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Drug Utilization Pattern in Neonatal Intensive Care Unit in a Tertiary Care Teaching Hospital - A Retrospective Study



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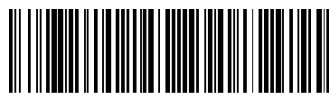
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ABSTRACT

Neonatal intensive care unit management (NICU) is a highly specialized unit that provides high-quality, skilled care to premature, low-birth-weight, or critically ill newborns. Hence, the study is being carried out to investigate drug use in the NICU at Navodaya Medical College Hospital & Research Centre, Raichur, Karnataka, India. A retrospective hospital-record-based study was conducted in the Department of Neonatal Intensive Care Unit at NMCH & RC. The study was carried out for a duration of 3 months (April 2024 to June 2024) after receiving clearance from the medical superintendent. The data was collected from the Medical Records Department. A total of 52 neonates, comprising 27 (51.9%) females and 25 (48.07%) males, were included in the study. The most frequent reasons for admission in the hospital were small for gestational age (SGA) (21.1%), followed by low birth weight (11.5%), respiratory distress syndrome (9.61%), neonatal hyperbilirubinemia, and sepsis (4 patients each), which are comparable to a study conducted by Choure et al. (2009). The drug(s) prescribed to each newborn ranged from 1 to 6 in number; a total of 88 drugs were prescribed. This study gave us an overall pattern of drug use profiles in a tertiary care NICU and reflected the problems for which neonates were admitted to the hospital. Prenatal care to prevent preterm delivery is one of the most important factors in reducing the rate of hospitalization and treatment costs.



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INTRODUCTION

Medicines play a pivotal role in improving neonatal health and reducing mortality, and thus are widely used in neonatal units.¹ Neonates are a vulnerable group of patients and are particularly susceptible for adverse drug reactions owing to their unique pharmacodynamic and pharmacokinetic responses because of the relative immaturity of various organ functions. Furthermore, they have a rapid changing body surface area and weight, a rapidly developing system of drug absorption, metabolism, and excretion, and an inability to communicate with the provider.^{2,3} Needless to say, a special caution is required while using any medications in newborns.

A Neonatal intensive care unit (NICU) is a highly specialized unit that provides high quality skilled care to premature, low-birth weight, or critically ill newborn. Apart from facilities for continuous clinical and biochemical monitoring and the life-support systems, the neonatal intensive care management (NICU) involves the use of a wide range of medications with well defined and specialized therapeutic objectives.⁴

The World Health Organisation (WHO) defines Drug Utilization as “the marketing, distribution, prescription and use of drugs in a society with special emphasis on resulting medical, social and economic consequences”.⁵ Drug utilization evaluation (DUE) is defined as an authorized, structured, ongoing review of prescribing, dispensing and use of medicines. DUE encompasses a drug review against pre-determined criteria that results in changes to drug therapy, when these criteria are not met. It involves a comprehensive review of patient’s prescription and medication data before, during and after dispensing to ensure appropriate medications decision making and positive patient outcome.⁶

In spite of many advances in neonatal care, currently, there are no standardized guidelines for the rational prescribing and individualizing the medication regimen in NICU. Moreover, the use of certain drugs in some NICUs, maybe an ‘off-label’ means beyond the approved indications, and also their safety is not being clearly established in high-risk neonates.^{7,8}

Drug utilization studies in NICUs optimize drug therapy by ensuring accurate dosages and tailored treatments for neonates. They enhance safety by monitoring and minimizing adverse effects, and they promote rational drug use, ultimately improving neonatal health outcomes. There are few drug utilization studies on NICU admitted patients. Neonate is a group of patients who are more susceptible to drug interactions and adverse effects, and special care

should be taken when prescribing medications to them. Hence, the study is being carried out to investigate the drug use in NICU at NMCH & RC, Raichur.

