. 2024 Jan; 111(1). doi: 10.1093/bjs/znae152.

[12] Joshi S, Shetty Y, Panchal R, Patankar P, Salgaonkar S, Rawat R *et al.* An Observational Study to Evaluate the Prescription Pattern of Analgesics Used in The Perioperative Period in A Tertiary Care Hospital. Perspectives in Clinical Research. 2020 May 7;12(3):165. doi: 10.4103/picr.PICR_87_19.

[13] Dowell D. CDC Clinical Practice Guideline for Prescribing Opioids for Pain—United States, 2022. Morbidity and Mortality Weekly Report Recommendations and Reports. 2022; 71. doi: 10.15585/mmwr.rr7103a1.

[14] Gagliese L, Weizblit N, Ellis W, Chan VW. The Measurement of Postoperative Pain: A Comparison of Intensity Scales in Younger and Older Surgical Patients. Pain. 2005 Oct; 117(3): 412-20. doi: 10.1016/j.pain.2005.07.004.

[15] Miller CJ, Bilker WB, DeLorey I, Argoff CE, Bell RL, Conroy A *et al.* Minimum Clinically Important Differences in Acute Pain: A Patient-Level Re-Analysis of Randomized Controlled Analgesic Trials Submitted to the US Food and Drug Administration. Pain. 2025 May; 166(10): 2430. doi: 10.1097/j.pain.0000000000003645.

[16] Huang YT, Dixon WG, O'Neill TW, Jani M. Postoperative Opioids Administered to Inpatients with Major or Orthopedic Surgery: A Retrospective Cohort Study Using Data from Hospital Electronic Prescribing Systems. PLOS One. 2024 Jun; 19(6): e0305531. doi: 10.1371/journal.pone.0305531.

[17] Wang X, Tay HP, Narayan SW, Penm J, Patanwala AE. Comparison of Opioid Prescribing Upon Hospital Discharge in Patients Receiving Tapentadol Versus Oxycodone Following Orthopedic Surgery. International Journal of Clinical Pharmacy. 2021 Dec; 43(6): 1602-8. doi: 10.1007/s11096-021-01290-7.

[18] Pirzada WU, Shamith S, Le T, Thomas TL, Ramtin S, Ilyas AM. Application and Analysis of the Enhanced Recovery After Surgery Opioid Prescription Protocol in Arthroscopy and Arthroplasty Patients. Journal of the American Academy of Orthopaedic Surgeons. 2025 May; 33(10): e583-92. doi: 10.5435/JAAOS-D-24-01232.

[19] Ramírez-Gonzalez M, Torres-Lugo NJ, Deliz-Jimenez D, Echegaray-Casalduc G, Ramírez N, Colón-Rodriguez E *et al.* Efficacy of An Opioid-Sparing Perioperative Multimodal Analgesia Protocol on Posterior Lumbar Fusion in a Hispanic Population: A Randomized Controlled Trial. Journal of the American Academy of Orthopedic Surgeons. 2023 Sep; 31(17): 931-7. doi: 10.5435/JAAOS-D-22-00878.

[20] Wang Q, Zhang W, Xiao T, Wang L, Ma T, Kang P. Efficacy of Opioids in Preemptive Multimodal Analgesia for Total Knee Arthroplasty: A Prospective, Double-Blind, Placebo-Controlled, Randomized Trial. The Journal of Arthroplasty. 2023 Jan; 38(1): 65-71.

[21] Brown F, Guinta M, Swindler J, Allison D, Selander C, Raynor B. Implementation of a Post-Surgical, Multimodal Analgesia Pain Management Order Set in Opioid-Naive Patients. The Permanente Journal. 2020 Dec; 25: 20-048. doi: 10.7812/TPP/20.048.

Copyright© 2026 The Authors. Published by CrossLinks International Publishers LLC, USA
This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0)