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A CROSS-SECTIONAL STUDY TO EVALUATE PRESCRIPTION-TO-ADMINISTRATION TIME IN PATIENTS PRESENTING WITH PAIN IN EMERGENCY DEPARTMENT OF A TERTIARY CARE HOSPITAL OF PAKISTAN

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Abstract

Introduction: *Pain, irrespective of its etiology, is one of the most prevalent complaints prompting patients to seek care in the emergency department (ED). The prompt administration of analgesics alleviates discomfort, provides reassurance, and facilitates early and comprehensive clinical evaluation. Notwithstanding its significance, timely and efficient pain management is frequently neglected in acute care environments owing to various systemic and operational obstacles. Extended delays in obtaining analgesics, particularly in crowded emergency departments, have been associated with adverse physical and psychological consequences.*

Objective*: This study aims to evaluate the prescription-to-administration time (PAT) for analgesia in patients presenting to the ED with pain and propose actionable recommendations for improvement.*

Methodology: *This cross-sectional, non-interventional analytical study was conducted in the ED of a large teaching hospital on 300 patients, aged over 12 years with an initial pain score > 5. Pain scores and relevant time intervals were recorded and analyzed.*

Results: *The mean PAT was 28 minutes. Of the total patients, 19% (n=58) received analgesia within 15 minutes, 66% (n=199) within 16-30 minutes, 13% (n=37) within 31-45 minutes, and 2% (n=6) within 46-60 minutes.*

Conclusion: *The average PAT of 28 minutes aligns with existing literature. However, this can be further improved by implementing standardized pain assessment tools, clear documentation practices, and protocol-driven pain management strategies in the ED.*

INTRODUCTION

Pain stands as a common motivator for people who visit Emergency Department facilities [1]. The reason behind pain development can be traced to trauma and acute or chronic medical conditions along with unknown origins [2]. As a critical measure pain management during active treatment produces better treatment results alongside enhanced patient comfort and satisfaction [3]. Pain management stands as an indispensable element that makes up emergency treatment success. Several emergency departments exhibit regular delays which extend the prescription-to-administration time (PAT) of medicines according to initial evaluation reports [4]. The time interval that passes between when healthcare providers write a prescription for pain medication and when medical staff give this analgesic to the patient represents PAT [1]. The delayed duration of this process leads to negative effects on patient experience and heightens their anxiety alongside the possibility of worsened clinical outcomes [5]. Healthcare professionals and emergency room staff often link delays in pain management to overcrowded departments and personnel shortages and non-standardized pain management protocols and ineffective workflows [6]. The speed at which health providers deliver treatments stands affected by both the type of pain along with demographic information of patients [7]. The emergency departments in Pakistan alongside other LMIC manage extensive patient caseloads with scarce resources thus it becomes vital to understand the barriers facing fast analgesic distribution. The emergency departments lack national data on PAT even though this metric remains crucial [8]. This study aims to assess the PAT in the emergency department of a large tertiary care hospital, identify the causes contributing to delays, and provide evidence-based recommendations for enhancing pain management methods. The objective is to augment the overall efficacy of emergency services while simultaneously enhancing patient care outcomes.

Material and Methods

This is a non-interventional, non-randomized, cross-sectional prospective study conducted over a 6-month period between July and December 2023. The study was conducted at the ED of Combined Military Hospital (CMH) Rawalpindi, which is a large, 1100-bedded tertiary care teaching hospital. Its ED is 47-bedded with an annual patient throughput of over 200,000 patients. Informed written consent from patients for anonymous use of data during the study and approval from the Ethics Committee were obtained (IERB Approval Certificate No. 582). A sample size of 300 patients was considered sufficient, with a confidence interval of 95%, keeping a margin of error at 5% and an estimated population proportion of 10 %. This sample size was considered adequate given the study's objectives, as it provides sufficient statistical power to detect meaningful associations while ensuring feasibility within the available resources and timeframe. Consecutive, non-probability convenience sampling method was used and all patients meeting the above-mentioned inclusion criteria for the duration of the study were included. Adult patients, aged 18 years and above, presenting to the ED with moderate to severe pain, requiring immediate analgesia, were included in this study. A clinically significant level of discomfort that justifies the administration of urgent pain-relieving therapies is defined as a score greater than 5 on a validated pain assessment tool, such as the Visual Analog Scale (VAS) [9]. The research focuses on patients with pain scores above 5 because the objective is to optimize the treatment process for patients needing emergency room first-line analgesics. The study excluded patients who received analgesics during the one-hour before their emergency department visit because researchers wanted to precisely measure initial pain assessment for patients receiving analgesia as their main treatment for current pain. Different patients were eliminated from the study when they failed to communicate their pain level because of communication issues or mental impairment or neurological problems. Patients with intellectual or physical disabilities and sensory disabilities who required inconsistent pain assessments inside the framework of this study proved to be ineligible for participation. The evaluation of pain occurred either at the Triage desk for patients requiring urgent assessment or following visual triage at the resuscitation room (RR). The visual analogue scale or VAS served as the measurement tool for assessing pain intensity from