MATERIALS AND METHODS:

A Retrospective hospital-record based study was conducted in the Department of Neonatal Intensive Care Unit at Navodaya Medical College Hospital & Research Centre, Raichur, Karnataka, India. The study was carried out for a duration of 3 months (April 2024 to June 2024) after receiving clearance from Medical Superintendent. The retrospective approach allows for efficient use of existing medical records to quickly gather comprehensive data on drug use patterns and neonatal health outcomes without additional risks or resource demands. This method provides timely and cost-effective insights into NICU management. Data of neonates admitted to NICU over the past one year January 2023 to December 2023, receiving one or more medications was collected from the Medical Records Department. Individual recordings in the register that were improperly filled were excluded from the study. Data extraction sheets were used to collect the information regarding demographic details, maternal and delivery details, indication for admission, final diagnosis and medications administered. The collected data was analysed using an Excel Programme. Microsoft Excel was used for the statistical analysis of the results.

RESULTS:

The study includes a total of 52 neonates, comprising 27(51.9%) female and 25(48.07%) male (Figure 1). Out of 52 neonates included in the study, 36 were in term, 11 were pre-term and 5 were post-term (Figure 2).

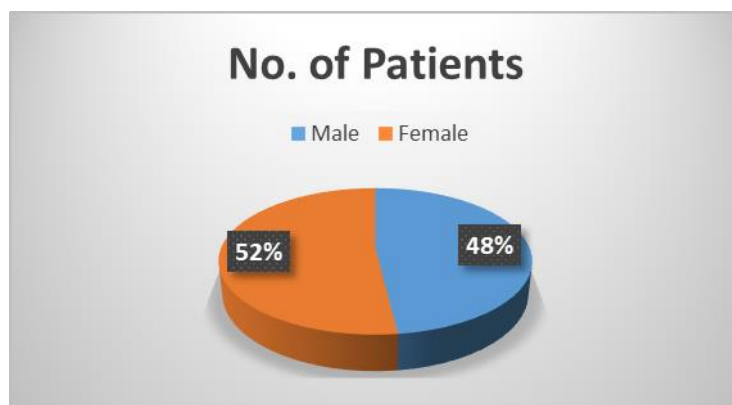


Figure No:1 Distribution of Neonates based on Gender

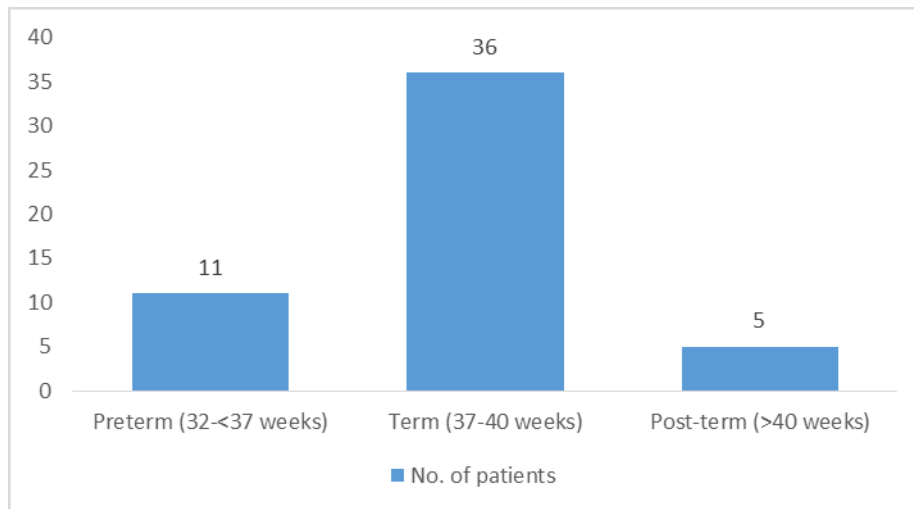


Figure No: 2 Distribution of Neonates based on Gestational age of delivery

Out of 52 patients, 29 were born by vaginal delivery and 23 were born by caesarean section. Among the patients, 41 were appropriate for gestational age (AGA), while 11 were small for gestational age (SGA).

