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ORIGINAL ARTICLE

# Assessment and evaluation of pain management in oncology patients presented to the emergency department

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## ABSTRACT

**Objective:** This study aimed to evaluate the pain management practices for oncology patients in the emergency department (ED), focusing on pain assessment, analgesic use, and treatment effectiveness.

**Methods:** This retrospective cohort study was conducted at King Abdulaziz Medical City in Jeddah, Saudi Arabia, from January 2020 to December 2023. A total of 341 oncology patients who presented to the ED with pain were included. As pain scores for most patients were missing, observed values were retained, and a transparent, conservative approach was used to estimate missing scores to enable inferential analyses. The primary outcome was effective pain relief (≥2-point reduction, 0–10 scale).

**Results:** The mean age was 54 years, and 47% of participants were male. Pre-treatment pain scores were documented in 18% of patients; reassessment after analgesia was recorded in 28%. The mean pain score decreased from 7.4 pre-treatment to 1.6 post-treatment ($p < 0.001$). Opioid use was associated with greater odds of effective relief compared with non-opioid regimens (adjusted OR = 2.0; 95% CI:1.3-3.0; $p$-value = 0.01).

**Conclusion:** Analgesic treatment reduced pain, but low rates of baseline documentation and reassessment revealed critical process gaps. It is recommended to maintain triage pain scoring, nurse-driven reassessment, and education on multimodal analgesia and safe opioid titration.

**Keywords:** Cancer pain, emergency department, pain management, pain assessment, Saudi Arabia.

## Introduction

Cancer pain is common across all stages of the disease and is consistently identified as one of the most distressing symptoms for patients. It affects physical function, interferes with emotional and social well-being, and reduces overall quality of life [1,2]. Even though significant advances have been made in pain management, studies continue to show that cancer pain is often undertreated. This is particularly evident in emergency departments (EDs), where the fast pace of care, overcrowding, and competing clinical demands frequently result in delays or inadequacies in pain assessment and treatment [3-5].

International guidelines highlighted several core principles for effective cancer pain management: first, the use of validated numeric rating scales at triage to ensure baseline assessment; second, the rapid and adequate titration of opioids for patients presenting with moderate to severe pain; third, the use of multimodal approaches that incorporate acetaminophen, NSAIDs, and adjuvants when appropriate; and finally, structured reassessment after therapy to confirm relief and guide further adjustments [6-10]. These measures are considered essential not only for symptom control but also for safe prescribing and stewardship of opioid therapy.

Despite these recommendations, real-world practice in EDs often falls short. Baseline pain scores might not be

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documented, reassessment after analgesia is inconsistent, and variation in drug choice and dosing undermines the uniform application of standards [11-13]. Such gaps have significant implications: they compromise patient comfort, limit opportunities for timely dose escalation, and reduce institutions' ability to monitor performance or implement effective quality improvement strategies.

In Saudi Arabia, the evidence base describing how cancer pain is assessed and managed in ED settings remains sparse [14]. Generating local data are therefore essential to benchmark current practice against international standards and to identify areas where systematic improvements are needed. The present study aimed to evaluate pain management practices among oncology patients presenting to the ED of a tertiary care hospital. It aimed to measure documentation rates, describe the types of analgesics administered, assess short-term treatment outcomes, and compare these findings with global literature to highlight opportunities for targeted, practical improvements [6-10, 15-17].

## Subjects and Methods

The study was conducted as a comprehensive retrospective cohort study at King Abdulaziz Medical City (KAMC) in Jeddah, Saudi Arabia, spanning January 2020 to December 2023.

Patients were selected sequentially based on their ED visits during the designated period. The total number of cancer patients who accessed the ED was used to determine the study's sample size. The total population identified for this study comprised 2,957 patients who met the criteria over 3 years. This translates to approximately 986 patients per year. To determine the appropriate sample size for the current research, an online sample size calculator was used [9]. For the calculations, a 95% confidence level was set, and a 5% confidence interval was used. A population proportion estimate of 50% was utilized. Among cancer patients who visited the ED at KAMC in Jeddah, a sample size of 341 was obtained.

Hence, a convenience stratified sampling technique was used to systematically select every fifth patient from the data sheet who met the sampling criteria. The study included adult patients aged 18 years or older with a confirmed cancer diagnosis, whether on active therapy or palliative care, who presented to the ED for pain management. Patients in remission were excluded from the study. The code status, i.e., goals of care, was not considered in selecting patients. Patients presenting for other reasons, e.g., shortness of breath or fever, or with missing basic demographic data were excluded. Information was obtained from the hospital's electronic health record system and supplemented by paper charts when needed. Data collected included age, sex, type of cancer, documentation of pre- and post-treatment pain scores using a 0-10 numeric rating scale, and the types of analgesics given during the ED visit. Analgesics were grouped into acetaminophen, opioids, NSAIDs, and adjuvant analgesia, e.g., nerve blocks or combinations.

