

ANALYSIS OF PRESCRIBING PRACTICES FOR ANTIBIOTICS AND ANALGESICS IN A TERTIARY CARE ORTHOPAEDICS DEPARTMENT

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ABSTRACT

Objective: Prescription pattern studies aim to give precise data for the creation of local recommendations for responsible drug use by analysing prescriptions against established benchmarks. In light of these details, we undertook this study intending to determine the prescription pattern for antibiotics and analgesics in an orthopaedic speciality teaching hospital.

Methods: Observational research was conducted retrospectively over a month from the Medical Record department. Using a pre-made proforma, information was gathered on the patient's demographics, diagnosis, whole prescription, and any adverse drug reactions. The research comprised all the patients admitted to orthopaedic wards who fulfilled the inclusion criteria.

Results: Out of the 807 patients, 573(721%) were male and 234 (29%) were female. The majority of them are between the ages of 26-35 y and 404 suffered from fractures. There were 2022 analgesics prescribed in total and 623 patients received prescriptions of fixed-dose combinations (FDCs). There were 1864 AMAs in all that was prescribed; of these, beta-lactam antibiotics made up 43.3%, and aminoglycosides 36%. The average number of drugs per contact in this study was 7 and the resultant average rationality score per prescription was 26.5±4.7 as per Phadke's criterion.

Conclusion: To improve clinical outcomes in medical practice, improvements must be made at all levels, including public awareness, physician sensitisation and clinical drug policy reform. Frequent instructional initiatives at various stages might encourage judicious prescription practices.

Keywords: Prescribing patterns, Drug utilization, Antimicrobial agents, Analgesics, Rationality, Phadke's criteria

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INTRODUCTION

Irrational medication usage leads to significant morbidity and death as well as extra financial strain, lowers drug quality and wastes resources. It also raises the likelihood of adverse drug reactions and the formation of resistance [1]. The goal of rational use of medicines (RUMs) is to assess the availability, accessibility, and appropriate prescribing of medications. In developing nations like India, RUM implementation is crucial where financial resources are limited and patient affordability is low [2].

Determining prescription patterns and detecting unreasonable prescribing practices is crucial in conveying a corrective message to prescribers and alterations to the suggested guidelines. The prescription patterns for antibiotics and analgesics have changed because of innovations in medication composition [3, 4].

The most prevalent example of irrational medication usage is the overuse of antibiotics [5]. A significant hazard to public health arises from antibiotic resistance as antibiotic usage increases. Antimicrobial resistance and hospital use of antibiotics may be related, according to the available data [6]. In an effort to stop the establishment and spread of pathogens, several writers advise hospitals to keep an eye on trends in susceptibility and antibiotic usage microorganisms that resist antibiotics [7].

Pain is an unpleasant emotional and sensory experience that can be linked to or defined in terms of existing or potential tissue damage [8, 9]. In clinical practice, a class of medications known as analgesics, which includes nonsteroidal anti-inflammatory medicines (NSAIDs), is frequently used to treat pain and inflammation [10, 11]. As the most often prescribed medications in the orthopaedics department, analgesics are known to have negative side effects when used excessively over extended periods, causing significant ADRS-related morbidity and death [12].

During orthopaedic procedures, infection is a significant concern. Antimicrobials are administered for both preventative purposes before operations and for the treatment of infections such as

osteomyelitis and septic arthritis [13, 14]. When these medications are used inappropriately, they can cause adverse drug responses, bacterial resistance, and higher rates of morbidity and death.

Prescription pattern studies aim to give precise data for the creation of local recommendations for responsible drug use by analysing prescriptions against established benchmarks. Overprescribing, self-medication, excessive use of injections and antibiotics, and increasing drug availability and accessibility are all contributing factors to the widespread irrational use of medications in India [3].

In light of these details, we undertook this study intending to determine the prescription pattern for antibiotics and analgesics in an orthopaedic speciality teaching hospital.