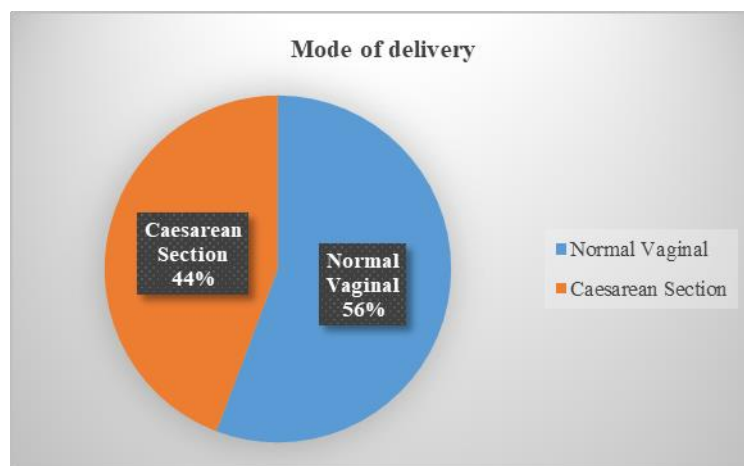


Figure No: 3 Mode of Delivery

Analysis of the clinical indication for admission at the NICU showed that small for gestational age (SGA) (21.1%) followed by Low birth weight (11.5%), respiratory distress syndrome (9.61%), neonatal hyperbilirubinemia and neonatal sepsis (4 patients each), were the common clinical indications.

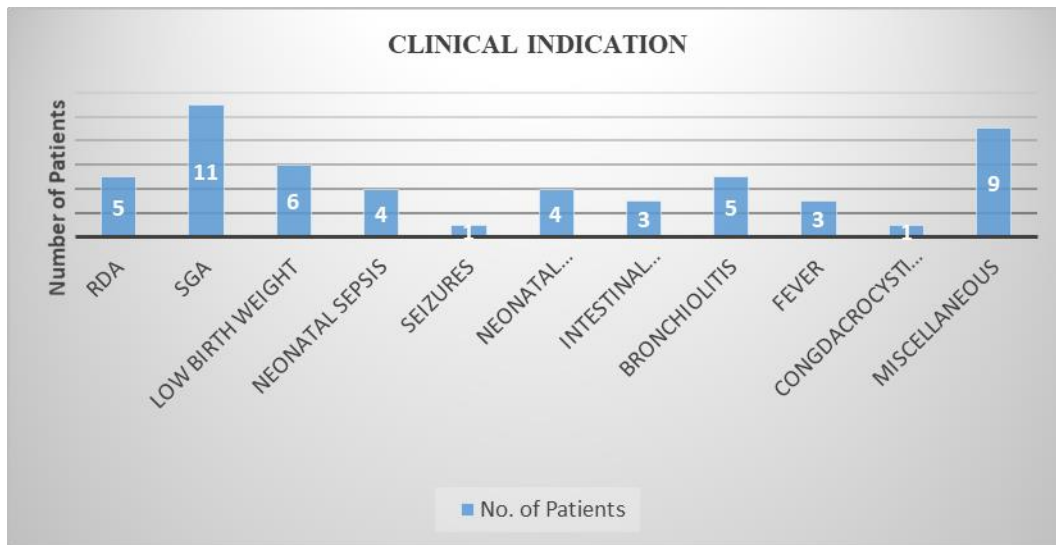


Figure No:4 Clinical Indications for NICU admission

As for the drugs used, while the drug(s) prescribed to each newborn ranged from 1 to 6 in number, a total of 88 drugs were prescribed in all. The most frequently prescribed therapeutic class of drugs was vitamins and minerals (60.81%), followed by antimicrobials (25.67%). Out of all antimicrobial, the most frequently prescribed agent belongs to the aminoglycosides group (Amikacin - 16.6%), and Penicillin + β lactamase inhibitor (Piperacillin+ tazobactam - 16.66%) respectively.

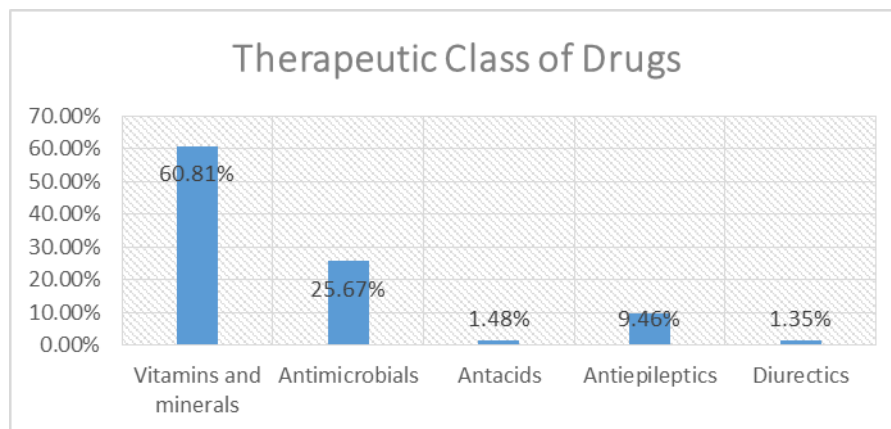


Figure No:5 Major Therapeutic Class of Drug Prescribed

Table No: 1 Drug Utilization Evaluation in NICU

The table depicts the drug utilization in Neonatal Intensive Care Unit.