zero (no pain) through ten (maximum imaginable agony) [9]. Pain management began when physicians gave analgesia based on patient-reported pain levels after following RCEM guidelines for pain treatment [2]. Data was gathered utilizing a self-constructed proforma sent to emergency department physicians via a secure, closed electronic platform (Survey Heart) (Fig 1). The data encompassed patient personal information and many time intervals: time of arrival to the emergency department (T0), time of analgesic prescription (T1), time of administration (T2), initial pain score (S1), pain score upon reassessment (S2), and therapies delivered in the emergency department. The data was gathered in real-time by the attending physicians, and any absent information was obtained from the patient's medical records to assure precision. Data integration and analysis were performed using Microsoft Excel (version 2) and the Statistical Package for Social Sciences (SPSS) (version 20.0). Descriptive data were presented as mean, median, and mode, and were displayed in both tabular and graphical formats. Quantitative data, such as time intervals, were reported numerically and illustrated using graphs and histograms. The PAT was calculated by subtracting the time of prescription (T1) from the time of analgesia administration (T2) i.e., PAT = T2 – T1 (in minutes).

Results

During the six-month study period, PAT was examined for 300 patients who presented with pain score ≥5. Of these, 57% (n=171) were male and 43% were female (n=129). Their age distribution was as follows: 9% (n=27) were aged 18-30 years, 18% (n=54) were aged 31-40 years, 37% (n=111) were aged 41-50 years, 19% (n=57) were aged 51-60 years, 17% (n=51) were aged > 60 years of age. Regarding pain score, 24% (n=72) of the patients presented with pain score of ≥5, 61% (n=183) with pain score 6-7, while 15% (n=45) presented with a pain score of 8-10 (Figure 2). Of the 300 patients,17% (n=58) presented with pain secondary to trauma while the rest presented with acute non-specific pain'. The most common cause of pain was migraine.

The mean PAT was 28 minutes, with values ranging from 6 to 59 minutes (TABLE 2). The registration-to-administration (RAT) time, calculated as T2-T0, was 47 minutes with a mode of 25 minutes and a median of 23 minutes . In this study, from the time of prescription, 19% (n=58) of the patients received analgesia within 15 minutes, 66% (n=199) within 16-30 minutes, 13% (n=37) within 31-45 minutes and 2% (n=6) within 46-60 minutes. These findings reflect a median PAT of 23 minutes with mode of 25 minutes (Figure 3).

The mean PAT significantly decreased with increasing pain severity (Table 3). Patients with pain scores of ≥5 had a mean PAT of 39 minutes (SD 0.12), those with pain scores of 6–7 had a mean PAT of 24 minutes (SD 0.01), and those with pain scores of 8–10 received analgesia in a mean time of 23 minutes (SD 0.05). Statistical analysis using one-way ANOVA demonstrated a significant difference in mean PAT across the three pain score groups of p= 0.03, indicating that higher pain severity was associated with faster administration of analgesia. The table demonstrates a clear inverse relationship between pain severity and the timeliness of analgesic administration. Patients with severe pain scores (8–10) experienced the shortest mean prescription-to-administration time (PAT) of 23 minutes, while those with lower pain scores (≥5) waited significantly longer, with a mean PAT of 39 minutes. The overall mean PAT across all pain groups was 28 minutes, with a statistically significant difference observed between the groups (p = 0.03), indicating that pain severity influenced the speed of analgesic delivery. Although the study encouraged documentation of the reasons for delay in administration of analgesia, there was an overall non-compliance, and reluctance, to clearly state the reasons. As a result, sufficient data for detailed analysis could not be obtained. However, the most commonly reported and observed reasons for delay were overcrowding, staff shortages and a busy department.

Table-I: Baselines Characteristics of patients included in the study

Baselines Characteristics		Study Population (n=390)
Age Range	Age (18-30) years	9% (n=27)

Mean: 41 years Median: 43 years Mode: 43 years	Age (31-40) years Age (41-50) years Age (51-60) years Age > 60 years	18% (n=54) 37% (n=111) 19% (n=57) 17% (n=51)
Gender	Male	57% (n=171)
	Female	43% (n=129)
Pain Score on arrival (S1)	≥5	24% (n=73)
	6-7	61% (n=183)
	8-10	15% (n=44)

Table 2: Distribution of PAT in Study Participants

PAT Intervals (minutes)	Number of patients (n)	Percentage (%)
≤ 15 minutes	58	19%
16–30 minutes	199	66%
31–45 minutes	37	13%
46–60 minutes	6	2%
Total	300	100%