MATERIALS AND METHODS

Observational research was conducted retrospectively at the Sanjay Gandhi Institute of Trauma and Orthopaedics, Bangalore. The investigation was conducted over a month. The patient case data from December 01, 2023 to December 31, 2023, were obtained from the Medical Records department. A pre-made proforma gathered information on the patient's demographics, diagnosis, whole prescription, and adverse drug reactions. Data were examined for the WHO core prescription indicators and logic. Using descriptive statistics and necessary software, statistical analysis was conducted. The research comprised of all the patients admitted to orthopaedic wards. The research did not include cases of discharge against medical recommendation or medicolegal issues, cases admitted in the intensive care unit and age below 18 y.

RESULTS

Out of the 807 patients that were part of the trial, 573(71%) were male and 234 (29%) were female (fig. 1a). The majority of them are between the age 26-35 y (fig. 1b). Of the 807 patients, 404 suffered from fractures, 123 had ligament injury, 114 had osteoarthritis admitted for joint replacement surgery and 94 were for either of wound management or infection table 1.

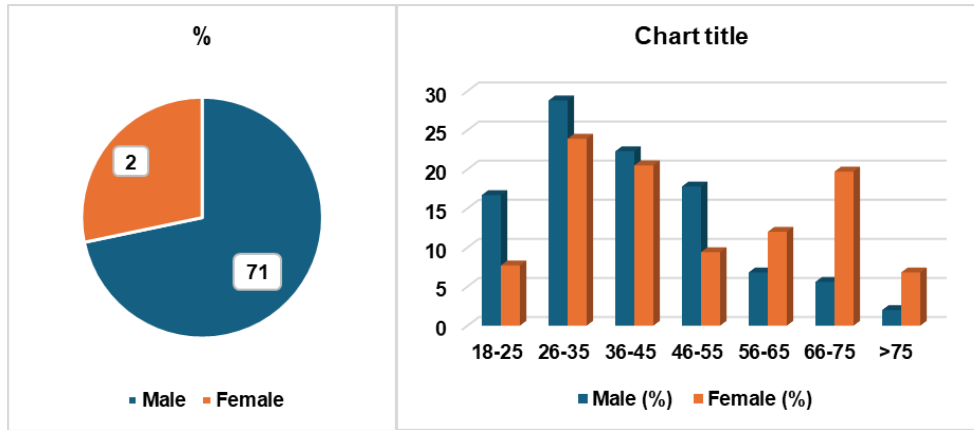


Fig. 1: (a) Gender distribution and (b) age distribution of admitted patients (in years)

Table 1: Pattern of injury and other orthopaedic conditions of patients admitted to the hospital

Disease	Number of patients	Percentage
Fractures	404	50.1%
Ligament Reconstruction	123	15.2%
Plastic Surgery – wound management	86	10.7%
Chronic osteomyelitis	08	1%
Joint Replacement	114	14%
Spine – IVDP/lithesis	72	9%
Total	807	100%

There were 2022 analgesics prescribed in total; of these, NSAIDs made up around 63% and Paracetamol was the most often prescription drug (38.5%), whereas opioid analgesics made up 32% and tramadol was the most often prescribed drug (31%). Majority of

the drugs administered either of intravenous or oral route. 623 patients received prescriptions of fixed-dose combinations (FDCs), with the most often used combination being Aceclofenac+Paracetamol (72.7%).

