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# Assessing Timing of Intravenous-to-Oral Analgesic Transition in Neurosurgical Patients at the Largest Cancer Hospital in a Low- and Middle-Income Country: Impact on Length of Hospital Stay

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***Abstract***

***Background:*** *Early transition from intravenous (IV) to oral analgesics in postoperative care has been shown to reduce hospital stay and healthcare costs without compromising analgesic efficacy or patient safety.*

***Objective:*** *To evaluate current practices regarding the timing of IV-to-oral analgesic transition in postoperative neurosurgical patients, assess its impact on hospital stay, and identify opportunities for improvement through staff education and protocol development.*

***Methods:*** *A retrospective audit was conducted on all postoperative neurosurgical patients admitted between October 1, 2024, and December 31, 2024, at the largest cancer hospital in a low- and middle-income country. Patients with multiple admissions or repeat surgeries during the audit period were excluded. Data collected included the number of patients switched to oral analgesics within 24 hours postoperatively and the total number of postoperative neurosurgical admissions.*

*Results: The average time from surgery to oral analgesic transition was 115.9 hours. Following the switch, the average duration of hospital stay was 14.7 hours.*

***Conclusion:*** *The audit revealed a delayed transition from IV to oral analgesia compared to international benchmarks. Earlier transition may contribute to reduced hospital stay, enhanced patient recovery, and optimized resource utilization.*

**Keywords:** Analgesic Transition; Hospital Stay; Intravenous to Oral Switch; Low- And Middle-Income Country; Neurosurgery; Postoperative Care.

## Introduction

Postoperative pain is a common yet often underrecognized consequence of various neurosurgical procedures, including craniotomies for tumor resection. Historically, postoperative pain following intracranial procedures has been inadequately addressed due to concerns that opioid use may obscure neurological assessments or precipitate adverse effects such as miosis, sedation, respiratory depression, and increased intracranial pressure [1]. This under-treatment was also supported by the belief that brain tissue itself is insensate, suggesting minimal pain post-surgery [2]. However, emerging evidence indicates that moderate-to-severe postoperative pain is both common and undertreated. Effective postoperative pain management is crucial for patient recovery, particularly in neurosurgical patients [3]. Early transition from intravenous (IV) to oral analgesics has been associated with reduced hospital stays and healthcare costs without compromising patient safety or treatment efficacy. A study by Vadivelu et al. demonstrated that patients transitioned to tramadol postoperatively experienced a reduction in hospital stay from 4.1 days (control) to 3.1 days, attributed to improved oral intake tolerance, fewer opioid-related side effects, and earlier mobilization [4].

## Methods

A retrospective audit was conducted at the largest tertiary cancer hospital in Pakistan (Shaukat Khanum Memorial Cancer Hospital And Research Centre) , to evaluate analgesic transition practices in postoperative neurosurgical patients. The study included all patients who underwent neurosurgical procedures and were admitted postoperatively between October 1, 2024, and December 31, 2024. Patients were excluded if they had multiple admissions or underwent repeat surgeries during the audit period, to ensure data independence and avoid duplication. Data were collected from electronic medical records after obtaining approval from hospital Audit department and included the total number of postoperative neurosurgical admissions and the number of patients who were transitioned from intravenous (IV) to oral analgesics following surgery. Descriptive statistics were used to analyze current practices, and findings were assessed to identify potential areas for improvement in pain management protocols.

## Results

The average time from surgery to oral analgesic transition was 115.9 hours (4.8 days) with significant variation. Following the switch, the average duration of hospital stay was 14.7 hours.

When divided transition time into early (less than or equal to 48 hours/2 days) , moderate (49 to 96 hours/ day 3 to 4) and delayed ( more than 96 hours / 4 days) ; Nearly half of patients (48.1%) transition in the moderate timeframe (49-96 hours). Only 20.4% achieve early transition (≤48 hours) . 31.5% have delayed transitions (>96 hours), with some as late as 24 days.

When looked at post switch discharge to home, most patients (83.6%) are discharged within 24 hours of starting oral analgesics. There was a very weak correlation between switch timing and hospital stay duration.

The type of IV analgesics presecribed were Paracetamol only in 46.3% of cases , Tramadol + Paracetamol in 40.7% of cases and Triple therapy regimens in 13.0% of cases. This has been summarised in figure 1.