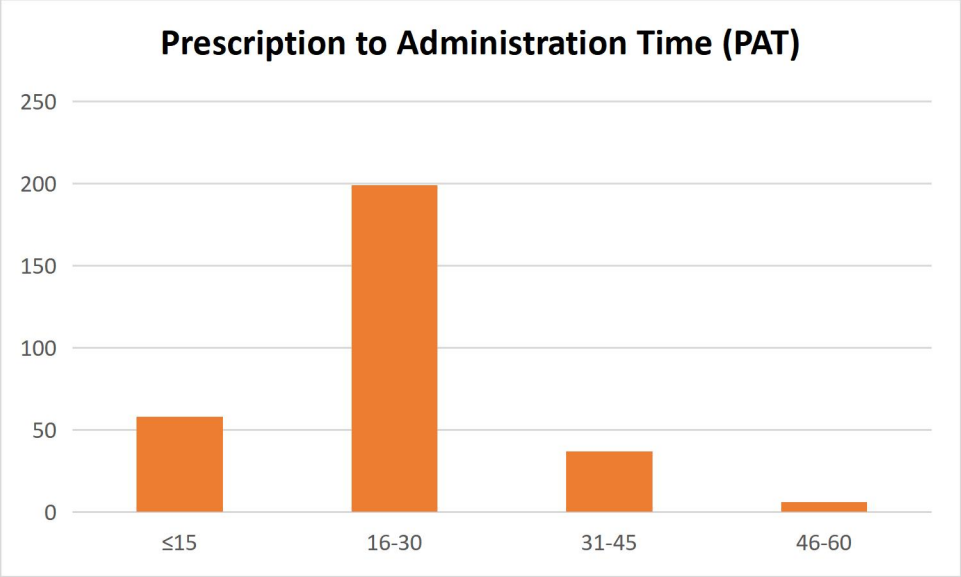

Figure 3: Prescription to administration (PAT) time among the study population

Table 3: Relationship between pain severity and time to analgesia in the Emergency Department

Pain Score (S1)	Number of patients (Percentage)	Mean PAT (Minutes)	Standard Deviation (SD)	p-value
≥5	72 (24%)	39	0.12	-
6-7	183 (61%)	24	0.01	-
8-10	45 (15%)	23	0.05	-
Total	300 (100%)	28	0.06	0.03

Key: Pain score on arrival (S1), Prescription-to-administration time (PAT). p-value of < 0.05 is considered statistically significant.

Discussion

Guidelines for PAT for analgesia in the ED vary across regions and are often influenced by healthcare system capacities and the severity of presenting pain. The Joint Commission (USA) emphasizes the importance of timely and regular pain assessment as part of comprehensive pain management but does not specify fixed time thresholds for analgesia delivery [10]. Conversely, the Australasian College for Emergency Medicine (ACEM) recommends a PAT of 30 minutes for patients with moderate to severe pain [11]. For patients experiencing severe pain, both RCEM UK and American College of Emergency Physicians (ACEP) advocate for analgesia within 20 minutes [12]. Published audits and clinical studies frequently site benchmarks of less than 30 minutes for patients with severe pain and a similar or slightly extended window (≤ 60 minutes) for moderate pain [13]. In this context, the findings of our study align with international standards, with an average PAT of 28 minutes across both pain categories.

A noteworthy trend observed in our data was a statistically significant reduction in PAT with increasing pain severity ($p<0.03$), whereby patients reporting higher pain scores (8-10) at arrival received analgesia faster than those with lower scores (5-7). This pattern is consistent with findings from previous studies, such as Todd et al, which highlighted a direct correlation between higher pain intensity and reduced time to analgesia administration [1].

Despite these encouraging results, opportunities for improvement remain. Informal feedback from this study suggests that even short delays beyond five minutes, can lead to patient dissatisfaction. Although formal patient satisfaction methods are not included in this study, previous literature supports the notion that prolonged waits for analgesia negatively impact not only comfort but also psychological and physiological outcomes [14]. Given that pain is inherently distressing, minimizing the time to its management must remain a continual focus.

Identified barriers to timely analgesia in in our setting included ED overcrowding, workforce limitations and workflow inefficiencies, all of which have been widely reported as common contributors to delays in pain management [15]. Additionally, the absence of standardized pain management protocols and clinical reassessments in some cases may have contributed to delays in certain subgroups. The RCEM guidelines on pain management in the ED stress the importance of early and effective pain management, recommending structured pain assessment tools to address such issues [16]. Our findings reinforce this approach, suggesting that adopting clear, protocol-driven strategies could significantly reduce PAT and enhance patient satisfaction [17].

Limitations:

The study excluded a significant number of patients presenting to the ED with mild pain (< 5), which may have introduced selection bias and limited the generalizability of the study. Additionally, as patients with fluctuating pain intensity during their ED stay were included, there is a potential for regression to the mean, which could influence the results. Another limitation is the inadequate documentation of non-pharmacologic pain management methods (e.g. ice application, splint, and elevation) in the ED medical records. As a result, we are unable to reliably account for these interventions, which may have impacted the overall assessment of pain management in this study.

Conclusion

Improving PAT for analgesia in the ED requires a comprehensive, multi-faceted pproach. It includes the adoption and implementation of standardized pain management protocols, enhancement of triage efficiency, and systemic efforts to mitigate ED overcrowding. Addressing these factors not only expedites timely pain relief, but also contributes to improved patient comfort, enhanced clinical outcomes, and increased patient satisfaction.

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