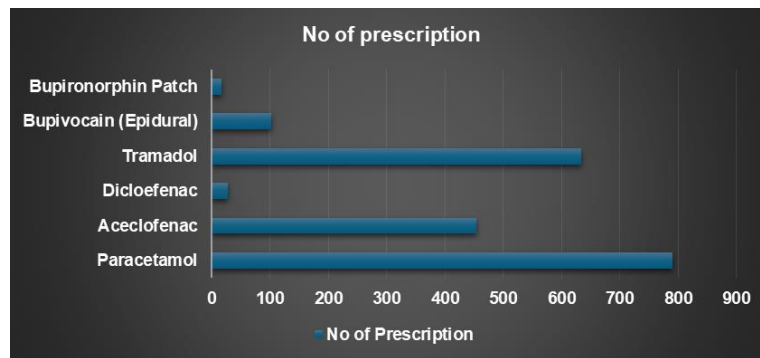


Fig. 2: Type of analgesics prescribed

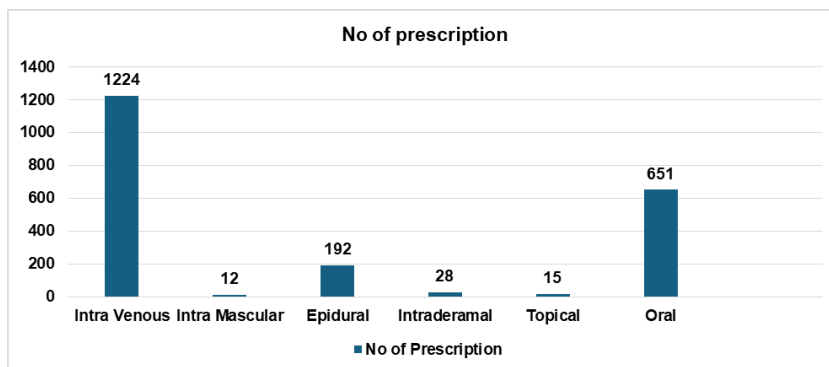


Fig. 3: Number of analgesics administered by different routes

There were 1864 AMAs in all that were prescribed; of these, beta-lactam antibiotics made up 43.3%, aminoglycosides 36%, and other AMAs 20.7% [table 2]. Cefoperazone+Sulbactam was the most favoured beta-lactam (41%), whereas amikacin was the most favoured

aminoglycoside (36%). 93% of AMAs were given intravenously, and 7% were given orally. Of all AMAs, 921 FDCs were given to the patients, accounting for 49.4% of the total. Of these, 82.8 included Cefoperazone+Tazobactam was the preferred one.

Table 2: Total number of antimicrobials prescribed to patients admitted

Antimicrobial agents	No of prescription	Percentage
Ceftriaxone	44	2.3%
Amikacin	674	36%
Cefoperazone+Sulbactam	763	41%
Piperacillin+Tazobactam	102	5.5%
Linezolid	22	1.1%
Meropenem	17	1%
Metronidazole	78	4.1%
Ciprofloxacin	19	1%
Levofloxacin	72	3.9%
Amoxicillin+Clavulanate	56	3%
Tigecycline	9	0.5%
Colistin	12	0.6%
Total	1864	100%

A proton pump inhibitor-Pantoprazole was prescribed in conjunction with other medications in 787 prescriptions. Most of the cases have been prescribed Calcium and Vitamin D3 supplements along with multi-vitamin supplements in older patients.

The WHO/INRUD indicators were utilized to generate the prescribing indicator values, as presented in table 3. Phadke's criterion was applied to determine the prescription status, and the resultant average rationality score per prescription was 26.5±4.7.

Table 3: WHO/INRUD prescribing indicators

Indicators	Value (%)
Average number of drugs per encounter	7.03
Percentage of drugs prescribed by generic name	87.83%
Percentage of encounters with an antibiotic-prescribed	97%
Percentage of encounters with an injection prescribed	97%
Percentage of drugs prescribed from essential drug list or formulary	99%

WHO/INRUD: World health organization/International network of rational use of drugs

Table 4: Status of prescriptions based on phadke's criteria

Status of prescriptions (score)	Number of prescriptions	Percentage
Rational (>25)	764	94.67
Semi-rational (15-24)	43	5.33
Irrational (0-14)	0	0
Total	807	100

DISCUSSION

A doctor's prescription might be seen as an indication of how they feel about the illness and how much they believe drugs can help treat it. It also sheds light on the characteristics of the healthcare delivery system [10]. Improving medical treatment standards across the board in the healthcare delivery system can lead to an improvement in quality of life. Clinical practice should incorporate standard-setting and performance assessment as a means of evaluating the quality of care [15].