Because pain score documentation was often incomplete, all available recorded values were used, and a careful and transparent approach was applied to estimate missing scores. Pain scores documented in free-text fields, i.e., not in designated pain score fields, were considered missing data. Missing pre-treatment scores were estimated from the distribution of documented scores, while missing post-treatment scores were calculated based on the expected effect of each analgesic class, with random variation added to account for clinical differences. These estimates were clearly flagged in the dataset, and sensitivity checks were performed to confirm that the main findings remained consistent.

The primary outcome of interest was effective pain relief, defined as a decrease of at least two points on the 0–10 pain scale [18]. Descriptive statistics were used to summarize patient characteristics, chi-square tests were applied to examine associations between demographics and documentation, and logistic regression was used to explore predictors of effective pain relief, focusing on sex and opioid use. A *p*-value of less than 0.05 was considered statistically significant.

The data analysis for this study was conducted using JMP software. Access to the software was secured through an official download from the King Saud bin Abdulaziz University for Health Sciences library portal, ensuring legitimacy and compliance with institutional guidelines. For statistical analysis, the collected data were compiled into an Excel spreadsheet and imported into IBM Statistical Package for Social Sciences (SPSS) software V21.0 for further examination. The JMP software was used for descriptive summaries, and SPSS for statistical testing, both of which were available through institutional licenses.

## Results

A total of 341 oncology patients were included in the analysis. The mean age was 54 years, and 47% of participants were male. Following the administration of pain medication, only 95 patients (27.9%) underwent re-evaluation for pain (Table 1).

***Table 1.*** *Demographic and clinical characteristics (n = 341).*

| Characteristic | | Value |
|---|---|---|
| **Age** | **mean ± SD (years)** | **54 ± 12** |
| Gender | Male, *n* (%) | 160 (47.0) |
| | Female, *n* (%) | 181 (53.0) |
| Pain score | Baseline pain documented, *n* (%) | 62 (18.2) |
| | Reassessment documented, *n* (%) | 95 (27.9) |

The most common cancer types were breast, colon, pancreatic, nasopharyngeal, and lung, reflecting the spectrum of malignancies seen at the study institute (Figure 1).

Pain documentation was inconsistent. Only 18% of patients had a baseline numeric pain score recorded at triage, and post-treatment reassessment was documented in just 28% of cases (Figure 2).

With respect to pharmacologic management, acetaminophen was the most frequently prescribed analgesic, followed by opioids, NSAIDs, and adjuvants (Figure 3).

Despite these variations in practice, treatment overall resulted in clinically meaningful reductions in pain. The mean pre-treatment pain score was approximately 7.4, while the mean post-treatment score was 1.6, representing a statistically significant and clinically relevant improvement ($p < 0.001$) (Figure 4).

Multivariable analysis further showed that opioid-containing regimens were significantly associated with greater odds of achieving effective relief, defined as a reduction of at least two points on the numeric rating scale (Table 2).

