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PRESCRIBING PATTERN OF OPIOID AND NON-OPIOID ANALGESICS IN THE OUTPATIENT SETTING AT HOSPITAL UNIVERSITI MALAYSIA SABAH

Baloch Mohsin Ali[1], Abdul Rahman Ramdzan[2], Praneetha Palasuberniam[3*], M Tanveer Hossain Parash [3]

[1]Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia
[2]Public Health Medicine Department, Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia
[3]Department of Biomedical Sciences, Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, Jalan UMS, 88400 Kota Kinabalu, Sabah, Malaysia
***Corresponding author:** Praneetha Palasuberniam, praneetha@ums.edu.my

ABSTRACT

Background: Analgesics are commonly prescribed for pain relief and are broadly classified into opioid and non-opioid agents, spanning use across mild to severe pain.

Objective: To describe the prescribing patterns of opioid and non-opioid analgesics, and the distribution of prescriptions by age, gender, and medical speciality, among patients attending Pusat Rawatan Warga and Poliklinik UMS (HUMS).

Methods: We conducted a cross-sectional study of 600 analgesic prescriptions for pain management among adult outpatients (aged ≥18 years), selected by simple random sampling from paper-based prescription records at Pusat Rawatan Warga and Poliklinik UMS, Hospital Universiti Malaysia Sabah, from November 2025 to March 2026. Data on analgesic type, diagnosis, prescribing speciality, age and gender were extracted using a structured data collection form and analysed descriptively (frequencies and percentages) using Microsoft Excel and GraphPad Prism v10.5.

Results: Among 600 prescriptions, 51 (8.50%) contained an opioid, while 549 (91.50%) contained only non-opioid analgesics. All opioid prescriptions were for oral tramadol 50 mg. The proportion of prescriptions containing an opioid was higher in the 31–60 years age group (9.79%) than in the 18–30 years group (6.84%), and higher among males (14.55%) than females (5.17%). By speciality, the proportion was highest in orthopaedics (14.38%), followed by dentistry (6.02%) and general medicine (1.78%). Orthopaedics and dentistry together accounted for 92.16% of all opioid prescriptions.

Conclusion: Non-opioid analgesics accounted for most outpatient analgesic prescriptions, while opioid prescribing, limited to tramadol, was relatively low. Opioid prescriptions were proportionally more frequent among male patients and were concentrated in orthopaedics and dentistry. Because pain severity and clinical outcomes were not assessed, these findings describe prescription distribution rather than prescribing appropriateness. They provide baseline data on outpatient analgesic prescribing at Hospital Universiti Malaysia Sabah to inform future studies of prescribing practice, safety and patient outcomes.

KEYWORDS: Prescribing pattern, opioid, non-opioid analgesics, outpatient, HUMS.

INTRODUCTION

Pain is one of the most common reasons for seeking medical care, and analgesics, which relieve pain without causing loss of consciousness, are a key component of pain management and among the most widely used medications globally (McCudden, 2020). Analgesics are broadly classified into non-opioid and opioid agents (Milani & Davis, 2023). Opioids, which include weak opioids such as tramadol and strong opioids such as morphine, are used mainly for moderate to severe pain (Ramirez et al., 2024). Conventional non-opioid analgesics, such as paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) including ibuprofen and diclofenac, are commonly used for mild to moderate pain; these should be distinguished from adjuvant analgesics, such as antidepressants and anticonvulsants, which are not primarily analgesics but are used to enhance pain relief in specific conditions, particularly neuropathic pain (Ezell et al., 2025). The World Health Organization (WHO) analgesic ladder, originally developed for cancer pain, recommends a stepwise approach: non-opioid analgesics for mild pain (step 1); weak opioids such as tramadol, with or without a non-opioid, for mild to moderate pain (step 2); and strong opioids such as morphine, with or without a non-opioid, for moderate to severe pain (step 3), with adjuvant analgesics added at any step where indicated (Ramanjulu et al., 2020).