Rational drug application means ensuring everyone obtains the proper medication at a reasonable cost, in a suitable dosage for a suitable amount of time, together with the necessary follow-up care and information. Irrational prescription, according to the World Health Organization, is the practice of using therapeutic medicines when there is little chance that they would be effective or when doing so would not be worth the expense or possible risk [16]. Fractures accompanied by excruciating pain are among the most frequent orthopaedic presentations in India, where 6.8 million people seek medical attention for pain [17]. In contrast to research by Roopavathy GM⁴, where fractures were observed in 72% of patients, the pattern of injuries in this investigation revealed that 404 (50%) patients had fractures.

The current study mainly studied the use of analgesics and antibiotics by the Department of Orthopaedics' indoor patients. 807 patients were administered a total of 5673 medications. Of these, 2022 were for analgesics, 1864 were for antibiotics, and 787 were for Proton pump inhibitors. Of the 1274 NSAIDs that were prescribed, 63% of the analgesics were paracetamol, which is comparable with research done by Rugyté D, Gudaitytė J [18].

Among the AMA's Cefoperazone+Sulbactam (41%) and amikacin (36%) were used, which contrasted with Roopavathy GM⁴ research that found amikacin (27.5%) followed by ceftriaxone (19%) of administered antibiotics. According to research by Das *et al.*, [19] 97% of antimicrobial prescriptions were made empirically based on the severity of the diseases, the potential microorganisms, and the available medications because of the significant risk of developing surgical site infections or other hospital-acquired infections following orthopaedic surgery.

An appropriate FDC is one that does not show supra-additive toxicity and consists of medications with distinct pharmacokinetics together [20]. Since NSAIDs and opioid analgesics function through distinct mechanisms, combining the two is a more sensible course of action. In our study, most of the patients prescribed both Paracetamol and Tramadol as post-operative analgesia which helps

to reduce the pain synergistically [21]. Most of the patients underwent at least one surgical intervention, hence most analgesics were administered in the parenteral route.

In the current study, only 3% of patients received no AMA prescriptions, 6% started monotherapy, 82% started a two-drug combination, and 9% started a three-drug combination, which is comparable with Roopavathy GM [4] and Prakasam A [22].

787 patients were administered the proton pump inhibitor, which is given intravenously and has an antiulcerogenic effect to prevent gastrointestinal ulcers caused by NSAIDs and stress. It was selected because of its affordability and availability in hospital formularies.

WHO/INRUD prescribing indicators

An essential indicator of a prescription audit and a gauge of polypharmacy is the average number of medications taken at each contact. The likelihood of bacterial resistance, non-compliance, adverse medication responses, drug interactions, and higher treatment costs are all enhanced by polypharmacy. The average number of drugs per contact in this study was 7, which was higher than the average of 5.6 reported in a study by Roopavathy GM [4]. But lower than the average of 8.8 reported in a study by Barakat A [23], which confirms the polypharmacy. Semi-rational choices of AMAs and analgesics were noted when Phadke's criteria were applied to analyse prescribing trends. Similar results were seen in a study done by Roopavathy GM [4].

Prescriptions written under generic names save money on treatment costs and remove the possibility of medication product duplication. 99% of the medications were prescribed from the National List of Essential Medicines of India, 2023, and 87.3% of the medications were prescribed by generic name in the current study which is again par with the study done by Roopavathy GM [4].

LIMITATIONS OF THE STUDY

The two main limitations of this study were the sample size and the study location. Since the information was gathered from patient records, it's possible that some prescriptions were filled but weren't included in the charts. There wasn't enough information about medications taken together. Large-scale research encompassing many departments and a bigger sample size would be required to make policy decisions about the judicious use of pharmaceuticals.

CONCLUSION

To improve clinical outcomes in medical practice, improvements must be made at all levels, including public awareness, physician sensitization, and clinical drug policy reform. Frequent instructional initiatives at various stages might encourage judicious prescription practices. Prescriptions for medications written under generic names and from the essential medicine list encourage patients to take medications sensibly in terms of safety, effectiveness, and treatment cost. This lowers patient financial burden and raises the standard of healthcare for the general public. In addition, minimizing the burden of orthopaedic disorders requires patient compliance and drug adherence.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICTS OF INTERESTS

Declared none

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