

Research Article**Drug Utilization Pattern of Anesthetics in a Tertiary care Hospital**Rejitha Thomas^{1*}, Anudeep Manne², Vinod Reddy², D, Gopinath. G²¹M Pharm, Department of Pharmacy Practice, the Oxford College of Pharmacy, Bangalore²Pharm D, Department of Pharmacy Practice, the Oxford College of Pharmacy, Bangalore

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ABSTRACT

Background: Anesthesia means 'loss of sensation'. Medications that cause anesthesia are called anesthetics. Anesthetics are used during tests and surgical operations to induce sleep, which prevents pain and discomfort and enables a wide range of medical procedures to be performed. **Objective:** To evaluate drug utilization pattern of anesthetics in a tertiary care teaching hospital. **Materials and methods:** The study was a Simple Prospective Observational study which was carried out for a period of six months. The patients were collected based on the inclusion and exclusion criteria. A total of 125 cases were collected in which anesthetics were administered for surgical procedures. In this study, the type of anesthetics mostly administered to patients whether single or in combination was evaluated. The gender, age of the patient, type of anesthetic and type of surgery performed were reported. The results were analyzed and evaluated. **Results:** A total of 125 anesthetic cases were collected. Of these, 51 (41.8%) were of General anesthesia and 74 (59.2%) were of Local anesthesia. Among the 125 cases, males were 67 (56.8%) and females were 58 (46.4%) underwent surgery which involved anesthetic usage. Among General anesthetics, Propofol (P), Nitrous Oxide (N), Isoflurane (I), Midazolam (M), Suxamethonium chloride (S), Vecuronium (V) were used in combination. PNIM was used in 23 (18.4%) cases. PNIS 16 (12.8%) of cases, PNIMV 12 (9.6%). Among Local Anesthetics, Bupivacaine (B), Lignocaine (L), Xylocaine (X) were used in combination or single. BLA 9 (7.2%) cases, BMXA 10 (8%) cases, Bupivacaine 35 (28%), Lignocaine 7 (5.6%) and Xylocaine 13 (10.4%). Based on surgery, the most commonly performed surgery was Hemorrhoidectomy 28 (22.4%). **Conclusion:** Evaluation of utilization of anesthetics and implementation of effective strategies can greatly aid in improving the quality use of anesthetics.

Keywords: anesthetics, utilization, hemorrhoidectomy.**INTRODUCTION:**

The term anesthesia means loss of all modalities of sensation, particularly pain, along with reversible loss of consciousness.¹

Anesthetic is a state which is considered to be a collection of "component" changes in behavior or perception. The components of anesthetic state include amnesia, immobility in response to noxious stimulation, attenuation of autonomic responses to noxious stimulation, analgesia, and unconsciousness.²

General anesthetics (GA) are drugs which produce reversible loss of all sensation and consciousness. The cardinal features of GA are loss of all

sensation, especially pain, sleep (unconsciousness) and amnesia, immobility and muscle relaxation, abolition of somatic and autonomic reflexes.³ The mechanisms of General anesthetics are unclear but these drugs usually increase the threshold for firing of Central Nervous system neurons. The potency of most inhaled anesthetics correlates positively with their lipid solubility. Possible action includes block of ion channels by interactions with membrane lipids or proteins, as well as effect on central neurotransmitter mechanisms. Central Nervous System neurons in different regions of the brain have different sensitivities to GA; inhibition of neurons involved in pain pathways occur before inhibition of neurons in the mid brain reticular formation.⁴

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Local Anesthetics (LA) are drugs which upon topical application or local injection cause reversible loss of sensory perception, especially of pain, in a restricted area of body. They block generation and conduction of nerve impulse at any part of the neuron with which they come in contact, without causing any structural damage. Thus, not only sensory but also motor impulses are interrupted when a LA is applied to mixed nerve, resulting in muscular paralysis and loss of autonomic control as well.⁵LAs block voltage dependant sodium channels and reproduce the influx of sodium ions, thereby preventing depolarization of the membrane and blocking conduction of the action potential. LA gain access to the receptors from the cytoplasm or membrane. Since the drug molecule must cross the lipid membrane to reach the cytoplasm, the more lipid soluble form reaches effective intracellular concentration more rapidly than with the ionized form. On other hand, once inside the axon, the ionized form of the drug appears to be the more effective blocking entity. Thus both the non-ionized and the ionized forms of the drug play important roles, the first in reaching the receptor site and second causing the effect. The affinity of the receptor site within the sodium channel, for the LA as a function of the state of the channel – whether it is resting, open, or inactivated.⁶

The World Health Organization (WHO) in 1997 defined drug utilization as the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences.⁷