In Malaysia, opioid analgesic prescribing has been reported as comparatively low (1.7%), with use in public hospitals being the least prescribed, while non-opioids accounted for 51.8% of analgesic prescriptions (Zin et al., 2018). Sex differences in analgesic use have also been documented locally: among patients on long-term opioid therapy, females (58.8%) outnumbered males (41.3%) (Zin et al., 2019). A slightly higher percentage of female patients were in the non-opioid group (50.7%) than in the male group (49.3%) (Zin et al., 2018). Internationally, opioid prescribing patterns vary by setting and speciality. In a population-based study in Canada,

general practice accounted for the highest percentage of opioid prescriptions (34.6%), followed by orthopaedic surgery (16.3%) and obstetrics/gynaecology (10.2%), and opioid prescriptions were most often associated with arthritis, joint or neck pain (56.5%), followed by low back pain (17.6%), anxiety (15.5%), cancer (14.7%) and depression (10.3%) (Merdad et al., 2025).

Studies of analgesic prescribing by speciality show a similar predominance of non-opioids. In an orthopaedic department in North India, non-opioids were the most prescribed analgesics, with diclofenac (37%) and aceclofenac (28%) being the most frequent; etoricoxib was prescribed in 5% of cases and paracetamol was co-prescribed in 25% of patients, while tramadol was used in 5%, mainly for severe postoperative pain (Semira et al., 2025). However, much of this evidence comes from inpatient, surgical or population-level settings outside Malaysia. Malaysian studies have focused mainly on public hospital data, long-term opioid therapy, or national prescribing trends, and have rarely described how opioid and non-opioid analgesics are distributed across patient groups and specialities in routine outpatient care. Evidence from outpatients with predominantly non-cancer pain is limited, and no published study, to our knowledge, has described outpatient analgesic prescribing patterns in Sabah, where population characteristics and access to healthcare may differ from other regions of Malaysia.

Monitoring outpatient analgesic prescribing is important because outpatient clinics are a common point at which patients receive analgesics for acute and chronic pain, and because exposure to opioids, including weak opioids such as tramadol, carries risks of adverse effects, dependence and misuse that warrant ongoing surveillance. Local data on how analgesics are prescribed can provide a baseline for evaluating prescribing practice and for planning pain-management and opioid-stewardship initiatives. This study therefore aimed to describe the prescribing patterns of opioid and non-opioid analgesics, and the distribution of these prescriptions by age, gender and medical speciality, among adult outpatients at Pusat Rawatan Warga and Poliklinik UMS, Hospital Universiti Malaysia Sabah (HUMS).

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional study was conducted through a review of outpatient prescription records at two healthcare facilities, namely Pusat Rawatan Warga and Poliklinik UMS, Hospital Universiti Malaysia Sabah (HUMS), Kota Kinabalu, Sabah. The study covered prescription records issued between November 2025 and March 2026 and focused on describing the prescribing patterns of opioid and non-opioid analgesics among adult outpatients.

Study Population and Sampling

The study population comprised outpatient prescription records from Pusat Rawatan Warga and Poliklinik UMS (HUMS) during the study period, and the individual prescription was the unit of analysis. All available paper-based prescription records were manually reviewed to identify prescriptions containing at least one opioid or non-opioid analgesic prescribed for pain management. Following eligibility screening, each eligible prescription record was assigned a unique identification number. The required sample of 600 prescriptions was then selected using a computer-generated random-number sequence.

The inclusion criteria were prescriptions issued to patients aged ≥18 years who received an opioid or non-opioid analgesic for pain management. Prescriptions issued for non-pain-related conditions were excluded, as were prescriptions for patients aged <18 years and records with missing or incomplete information on patient demographics, diagnosis or prescribed medications. No prescriptions for patients aged above 60 years were present in the final sample.

Sample Size Determination

The sample size was calculated using the single population proportion formula described by Daniel (1999):

$$n = \frac{Z^2 p(1-p)}{d^2}$$

where:

n = required sample size

Z = 1.96 (standard normal value for a 95% confidence level)

p = 0.50 (assumed population proportion; used because no previous local estimate was available, as it gives the largest required sample)

$1 - p$ = 0.50

d = 0.04 (margin of error)

Substituting these values into the formula:

$$n = \frac{(1.96)^2(0.50)(1-0.50)}{(0.04)^2}$$

$$n = \frac{(3.8416)(0.50)(0.50)}{0.0016}$$

$$n = \frac{0.9604}{0.0016} = 600.25$$

The calculated sample size was 600.25, corresponding to a minimum of 601 prescriptions after rounding up. However, a total of 600 eligible outpatient prescriptions were included in the final analysis. Based on the final sample of 600 prescriptions, the achieved margin of error at the 95% confidence level was approximately 4.001%, which was marginally above the prespecified 4% margin of error.