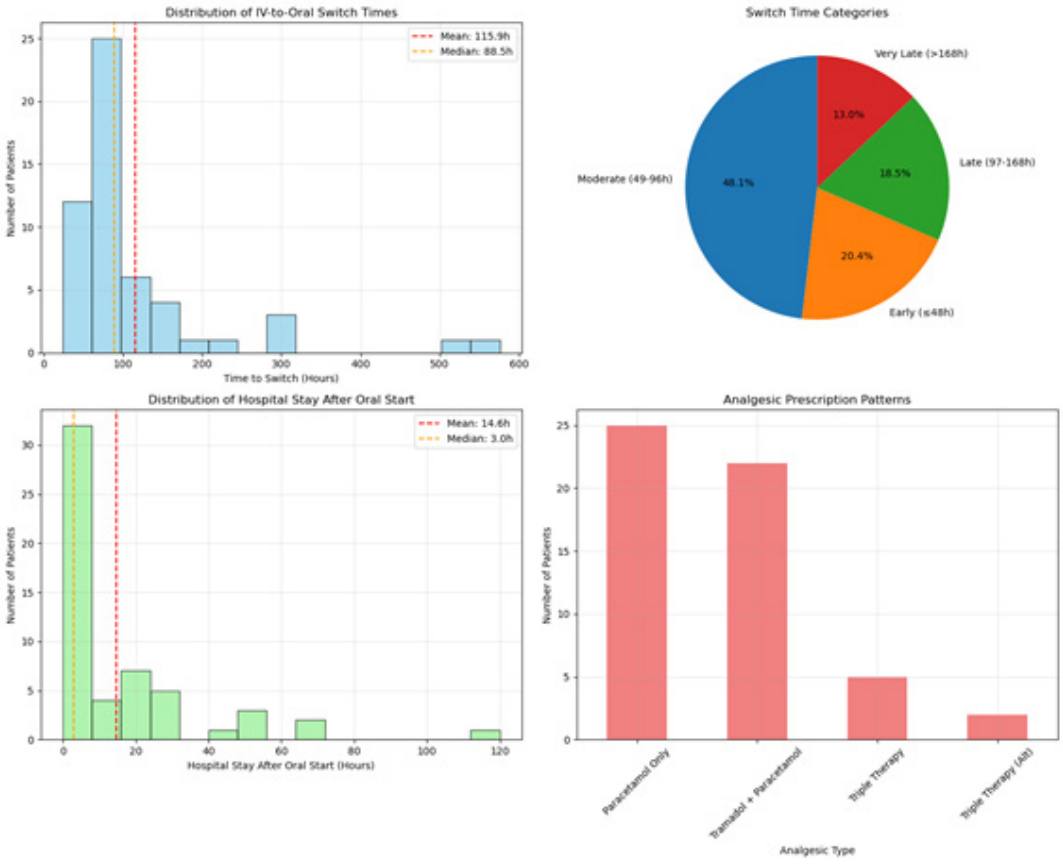


**Figure 1:** showing results

## Discussion

In 1986, the World Health Organization (WHO) introduced the analgesic ladder as part of its Cancer Pain and Palliative Care Program to improve cancer pain management. Developed by international experts, the ladder has since evolved and is now used to treat both cancer-related and various non-cancer chronic pain conditions. Though its effectiveness lacks confirmation from large-scale studies, it remains a widely used, straightforward approach that alleviates pain in 70–80% of cases (5). The original three-step ladder included Non-opioid analgesics (e.g., NSAIDs, acetaminophen) ± adjuvants for mild pain, Weak opioids (e.g., codeine, tramadol) ± non-opioids and/or adjuvants for moderate pain and Strong opioids (e.g., morphine, fentanyl) ± non-opioids and/or adjuvants for severe pain [6]. The WHO analgesic ladder is based on three key principles: "By the clock, by the mouth, by the ladder." This implies that medications should be taken consistently and at regular intervals, preferably orally, and that analgesics start at Step 1 (nonopioid analgesics) and be titrated up as necessary.

