

# Auditing Analgesic Use in Post-operative Setting in a Teaching Hospital

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## ABSTRACT

**Introduction:** Managing postoperative pain efficiently is one important therapeutic challenge in the hospitals. Combination use of analgesics is in vogue, where in drugs from the opioid and non-opioid group are given synergistically. The aim of this study is to audit the use of different analgesics on the first postoperative day. Effort has been made to look into the drug or drug combinations used and other factors associated with their use.

**Materials and Methods:** Retrospective, cross sectional observational study was conducted over a period of 11 months in a tertiary care teaching hospital at Hyderabad with approval from institutional ethics committee. Medical records of 649 patients on the first postoperative day were analysed for analgesics by various indicators.

**Results:** Average number of drugs per encounter was 4.23. Percentage of patients prescribed drugs from national essential drug list/WHO was 81.94%. Most common analgesic (monotherapy) prescribed was tramadol followed by diclofenac and the most common combination drugs prescribed were tramadol+Paracetamol. The most common route of administration was intravenous. All the drugs except piroxicam, were in the lower limit of the recommended daily dose.

**Conclusion:** The present study gives an idea of the overall pattern of analgesic drug use in postoperative patients. The drug combinations used, the most common single use drug can be made out. The health professionals can be encouraged to prescribe by generic name and from the National List of Essential Medicines NLEMs.

**Keywords:** Analgesic utilization study, Diclofenac, Postoperative pain, Tramadol

## INTRODUCTION

Post operative pain is one of the end results of any surgical procedure and calls for efficient management. It is the commonest therapeutic challenge in the hospitals.

Pain has been defined as, 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage' by the Task Force on Taxonomy of the International Association for the Study of Pain [1]. Optimising pain management can improve the outcome of patient care after any surgical intervention. Inadequate pain control can result in increased morbidity and length of hospital stay as well as lead to chronic pain. It can also lead to complications like deep vein thrombosis, atelectasis and also delayed wound healing [2]. The other concern in inadequate pain relief is the fear of the possibility of development of physical dependence, tolerance and addiction with the use of opioid analgesics [3]. Undertreated severe pain may have physiological consequences increasing the stress response to surgery, seen as a cascade of endocrine-metabolic and inflammatory events that ultimately may contribute to organ dysfunction, morbidity, increased hospital stay and mortality. It may lead to several complications related to major systems like cardiovascular, respiratory, gastrointestinal, musculoskeletal, thromboembolic and also psychological [4]. Besides, restlessness caused by severe pain may contribute to postoperative hypoxemia [5].

Opium and its semisynthetic and synthetic derivatives have come up to be the most effective analgesics in immediate postoperative period [6]. A combination modality of opioid and non opioid analgesics are also used nowadays. The World Federation of Societies of Anesthesiologists (WFSA) has devised 'Analgesic Ladder' to treat acute pain [7]. According to this ladder, immediately after an operation, the pain can be expected to be severe and may need controlling with strong parenteral opioids in combination with

local anesthetic blocks and peripherally acting drugs. Normally, postoperative pain should decrease with time and the need for drugs to be given by injection should cease. There is then a step down to oral opioids and finally to non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen on its own [8]. As the feeling of pain is subjective, the requirement of different class of analgesics may differ. Analgesics with a better safety profile and having less tolerance, dependence and abuse potential should be used. The goal of effective pain management is to provide relief/satisfaction to patients, expedite recovery and functional ability, reduce morbidity and minimize hospital stay. The concept of 'multimodal analgesia' advocates the use of several different classes of analgesics and different routes of administration which can produce a synergistic action. This also helps to reduce the effective doses of the individual drugs and their adverse effects. Not many Indian studies have focused solely on analgesic utilization pattern nor has highlighted the different aspects of multimodal analgesia.

The aim of this study is to study the use of different analgesics on the first postoperative day and also to find out the combination use of non steroidal anti-inflammatory drugs (NSAIDs) and opioid group of analgesics. Apart from that it also looks into the commonest route of their administration and whether they are from the NLEMs as given by Central Drugs Standard Control Organization (CDSCO), India.

## MATERIALS AND METHODS

This retrospective observational study was conducted by the department of Pharmacology in collaboration with Surgery and allied Departments of a tertiary care teaching hospital at Hyderabad, India. Prior approval was taken from institutional ethics committee. Data was collected from medical records of postoperative patients from various departments like general surgery, gynaecology/obstetrics,

ophthalmology, ENT, urology and orthopaedics only. Patients undergoing emergency surgery psychologically disabled and from extreme age groups were excluded. The study period was from 10/1/2011 to 15/11/2011. Medical records of 649 patients were audited for the first postoperative day and a proforma was devised to gather the required information. Complete patient demographics and the type of surgery were recorded. Principle mode of analgesia, the routes of administration and other co-administered analgesics were noted. The data collected from the medical records was analyzed and expressed as absolute numbers and/or percentages.