Data Collection

Data were collected manually from paper-based outpatient prescription records at Pusat Rawatan Warga and Poliklinik UMS (HUMS). Each prescription was reviewed to identify the prescribed analgesic medications and the relevant patient information, and only prescriptions that fulfilled the inclusion criteria were considered for data extraction. Information from each prescription was manually transferred into a structured data collection form before being compiled into a Microsoft Excel spreadsheet for subsequent analysis. The variables collected were:

i) Patient demographics (age, gender)
ii) Clinical information (diagnosis)
iii) Analgesic prescribed (drug name, class and strength)
iv) Prescribing medical speciality

The extracted information was then organised by opioid and non-opioid analgesic classification to allow prescribing patterns to be compared across demographic groups and medical specialities.

Data Analysis

Data were analysed using descriptive statistics, with results presented as frequencies and percentages. The study was designed to describe prescribing patterns rather than to test associations; therefore, no inferential statistical tests were performed. Data analysis and visualisation were performed using Microsoft Excel and GraphPad Prism version 10.5. The prescription selection, data collection and analysis process is summarised in Figure 1.

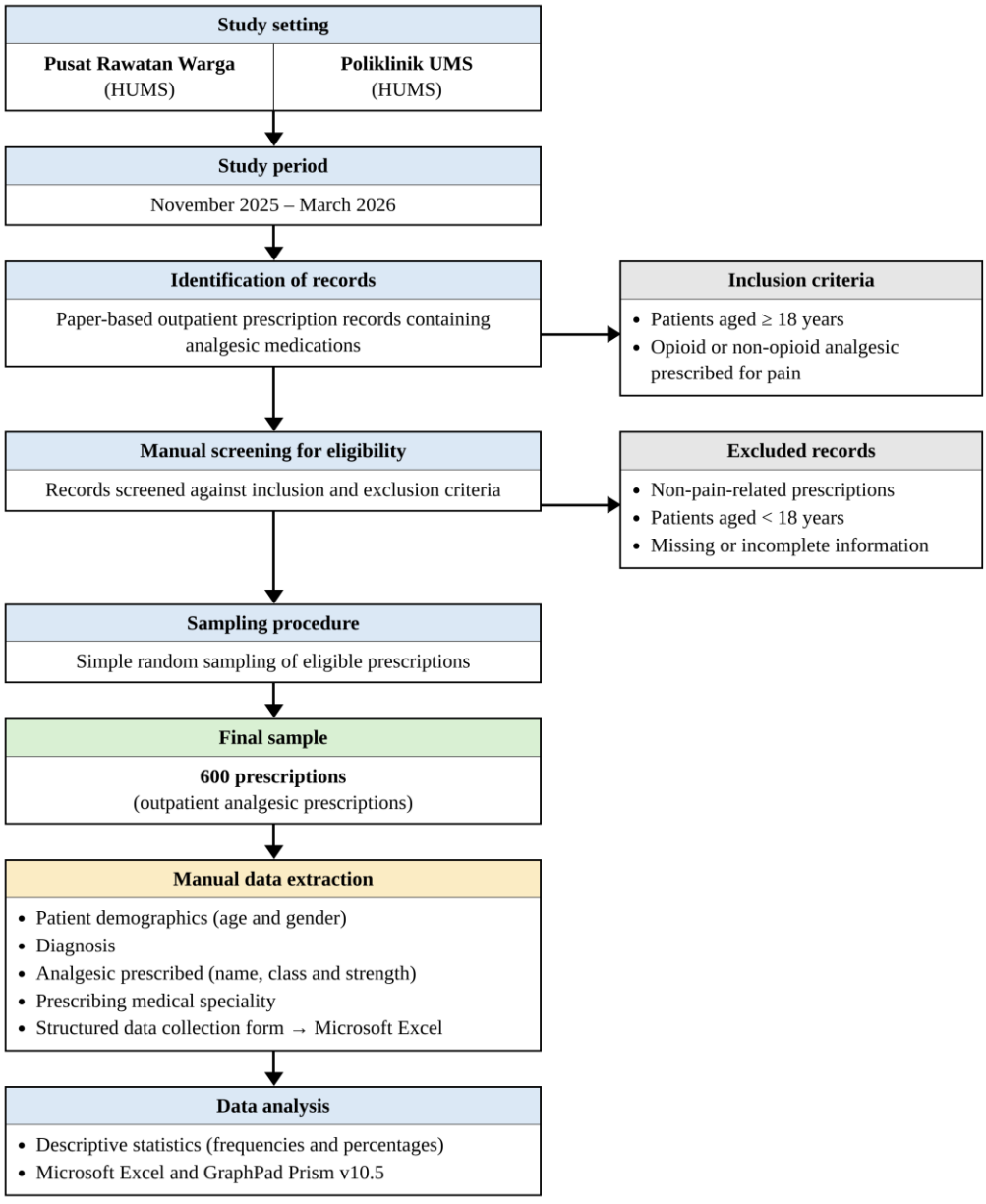


Figure 1: Flowchart illustrating the prescription selection, data collection and analysis process.

Ethical Approval
The study was conducted in accordance with ethical guidelines. This research obtained Ethical approval from the Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, with Approval code: JKEtika 4/25(2).

RESULTS
A total of 600 outpatient prescriptions were included in the analysis. Of these, 51 (8.50%) contained an opioid analgesic, whereas 549 (91.50%) contained only non-opioid analgesics. All opioid prescriptions were for oral tramadol 50 mg (Table 3). The distribution of prescriptions by patient demographics is presented in Table 1 and Figure 2. The proportion of prescriptions containing an opioid was higher among patients aged 31–60 years (9.79%) than among those aged 18–30 years (6.84%), and higher among male (14.55%) than female patients (5.17%). By speciality (Table 2 and Figure 3), the proportion was highest in orthopaedics (14.38%), followed by dentistry (6.02%) and general medicine (1.78%). Orthopaedics and dentistry together accounted for 92.16% of all opioid prescriptions.