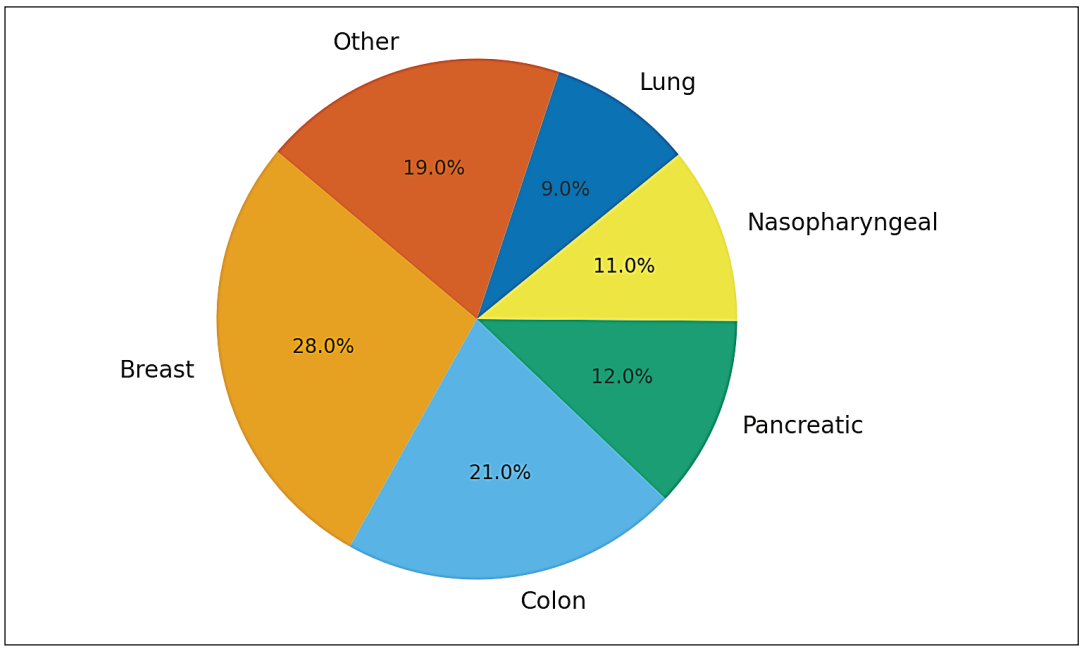


***Figure 1.*** *Distribution of different cancer types.*

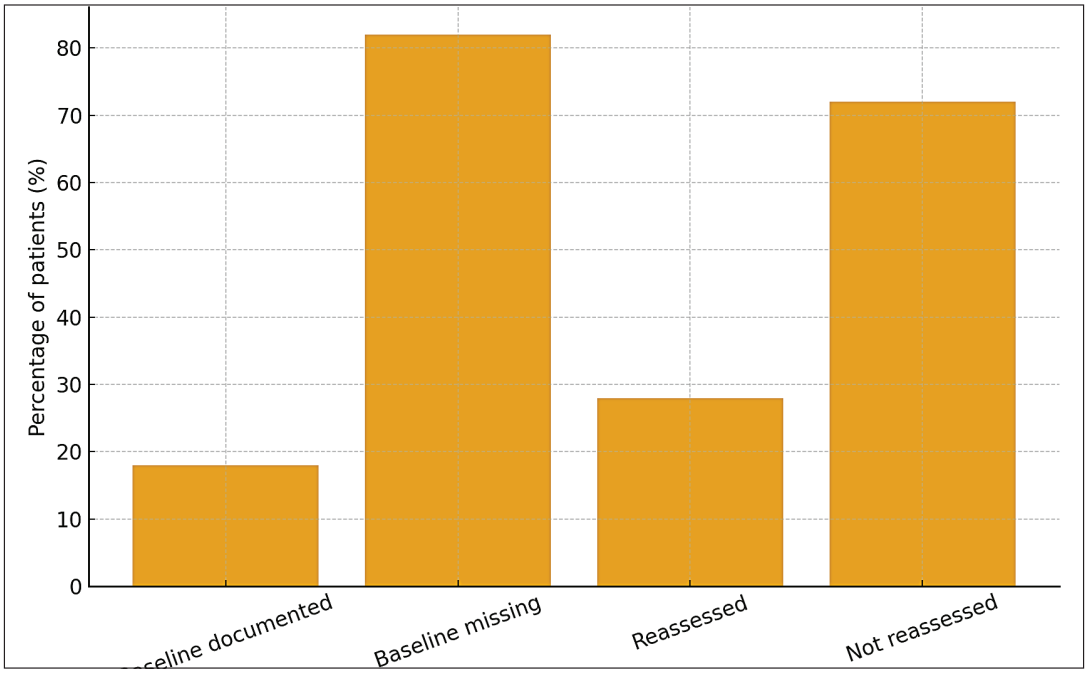


***Figure 2.*** *Documentation of baseline and reassessment scores among the participants.*

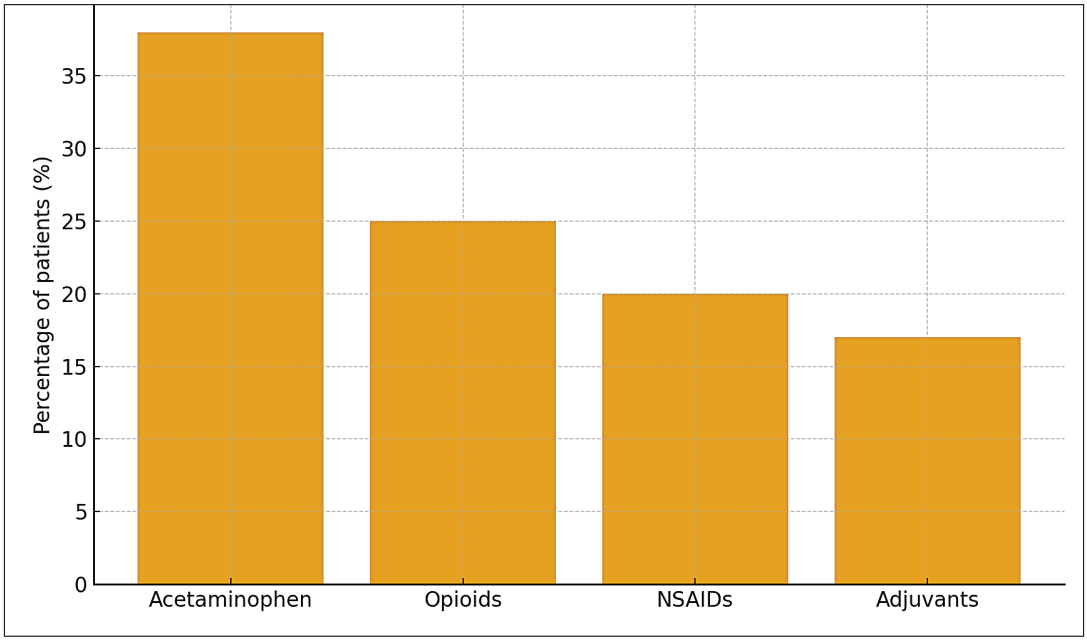


***Figure 3.*** *Analgesic distribution among the participants.*

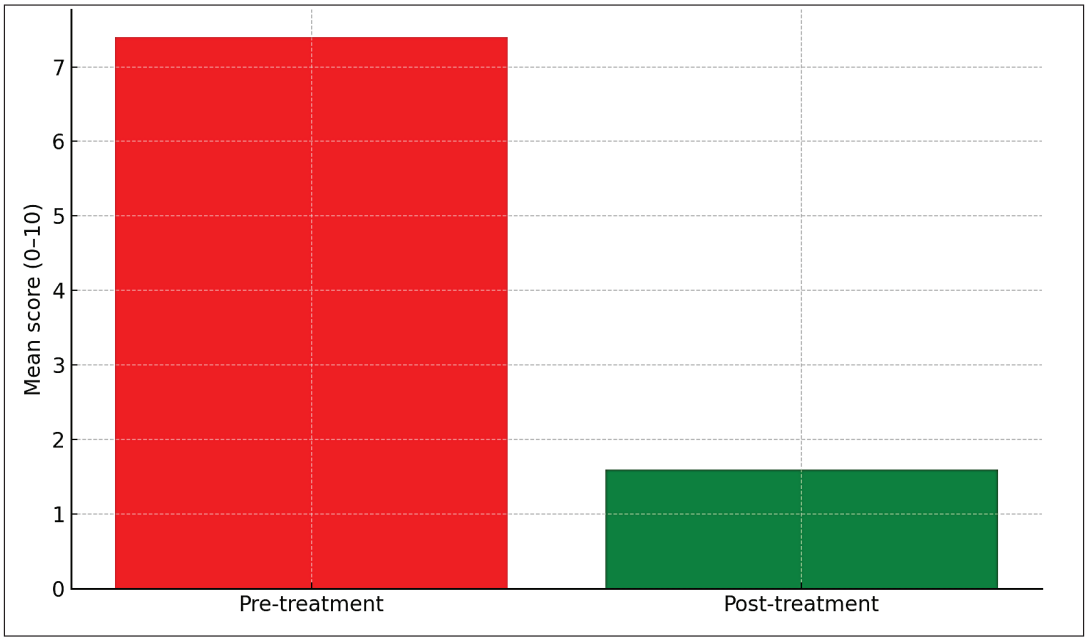


***Figure 4.*** *Mean pain scores before and after treatment among the participants.*

The adjusted odds ratio for opioid use was about 2.0, with a 95% confidence interval of 1.3-3.0, and the association was statistically significant ($p$-value = 0.01) (Table 3).

Exploratory chi-square analyses suggested a demographic influence, as younger patients were more likely to have pain scores documented than older patients, underscoring the need for standardized assessment processes across all age groups (Table 4).

## Discussion

Analgesic therapy in the ED was associated with a clear and clinically meaningful reduction in pain among oncology patients. Despite this positive outcome, documentation of baseline pain scores and post-treatment reassessment remained low. The disconnect between the effectiveness of pharmacological interventions and the inconsistency of process measures reflects a gap repeatedly described in the literature. It highlights the importance of structured, protocol-driven care in the ED [3,4,6-10,15].