## RESULTS

Six hundred forty nine medical records of patients were audited.

Demographics Results ( numbers)	
Age( years) mean $\pm$ SD	49.12 $\pm$ 9.35
Weight ( kg) mean $\pm$ SD	61.25 $\pm$ 11.04
Male (number)	356
Female (number)	293
General surgery	232
Gynaecology / obstetrics	176
Urology	47
ENT	53
Ophthalmology	43
Orthopaedics	98

[Table/Fig-1]: Demographic features and the department involved

The mean age and weight of the patients were 49 years and 61 kg respectively. 356 were male and 293 were female patients. The highest number of cases was from the Department of General Surgery, followed by Gynaecology and Obstetrics [Table/Fig-1]. The commonly encountered surgical procedures were appendectomy, inguinal hernia repair, Caesarean section, and abscess drainage (breast, perineal, mastoid). The other procedures were cholecystectomy, cataract operation, hydrocele repair, ureteric calculi removal and orthopedic procedures [Table/Fig-2].

One hundred and seventy three (26.64%) patients received an opioid analgesic and two hundred and thirty six received a non steroidal anti-inflammatory analgesic (36.36%). In the above situation, both the drugs were administered as sole analgesic agent. Parenteral synthetic opioid tramadol was used in 25.26% and non opioid analgesic diclofenac was used in 24.5% of patients as analgesic monotherapy [Table/Fig-3].

The combination use (opioid + non opioid or two nonopioids or two opioids) was observed in 340 patients (36.97%). The commonly used drug combinations were tramadol + paracetamol (8.62%), diclofenac + paracetamol (7.85%), aceclofenac + paracetamol (6.93%) and tramadol + pentazocine (7.09%). Others noted were ibuprofen + paracetamol (3.08%), tramadol + diclofenac [Table/Fig-4] (2.62%), tramadol + ibuprofen (0.31%) and ibuprofen + aceclofenac (0.46%).

Route of administration	Frequency (percentage)	Frequency ( number of patients )
Intravenous	70.3	456
Oral	19.1	124
Intramuscular	8.6	56
Unspecified	2.0	13

[Table/Fig-2]: Route of administration

Route of administration could not be elicited in 2% of the records. The percentage of patients who received more than one analgesic on the first postoperative day was 36.97% and 63.2% was on a single analgesic.

Analgesic	PDD	RDD	Route	Frequency
Tramadol	100 mg	200-400 mg	Intravenous	25.26%
Diclofenac	100 mg	100-150 mg	Intravenous /oral	24.5%
Ibuprofen	1200 mg	1200-2400 mg	Oral	5.7%
Paracetamol	2 g	2- 3.5g	Oral	4.31%
Pentazocine	30 mg	240 mg	Intramuscular	1.38%
Piroxicam	40 mg	20 mg	Oral	1.54%
Aceclofenac	200 mg	200 mg	Oral	0.31%

[Table/Fig- 3]: Analgesics- route, PDD & RDD

The prescribed daily dose (PDD) and the recommended or defined daily dose (RDD) of the analgesics are shown above [Table/Fig-3]. The RDD is the average maintenance dose per day in adult for it's prime indication. The PDD is the average dose of a particular analgesic prescribed in the study [9-11]. The analgesic used maximally as monotherapy is also shown below [Table/Fig-4].

Single use drugs			Combination drugs		
Sl. No	Drug	Percentage (patients)	Sl. No	Drug	Percentage (patients)
1.	Tramadol	25.26%	1	Tramadol+Paracetamol	8.62%
2	Diclofenac	24.50%	2	Diclofenac+Paracetamol	7.85%
3	Ibuprofen	5.70%	3	Tramadol+Pentazocine	7.09%
4	Paracetamol	4.31%	4	Aceclofenac+Paracetamol	6.93%
5	Piroxicam	1.54%	5	Ibuprofen+Paracetamol	3.08%
6	Pentazocine	1.38%	6	Tramadol+Diclofenac	2.62%
7	Aceclofenac	0.31%	7	Indomethacin+Aceclofenac	0.46%
			8	Tramadol+Indomethacin	0.31%

[Table/Fig-4]: Prescribing frequency of analgesics  
Prescribing pattern of analgesics is depicted above.

Sl. No	Indicators assessed	Data value
1	Average number of analgesics per prescription	1.39
2	Percentage of drugs prescribed by generic name	4.83%
3	Percentage of patients on analgesics from National List of Essential Medicines ( NLEM)	81.94%
4	Most common analgesic prescribed	Tramadol
5	Most common combination analgesic prescribed	Tramadol+Paracetamol
6	Most common route of administration	Intravenous
7	Percentage of injections prescribed	78.9%

[Table/Fig-5]: Indicators assessed

Above table highlights the indicators assessed [Table/Fig-5]. Among all the analgesics prescribed, tramadol was the only drug to be prescribed as generic in 4.83% of all analgesics prescribed. Most of the analgesics prescribed comply with that mentioned in the NLEMs. The NSAIDs were paracetamol, ibuprofen and diclofenac. Tramadol was the drug which represented the opioid group. 78.9% analgesics were administered via parenteral route. The average number of analgesics was 1.39 per prescription and 81.94% complied with those from NLEMs.