Table 1: Distribution of demographic characteristics of opioid and non-opioid analgesic prescriptions among outpatients at Pusat Rawatan Warga and Poliklinik UMS (HUMS)

Characteristics	***Opioid (%)***	***Non-opioid (%)***	***Total***
All prescriptions	51 (8.50%)	549 (91.50%)	600
Age group (years)			
18–30	18 (6.84%)	245 (93.16%)	263
31–60	33 (9.79%)	304 (90.21%)	337
Gender			
Female	20 (5.17%)	367 (94.83%)	387
Male	31 (14.55%)	182 (85.45%)	213

Table 2: Distribution of opioid and non-opioid prescriptions according to medical speciality and representative diagnoses

Medical speciality	***Opioid (%)***	***Non-opioid (%)***	***Total***	***Representative diagnoses***
Orthopaedics	42 (14.38%)	250 (85.62%)	292	Musculoskeletal pain, soft-tissue injury
General Medicine	4 (1.78%)	221 (98.22%)	225	Fever/infection, headache/migraine and other gynaecological complications
Dental	5 (6.02%)	78 (93.98%)	83	Tooth extraction pain, toothache/dental pain

Non-opioids predominated in every speciality. Opioid prescriptions in orthopaedics were mainly for musculoskeletal pain and soft-tissue injuries, and those in dentistry for tooth extraction pain and dental pain, whereas general medicine prescriptions were mainly for fever/infection, headache/migraine and other gynaecological complaints.

Table 3: Distribution of opioid analgesic medications prescribed among outpatients at Pusat Rawatan Warga and Poliklinik UMS (HUMS) (n = 51)

Medication	**Strength**	**Route**	**Frequency (n)**	**Percentage (%)**
Tramadol	50 mg	Oral	51	100.00
Total			**51**	**100.00**

Percentages are calculated from the 51 prescriptions that contained an opioid.
Oral tramadol 50 mg was the only opioid prescribed during the study period, accounting for all 51 opioid prescriptions (100% of opioid prescriptions; 8.50% of all prescriptions) (Table 3). The remaining 549 prescriptions (91.50%) contained only non-opioid analgesics (Table 1); individual non-opioid agents were not recorded separately in the aggregated dataset.