Post-craniotomy pain is frequent and often severe, affecting up to 90% of patients, with more than half reporting moderate to severe discomfort, especially during the first two days after surgery [7- 9]. This pain, usually somatic in origin—arising from the scalp, muscles, soft tissues, and dura mater—is typically more intense following infratentorial procedures compared to supratentorial ones [10]. Inadequate pain control can increase complications, prolong hospital stays, and contribute to intracranial hypertension, delayed recovery, and the development of chronic headaches. Optimal recovery following neurosurgery procedures is ensured by excellent postoperative pain prevention. Ineffective pain management and side effects associated with analgesic use—particularly opioid-induced drowsiness, nausea, and vomiting—are undesirable. Opioids should be used as rescue analgesia in cases of severe pain rather than as regular analgesia since they may prevent early neurologic assessment [11]. The "basic analgesic regimen" consists of NSAIDs or COX-2 selective inhibitors and perioperative paracetamol. The analgesic action of paracetamol is mild, and it spares opioids. NSAIDs or COX-2 selective inhibitors provide strong analgesic and opioid-sparing effects when taken as a single dosage or on a regular basis. NSAIDs and paracetamol work together to improve analgesia. Except in cases where they are contraindicated, including in people with severe renal impairment, there is currently no proof that the potential adverse effects of NSAIDs outweigh their advantages[12]. Therefore, as basic analgesia following craniotomy, it is suggested to use paracetamol and NSAIDs/COX-2-selective inhibitors[13]. One meta-analysis suggests that unless otherwise indicated, paracetamol should be used in conjunction with an NSAID or COX-2 selective medication as part of peri-operative pain management for craniotomies. This medication can be given either before or during surgery and should be continued after the procedure [14]. Furthermore, it is also advised to use either ISI(incision site infiltration) or SNB (scalp nerve block). These blocks might be given at the conclusion of the procedure or prior to the incision for better analgesic effect post craniotomies [15].

This audit aimed to evaluate the current practices regarding the timing of intravenous (IV) to oral analgesic transition in postoperative neurosurgical patients, its impact on hospital stay, and to identify opportunities for improvement through standardized protocols and staff education.The results reveal considerable variability in the timing of IV-to-oral analgesic conversion. The mean transition time was 115.9 hours (approximately 4.8 days), indicating a general delay in achieving oral analgesic adequacy. While nearly half of the patients (48.1%) transitioned within the moderate timeframe of 49–96 hours, only 20.4% achieved an early switch (≤48 hours), which is often recommended for uncomplicated postoperative recovery. Alarmingly, nearly one-third of patients (31.5%) had significantly delayed transitions (>96 hours), with outliers as late as 24 days post-surgery. These findings suggest a lack of standardized criteria guiding the switch, possibly due to inconsistent clinical assessments, variability in pain control approaches, or caution among providers regarding neurologically vulnerable patients.

Despite these delays, the impact on hospital stay duration was minimal. The average length of stay after transitioning to oral analgesia was only 14.7 hours, and 83.6% of patients were discharged within 24 hours following the switch. This indicates that the decision to transition to oral analgesia may serve as a proxy discharge criterion, with discharge processes often initiated only after the change in analgesic route. The weak correlation between timing of transition and overall hospital stay underscores that IV-to-oral switch delays may be an independent bottleneck in patient flow, and early transition could potentially expedite discharge planning without compromising care.

The audit also highlighted notable variation in analgesic prescribing practices. Nearly half of the patients (46.3%) received oral paracetamol monotherapy, while 40.7% were managed with a combination of paracetamol and tramadol. A smaller proportion (13.0%) received triple therapy regimens. This variability suggests a lack of uniform pain management protocols and a reliance on individual physician preferences rather than evidence-based, tiered analgesic strategies. Standardizing analgesic regimens based on pain severity and patient factors could improve consistency, minimize opioid overuse, and reduce the decision-making burden for junior staff.

Collectively, these findings emphasize several areas for improvement. First, early transition protocols should be developed and integrated into postoperative care pathways, particularly for patients undergoing elective or uncomplicated surgeries. Such protocols should be supported by defined clinical criteria (e.g., stable neurological exam, adequate oral intake, controlled pain scores). Second, outliers with delayed transitions should be systematically reviewed to identify avoidable delays and inform quality improvement initiatives. Finally, the development of standardized analgesic guidelines would support more uniform prescribing practices and may further streamline discharge readiness.

Given the resource-constrained setting of this study, implementing these changes may contribute significantly to improved patient throughput, reduced length of stay, and enhanced patient outcomes. Additionally, staff education and regular audit-feedback cycles can promote adherence to protocols and sustain improvements over time.

## Conclusion

Early transition from IV to oral analgesics in postoperative neurosurgical patients can reduce hospital stay and improve resource utilization. Encouraging timely conversion, supported by standardized protocols and regular staff education, promotes

consistent, evidence-based pain management and enhances patient recovery and discharge efficiency Re-audit Plan. A re-audit is planned within three months to evaluate the impact of implemented interventions and to monitor sustained improvement in practice.

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