The most common procedures were general surgical procedures like appendectomy (14.32%) and inguinal hernia repair (9.70%). Others are depicted in [Table/Fig-6]. The procedures from the department of Gynaecology & Obstetrics were Caesarean section (10.01%), breast abscess drainage (6.0%), perineal tear repair (2.0%) and ovarian cyst removal (2.0%). Department of Orthopedics reported fracture repair (2.1%), joint effusion (2.77%), and arthroscopy (2.0%). Cataract surgery was the frequently performed (2%) procedure in Ophthalmology.

Procedures ( Surgery)	Percentages ( %)
Appendectomy	14.32
Inguinal hernia repair	9.70
Perineal abscess drainage	5.85
Cholecystectomy	4.62
Ureteric calculi removal	3.85
Umbilical hernia repair	3.54
Incisional hernia repair	3.54
Hydrocele	3.54
<b>Gynaecology &amp; Obstetrics</b>	
Caesarean section	10.01
Breast abscess drainage	6.0
Perineal tear repair	2.0
ovarian cyst removal	2.0
<b>Orthopedics</b>	
Fracture repair	2.1
Joint effusion	2.77
Arthroscopy	2.0

[Table/Fig-6]: Procedures

## DISCUSSION

As known, the present study focuses on the management of post operative pain, which is usually moderate to severe in quality and the analgesic utilization pattern of opioids and non-opioids. Pain assessment is a procedure involving complex parameters of physical estimation compounded with social, psychological and spiritual factors. It is a highly subjective sensation difficult to quantify and we have focused on auditing analgesic utilization pattern on the first postoperative day. The surgical interventions performed were diverse as already depicted above. Use of oral tramadol was the least as far as the first postoperative day was concerned and the dose was much lesser than the maximum limit of 400mg per day. This might be beneficial in terms of reducing adverse effects of tramadol commonest being respiratory depression, sedation, vertigo, dizziness and gastrointestinal side effects [12].

The non opioid analgesic diclofenac showed second highest use (24.5%) as analgesic monotherapy. This finding is similar with the study of Bhansali et al., [13] where diclofenac was one of the most common prescribed drug. Vlahovic-palcevski et al., also reported a similar study in Croatia and Sweden which support this finding [14]. The route of administration was commonly intravenous followed by oral. Paracetamol and ibuprofen were the other non opioids used through the oral route. Paul and Chauhan, Henry et al., have shown that ibuprofen was the most often prescribed NSAID which is different from our study [15,16]. The use of these analgesics conforms to that specified in the NLEMs of India by CDSCO.

All these drugs were used as single agent analgesic for three hundred sixty (360) or 55.46% patients on the first postoperative day and the doses were within the recommended limits [17].

Three hundred and five patients were on combination of analgesics or 'multimodal analgesics'. Based on the combination use, our study shows that the most frequent combination was a synthetic opioid and NSAID (tramadol + paracetamol 8.62%). Dutta et al., showed a similar finding in a study done in eastern India [18]. It suggests that the combination may be beneficial in terms of reducing side effects as individual drug doses go down in combination use. To sum up, Tramadol and Diclofenac recorded high use as monotherapy in our study. The commonest combination was Tramadol and Paracetamol (8.62%) followed by Diclofenac and Paracetamol (7.85%).

As far as the trend of generic prescribing goes, it was observed only with the opioid analgesic tramadol. It was observed in 4.83% of all analgesics prescribed. The Medical Council of India has called upon for generic prescribing, but has a long way to go. Use

of some analgesics did not comply with that specified by NLEMs like piroxicam, pentazocine and aceclofenac. Patients prescribed analgesics from the NLEM were 81.94%. The PDD showed that most of the drugs were on the lower limit of RDD. This may be due to the lesser muscle mass or body mass index (BMI) in the Indian population [19].

## LIMITATION OF THE STUDY

Since the analgesic use was taken from the medical records, the pain assessment scores could not be implemented in our study. It was not done subjectively and therefore the correctness of the therapy remains conjectural. Moreover, this study involved a broader area including Surgery and allied departments, instead of which it could have been focused on a particular speciality.

## CONCLUSION

Pain assessment can be done using scales though with large subjective variability. This study is a retrospective one and throws some light regarding the prescribing trend for analgesics, the combinations used and their route of administration. Overall, it does not reveal improper drug/ drug combination use. Regular utilization studies on large population may throw light on the analgesic usage pattern, and also provide insights regarding modulation of analgesic therapy. Prescribing trends in any particular locale can get highlight which may educate new health professionals. The shortcoming was the inability to include the pain assessment methods in the study.

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