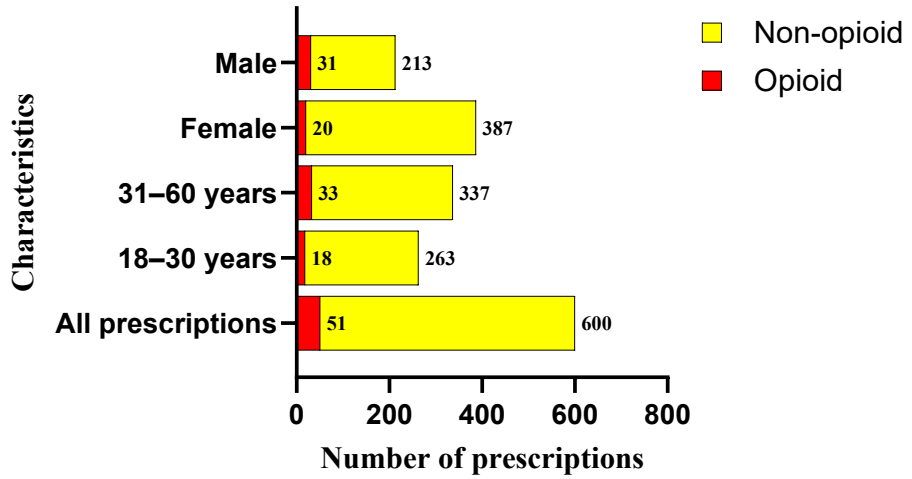


Figure 2: Distribution of opioid and non-opioid analgesic prescriptions by age group and gender (n = 600). Bars show the number of prescriptions containing an opioid and those containing only non-opioid analgesics; the value at the end of each bar is the total number of prescriptions in that group.

Non-opioid analgesics predominated in every age group and in both genders.

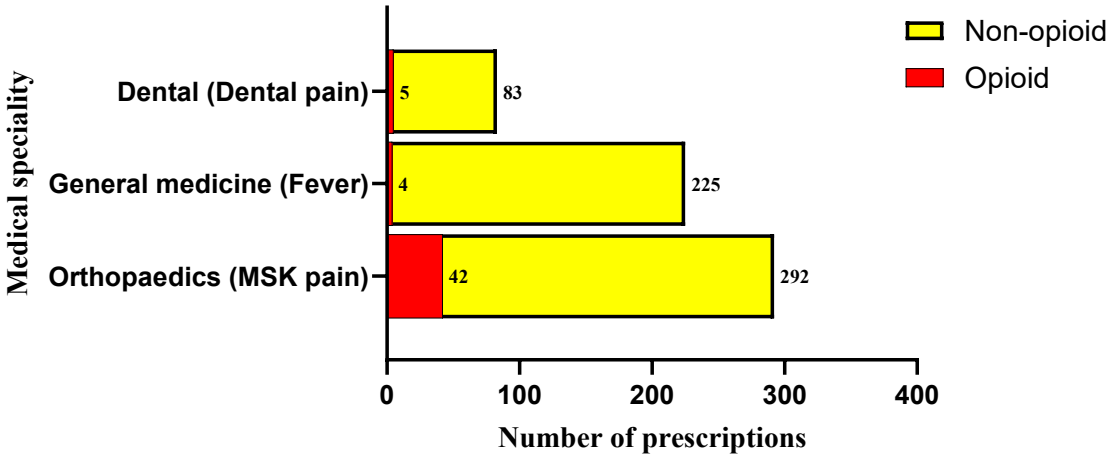


Figure 3: Distribution of opioid and non-opioid analgesic prescriptions by medical speciality, with representative diagnoses (n = 600). Values indicate the number of prescriptions in each category.

Non-opioid analgesics predominated in all specialities; orthopaedics had the largest number of both non-opioid and opioid prescriptions, and general medicine the fewest opioid prescriptions.

DISCUSSION

This study describes the prescribing patterns of opioid and non-opioid analgesics in the outpatient setting at Hospital Universiti Malaysia Sabah (HUMS), where 91.5% of prescriptions contained only non-opioid analgesics and 8.5% contained an opioid. This distribution is similar to that reported in an orthopaedic department in North India (95% non-opioid; 5% opioid), although that study was conducted among inpatients (Semira et al., 2025). In our study, the proportion of prescriptions containing an opioid was higher among males (14.55%) than females (5.17%). Because pain severity, clinical indication and case mix by gender were not assessed, the reason for this difference cannot be determined from the present data. This finding differs from a national study in the United States, in which a higher proportion of women (16.2%) than men (11.7%) received opioid prescriptions, a difference that was largely explained by sociodemographic factors, health status and greater health care use among women (Agnoli et al., 2021). Another study reported that 58.5% of males and 41.5% of females were prescribed non-opioids (Taghaddosinejad et al., 2013). Such differences may reflect variation in patient populations, clinical conditions, study settings and prescribing practices across studies.