Drug	No. of times prescribed	% use
Inj Augmentin	1	1.26%
Inj Amoxiclav	2	2.53%
Inj Calcium gluconate	5	6.32%
IVF dextrose	6	7.59%
Inj Gentamicin	2	2.53%
T Sildenafil	2	2.53%
Syp Calcimax	9	11.39%
Ultra D3 drops	11	13.90%
IVF EP	4	5.06%
Inj Ampicillin	2	2.53%
Inj Midazolam	3	3.79%
Inj Phenobarbitone	3	3.79%
Inj Rantac	2	2.53%
Inj PCT	2	2.53%
Navision drops	3	3.79%
A to Z drops	6	7.59%
Inj Amikacin	3	3.79%
Inj Piptaz	3	3.79%
Inj Dexona	1	1.26%
Inj Lasix	1	1.26%
Inj Fluconazole	1	1.26%
Tobramycin drops	2	2.53%
Inj Meropenem	1	1.26%
Inj Linezolid	1	1.26%
Heparin infusion	1	1.26%
Inj Leviteracetam	1	1.26%
T- Bact ointment	1	1.26%

DISCUSSION

Recent advances in prenatal care have resulted in an increase in drug exposure rates in pregnant mothers, causing infants to be exposed to a multitude of different drugs, even when in utero. Drug Utilization study is an effective mechanism to identify individual variability in drug use and to promote interventions that will improve patient outcomes. Neonate is a group of patients who are more susceptible to drug interactions and adverse effects, and special care should be taken when prescribing medications to them. Hence, the study is being carried out to investigate the drug use in NICU at NMCH & RC, Raichur.

Data indicated that 48% of patients were male and 52% were female. Unlike our results, Choure et al. conducted a study on 220 neonates, in which male neonates (53.6%), outnumbered female neonates (46.4%). Among the patients, 21.15% were preterm, 69.23% were term and only 9.61% were post-term, this data was found to be similar to a study conducted by Namdarifar F et al.

Distribution of patients based on the birth procedure showed that 56% were born by normal vaginal delivery and 44% were born by caesarean section.

The most frequent reasons for admission in NICU were small for gestational age (SGA) (21.1%) followed by Low birth weight (11.5%), respiratory distress syndrome (9.61%), neonatal hyperbilirubinemia and neonatal sepsis (4 patients each), which is comparable to a study conducted by Choure et al. These results indicate that prenatal care to prevent preterm delivery is one of the most important factors in reducing the rate of hospitalization and treatment costs.

The most frequently used medication was Vitamin and minerals (60.81%) and antimicrobials, followed by Antiepileptics (9.46%). Antibiotics were the second most prescribed drugs. In different types of antibiotics, amikacin and piperacillin + tazobactam were commonly administered. Higher incidence of antibiotic exposure in NICU could be due to common practice of instituting empirical therapy and can be attributed to higher incidence of infections. However, inappropriate use of antibiotics can lead to emergence of resistance.

CONCLUSION

This study gave us an overall pattern of drug use profile in a tertiary care NICU and reflects the problems for which neonates were admitted to NICU. Antibiotics were of major concern. Similar studies done on larger scale and at regular intervals can reflect the changing pattern of drug prescribing which may help authorities in planning necessary drugs available.

LIMITATIONS

The data is collected from a single institute. Large scale, multicentered studies are needed.

ACKNOWLEDGEMENT

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVAITIONS

AGA - Appropriate for Gestational Age

DUE - Drug Utilization Evaluation

NICU - Neonatal Intensive Care Unit


NMCH & RC - Navodaya Medical College Hospital & Research Centre

SGA - Small for Gestational Age

WHO - World Health Organization

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