Drug use is a complex process. In any country a large number of socio-cultural factors contribute to the ways drugs are used. In India, these include national drug policy, illiteracy, poverty, use of multiple health care systems, drug advertising and promotion, sale of prescription drugs without prescription, competition in the medical and pharmaceutical market place and limited availability of independent, unbiased drug information. The complexity of drug use means that optimal benefits of drug therapy in patient care may not be achieved because of underuse, overuse or misuse of drugs. Inappropriate drug use may also lead to increased cost of medical care, antimicrobial resistance, adverse effects and patient mortality.⁸

Studies on the process of drug utilization focus on the factors related to the prescribing, dispensing, administering and taking of medication, and its associated events, covering the medical and non-medical determinants of drug utilization, the effects of drug utilization, as well as studies of how drug utilization relates to the effects of drug use, beneficial or adverse. The therapeutic practice is expected to be primarily based on evidence provide an adequate basis for improving drug therapy.⁹

In recent years, pharmacists have been increasingly involved in many emerging areas of pharmacy in addition to drug therapy. Pharmacists are expected to share their knowledge in improving policy decision in hospitals. At drug therapy level, pharmacists may utilize their expertise in making choice of drugs include or exclude in the formulary based on pharmacoeconomics.¹⁰

In recent years, studies on drug utilization have become a potential tool to be used in the evaluation of health systems. The interest in drug utilization studies began in the early 1960s and its importance has increased since then because of increase in marketing of new drugs, wide variation in the pattern of drug prescribing and consumption, growing concern about delayed adverse effects and the increasing concern regarding the cost of drugs.¹¹

The role of clinical pharmacists is to ensure rational, effective and safe treatment for the patient in their care. This involves interacting with patient to identify the medicines they have been taking before they were admitted to hospital and educating patient on the use of their medicines when they leave the hospital. Pharmacists by virtue of their expertise and their mission of ensuring optimal patient outcomes, should work in the process of medicine use improvement through DUE.¹²

Thus DUE plays a key role in helping the health care system to understand, interpret and improve the prescribing, administration and use of medications. The principal aim of DU research is to facilitate rational use of drugs, which implies the prescription of a well-documented drug in an optimal dose on the right indication, with correct information and at an affordable price. It also

provides insight into the efficacy of drug use i.e., whether a certain drug therapy provides value for money. Drug utilization research can thus help to set priorities for the rational allocation of health care budgets.¹³

MATERIALS AND METHODS:

A six month prospective observational study was carried out in the anesthesiology department of The Oxford Medical College Hospital and Research center Bangalore. A total of 125 cases were collected in which anesthetics were administered for surgical procedures. Patients, both female and male of all age groups were included in the study. The anesthesia case sheets, prescriptions and case files of patients who have undergone an operation involving an anesthetic were documented in a suitably designed documentation form. In this study, the type of anesthetics mostly administered

to patients whether single or in combination was evaluated. The gender, age of the patient, type of anesthetic and type of surgery performed were studied. The results were analyzed and evaluated.

RESULTS:

In this study 125 cases involving anesthetic administration were included. The demographic characteristics of patients to whom anesthetics were administered based on age and gender are given in Table No. 1. Maximum number of anesthetics was administered in the age group of 31-40 years (33.6%) and the least in 0-10 (1.6%) and 71-80 (1.6%) age groups. Among all the 125 cases, males constituted 67 (56.8%) and females 58 (46%).

Demographic characteristics of patients undergone anesthetic administration based on age and gender.

Table 1: Age Distribution

Sl. no.	Patient characteristics	Number of cases	Percentage (%)
1	0-10	2	1.6%
2	11-20	11	8.8%
3	21-30	33	26.4%
4	31-40	42	33.6%
5	41-50	15	12.0%
6	51-60	12	9.6%

Table 2: Gender distribution

Sl. no.	Gender	Number of cases	Percentage (%)
1	Male	67	56.8
2	Female	58	43.2

Surgeries for which the anesthetics were administered are given in table 3.

Hemorrhoidectomy (22.4%) and others (22.4%), were common clinical surgeries in which anesthetics were administered in high percentage followed by Breast Fibroadenoma (15.2%), Tonsillectomy (12.8%), Fissurectomy (10.4%), Appendicectomy (9.6%) and Hernioplasty (7.2%).

Table 3: Surgeries in which the anesthetics were administered

Sl No	Surgery	No of cases	Percentage
1	Breast Fibroadenoma Excision	19	15.2%
2	Tonsillectomy	16	12.8%
3	Appendicectomy	12	9.6%
4.	Hernioplasty	9	7.2%
5.	Haemorrhoidectomy	28	22.4%
6.	Fissurectomy	13	10.4%
7.	Others	28	22.4%

The types of anesthetics used in tertiary care hospital are given in table 4. They are categorized into single anesthetic and combination usage. When the cases were screened thoroughly, it was found that the combination of anesthetics usage was preferred over single anesthetic administration.