Orthopaedics at HUMS had the highest number of analgesic prescriptions (250 non-opioid and 42 opioid), mainly for musculoskeletal pain and soft-tissue injuries. The predominance of non-opioids is consistent with the orthopaedic department of a teaching hospital in North India, where non-opioid (95%) and opioid (5%) analgesics were prescribed (Semira et al., 2025). General medicine had the lowest opioid use, with 4 opioid and 221 non-opioid prescriptions. This is consistent with guidance that non-opioids are first-line treatment for

common conditions such as acute migraine, and that opioid use in gynaecological care is generally reserved for specific situations such as postoperative pain (Mayans & Walling, 2018; Bougie et al., 2022). In dentistry at HUMS, 78 non-opioid and 5 opioid analgesic prescriptions were recorded. This is comparable with a recent study of acute dental pain after tooth extraction or toothache, in which 73 (81%) patients received non-opioid pain medication and 2 (2%) received an opioid (Polk et al., 2026).

The low proportion of opioid prescriptions in this study may partly reflect the regulatory requirements for prescribing controlled drugs in Malaysia, although this was not examined directly. Comparison with other Malaysian studies should be made cautiously because of differences in setting and design. At an outpatient hospital setting in Malaysia, 58.5% of patients receiving strong opioids (dihydrocodeine, fentanyl, morphine and oxycodone) had cancer-related pain, and oxycodone was mainly used for non-cancer pain (Zin et al., 2017). In contrast, tramadol was the only opioid prescribed in the present study, which is consistent with national data showing tramadol to be the predominant opioid analgesic used in Malaysian public hospitals (Zin et al., 2018). The concentration of opioid prescriptions in orthopaedics and dentistry is likely to reflect the case mix of these specialities, in which musculoskeletal injuries and dental procedures are common.

The strengths of this study include the random selection of prescriptions and the description of prescribing patterns across age groups, genders and medical specialities in a setting for which no previous data were available. Several limitations should be considered. First, the study was conducted at a single institution and included only two outpatient facilities, which limits generalisability to other outpatient settings in Sabah and Malaysia. Second, data were extracted from paper-based prescription records, so the findings depend on the completeness and accuracy of those records, and prescriptions with missing information were excluded, which may have introduced selection bias. Third, information on pain severity, dose, duration of therapy, patient response, adverse drug reactions and other clinical outcomes was not available, so the clinical appropriateness of prescribing could not be assessed. Fourth, the sample of 600 prescriptions and the small number of opioid prescriptions (n = 51) limit the precision of subgroup estimates, and no patients older than 60 years were included, although older adults are a group in whom analgesic safety is particularly important. Finally, only descriptive analyses were performed, so no conclusions can be drawn about associations between patient characteristics or specialities and opioid prescribing.

CONCLUSION

This study found that non-opioid analgesics accounted for most prescriptions among adult outpatients at Pusat Rawatan Warga and Poliklinik UMS, Hospital Universiti Malaysia Sabah, while opioid prescriptions, all for tramadol, were relatively few. Opioid prescriptions were concentrated in orthopaedics and dentistry and were proportionally more frequent among male patients.

Because pain severity, dose, duration of therapy and clinical outcomes were not assessed, these findings describe the distribution of analgesic prescriptions rather than the appropriateness of prescribing. Continued monitoring of opioid prescribing is recommended. Future studies should include pain severity assessment, opioid dosage, duration of therapy and clinical outcomes, ideally across multiple centres in Sabah, to provide a more comprehensive evaluation of analgesic management practices.

Author contributions

Baloch Mohsin Ali: Methodology, Formal analysis, Conceptualisation, Software, Resources, Investigation, Data curation, Writing-original draft, Visualisation, Validation, Project administration; Praneetha Palasuberniam: Supervision, Conceptualisation, Writing-review & editing. Dr Abdul Rahman Ramdzan: Writing-review & editing; Dr M Tanveer Hossain Parash: Writing-review & editing.

Author's statement: The authors stated no conflict of interest.

Declarations

Conflict of interest: The authors declare they have no conflict of interest.

Ethical approval: This Project obtained Ethical approval from the Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah, with Approval code: *JKEtika* 4/25(2)

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