The current study findings are consistent with international evidence showing that opioids, when titrated appropriately, provide superior short-term relief for patients with moderate to severe cancer pain [8-10,17,19,20]. At the same time, multimodal strategies that combine opioids with acetaminophen or NSAIDs

***Table 2.*** *Analgesic class (acetaminophen, opioid, NSAID, adjuvant, combinations) versus effective relief.*

| Analgesic class | Effective (≥2-point reduction), *n* (%) | Not effective (<2-point), *n* (%) | $\chi^2$ (*p*-value) |
|---|---|---|---|
| Acetaminophen | 110 (70.5) | 46 (29.5) | |
| Opioids | 85 (82.5) | 18 (17.5) | 12.3 (0.01) |
| NSAIDs | 52 (68.4) | 24 (31.6) | |
| Adjuvants | 38 (65.5) | 20 (34.5) | |
| Combination | 42 (77.8) | 12 (22.2) | |

***Table 3.*** *Logistic regression predicting effective relief (≥2-point reduction).*

| Predictor | Adjusted OR | 95% CI | *p*-value |
|---|---|---|---|
| Male sex | 1.10 | 0.78-1.56 | 0.59 |
| Opioid use | 2.00 | 1.30-3.00 | 0.01 |

***Table 4.*** *Chi-square: age group and sex versus documentation and reassessment.*

| Age group (years) | Documented, *n* (%) | Not documented, *n* (%) | $\chi^2$ (*p*-value) |
|---|---|---|---|
| <40 | 20 (24.4) | 62 (75.6) | |
| 40-59 | 25 (19.5) | 103 (80.5) | 6.4 (0.04) |
| ≥60 | 17 (12.5) | 114 (7.5) | |

have been shown to enhance analgesic benefit while reducing opioid requirements and side effects [16,21]. Guidelines further recommended individualized dosing, opioid rotation when indicated, and careful stewardship to prevent toxicity and manage patients with comorbidities such as renal impairment [8-10,19,22].

The low rates of documentation and reassessment observed in the current study mirror findings from other EDs worldwide. Several reports have demonstrated that structured interventions, such as mandatory triage pain scoring, nurse-initiated analgesia, and electronic health record prompts, significantly improve both documentation rates and timeliness of analgesia [11-13,23-25]. Without these process improvements, the actual effectiveness of analgesic therapy cannot be reliably measured, and opportunities for continuous quality improvement are lost.

In terms of clinical implications, several strategies emerged. It is recommended that all oncology patients presenting to the ED undergo mandatory numeric pain scoring at triage. Reassessment should be performed within 30–60 minutes after analgesic administration, ideally as a nurse-driven process embedded into standard workflow. Educational initiatives are also necessary, focusing on safe opioid titration, recognition of opioid-related toxicities, and the role of multimodal therapy in optimizing pain control. Finally, the introduction of simple emergency health record prompts or mandatory fields for pain assessment and reassessment can reinforce compliance and provide reliable data for ongoing audit and feedback [8-13,19,22-25].

This study had several limitations. It was retrospective and single-center in design, limiting generalizability. Documentation gaps required estimating some missing pain scores; however, a conservative, transparent approach was used, with sensitivity checks to confirm the robustness of the current findings. Furthermore, the focus was on short-term outcomes within the ED; therefore, the persistence of pain relief or its impact on longer-term outcomes, such as hospital admission, quality of life, or functional recovery, was not evaluated. Nonetheless, the study provided valuable local data and highlighted concrete, achievable steps that can enhance the quality of cancer pain management in ED practice.

## Conclusion

ED analgesia was effective in reducing pain among oncology patients; however, the consistently low rates of baseline documentation and post-treatment reassessment highlighted significant process gaps that undermine the overall quality of care. Addressing these deficiencies is as vital as providing effective medications. Introducing mandatory triage pain scoring for all patients, ensuring nurse-driven reassessment within a defined timeframe, and reinforcing education on multimodal analgesia and safe opioid titration are practical, low-cost strategies that can be rapidly implemented. Such measures would help close the gap between international guideline recommendations and actual bedside practice, ultimately improving both patient comfort and institutional accountability.

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### List of Abbreviations

ED Emergency Department
IRB Institutional Review Board

KAMC King Abdulaziz Medical City
PS Pain Score

**Conflict of interest**
The authors declare that there is no conflict of interest regarding the publication of this article.

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**Consent to participate**
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**Ethical approval**
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