Table 4: Type of anesthetics administered in various surgeries

SI No	Type of administration	Number of cases	Percentage (%)
1	Single anesthetic usage	55	44
2	Combination anesthetic usage	70	56

Table 5: Frequency of administration of GA and LA.

S. No.	Type of Anesthesia	Number of cases	Percentage
1.	GA	51	40.8%
2.	LA	49	59.2%

The frequency of anesthetics used in tertiary care hospital is shown in table. 6
 The most common GA anesthetic combination used was found to be PNIM 23 (18.4%) and the most commonly used LA was found to be Bupivacaine 35 (28%).

Table 6: Frequency of Anesthetics used.

S. No.	Anesthetic	Number of cases	Percentage
1.	PNIM	23	18.4%
2.	PNIS	16	12.8%
3.	PNIMV	12	9.6%
4.	Bupivacaine	35	28%
5.	Lidocaine	7	5.6%
6.	Xylocaine	13	10.4%
7.	BLA	9	7.2%
8.	BMXA	10	8.8%

DISCUSSION:

In a tertiary care hospital setting, the prominent use of anesthetics determines the fine outcome of various surgical procedures performed. The rational use of anesthetics has been reported to have reduced surgical complications. The administration of anesthetics by anesthesiologists depends upon the input from various sources like patients, anesthesia related problems, professional colleagues, academic literatures and government regulations. Ineffective use of these inputs can result in wide variety of administration errors.

The present study indicates the general trend of administration of anesthetics in the general surgery ward of tertiary care hospital.

Demographic characteristics showed that out of 125 patients in whom anesthetics were administered, 67 (56.8%) were male and 58 (46.4%) were female. The maximum amount of anesthetics were administered in the patients between the age group of 31 – 40 and least among 0 – 10 and 71 – 80. The most common surgery in which the anesthetics were administered was Hemorrhoidectomy (22.4%) followed by Breast Fibroadenoma excision (15.2%), Tonsillectomy (12.8%), Fissurectomy (10.4%), Appendicectomy (9.6%) and Hernioplasty (7.2%).

Because drugs are not given in isolation, the most common drug combinations were looked at. The various general anesthetics used are abbreviated as Propofol (P), Nitrous oxide (N), Isoflurane (I), Midazolam (M), Scoline (S) and Vecuronium (V). The combinations are PNIM, PNIS and PNIMV. Among them, PNIM was used in (18.4%), PNIS (12.8%), PNIMV (9.6%). In case Local anesthetics, the commonly used drugs were Bupivacaine (B), Lignocaine (L), Xylocaine (X) and the combinations used were BLA, BMXA. Among them, Bupivacaine was used in (28%), Xylocaine (10.4%), Lidocaine (5.6%), BMXA (8%) and BLA (7.2%).

When cases were screened thoroughly, it was found that number of cases of Monoanesthetic cases was (44%) and polyanesthetic cases were (56%). This shows that polyanesthetic administration was more preferred. Among the monoanesthetic cases, Bupivacaine (28%) was mostly used and in combinations PNIM (22.4%) in general anesthetics and BMXA (10%) in local anesthetics.

FUTURE DIRECTIONS:

The establishment of anesthesia record systems and databases is necessary in tertiary care hospitals which may help in assisting anesthesiologists in reducing the frequency of anesthetic related problems. Establishment of therapeutic guidelines, a constant monitoring of preoperative and postoperative condition of a patient reduces the threat during surgical procedures and other complications.

CONCLUSION

The present prospective study was carried out to assess the current trends in utilization patterns of anesthetics in various surgeries in the medical inpatient and departments of The Oxford Medical College, Hospital and Research centre, Bangalore. In this study, post analysis of 125 case sheets, it was found that number of cases of Monoanesthetic cases was (44%) and polyanesthetic cases were (56%). This shows that polyanesthetic administration was more preferred. Among the monoanesthetic cases, Bupivacaine (28%) was mostly used and in combinations PNIM (22.4%) in general anesthetics and BMXA (10%) in local anesthetics. The most common surgery in which the anesthetics were administered was

Hemorrhoidectomy followed by Breast Fibroadenoma excision.

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CONFLICT OF INTEREST:

The authors declare no conflict of interest

ABBREVIATION:

GA: General Anesthetics

LA: Local Anesthetics

WHO: World health Organization

DUE: Drug Utilization Evaluation

PNIM: Propofol (P), Nitrous oxide (N), Isoflurane (I), Midazolam (M)

PNIS: Propofol(P), Nitrous Oxide (N), Isoflurane (I), Suxamethonium Chloride (S)

PNIMV: Propofol(P), Nitrous Oxide (N), Isoflurane (I), Midazolam (M), Vecuronium(V)

BLA: Bupivacaine (B), Lidocaine (L) with Adrenaline (A)

BMXA: Bupivacaine (B), Midazolam (M), Xylocaine (X) with Adrenaline(A)

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