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Original Research Article

Drug Prescription Trends in Neonatal Intensive Care Unit (NICU) at a Tertiary Care Private Teaching Hospital in Central India

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Abstract:

Context: Neonatal intensive care units (NICUs) treat critically ill or premature newborns. A variety of medications are used in neonatal intensive care units. Lack of knowledge about these drugs and unethical marketing of these drugs lead to irrational prescriptions in clinical practice.

Aims: To determine drug prescribing trends in NICU at a tertiary care private teaching hospital.

Settings and Design: A retrospective observational study was conducted in a NICU of teaching hospital during the period of 1st January 2021 to 31st December 2021.

Methods and Material: All new-born admitted to the NICU during the study period are included in this study. Demographic information, delivery details, the purpose of admission, final diagnosis, and medication prescribed was collected from case sheets. As per the WHO-ATC classification system, prescribed drugs are divided into different categories based on their effects on different organs and system.

Statistical analysis used: The data collected was entered in Excel and analyzed with the help of SPSS ver 2020. Descriptive statistics were used in the form of percentages and proportions were used to express the results.

Results: Total 657 neonates admitted in NICU during the study period. 54.2% were males and 45.8% were females. Total number of drugs prescribed was 2484 and average number of drugs per neonate was 3.78. Low birth weight (2.5 kg) and preterm birth (37 weeks) were significantly more exposed to drugs. Neonatal sepsis was the most common morbid condition observed (39.3%), followed by birth asphyxia (12.7%) and neonatal jaundices (11.4%). In the majority of cases, antibiotics were prescribed to neonates, and among antibiotics, ampicillin was the most commonly prescribed medicine.

Conclusions: Periodic surveys should be conducted over time in order to facilitate rational drug use in neonates due to their immature bodies and to avoid adverse drug reactions in neonates.

Keywords: Neonates, NICU, Rational drug use, Drug prescription.

Introduction

New-born who are critically ill, premature, or of low birth weight require specialized care in neonatal intensive care units (NICUs). The neonatal intensive care unit uses a wide range of medications in addition to continuous clinical and biochemical monitoring. [1] Infants and newborn are discouraged from taking part in drug trials, so there is little information available about the pharmacokinetics and pharmacodynamics of drugs in them. [2] Neonates, especially preterm neonates, are most vulnerable. A premature baby often has multiple morbidities and requires intensive medical attention due to his or her immaturity and difficulty adjusting to life outside the womb. It is important for a baby to survive the first few days and weeks of its life, whereas term neonates are usually admitted for postnatal complications. [3] The world market is filled with a growing number of pharmaceutical products, so there has been a rise in both the consumption of the drugs and the expenditure on them. There is a high rate of irrational prescriptions of drugs in clinical practice due to a lack of knowledge about them and unethical marketing of these drugs. Monitoring prescriptions and drug utilization studies could

identify problems and provide prescription writers with feedback. [4]

A growing amount of antibiotic resistance has been linked to the overuse, misuse, and excessive use of antibiotics, which is a major public health concern. Research has shown that inappropriate antimicrobial selection is directly responsible for resistance. It is necessary to develop and enforce improved antibiotic guidelines based on the microbial aetiology and sensitivity of neonatal sepsis. [5] It is imperative that drugs are prescribed rationally in developing countries since limited funds are available for medical care and drugs. Only a few studies on medication utilization in neonates have been conducted, most of which have been conducted in adult patients.

As far as rational prescription in neonatal intensive care was concerned, there were no universally accepted and standardized guidelines. [6] We examined the pattern of drug use in neonates admitted to a tertiary care NICU over a one-year period. Our study aimed to determine drug utilization patterns in neonatal intensive care units (NICUs). The results of our study can be used to develop evidence-based prescribing guidelines for NICU patients.

This will help in optimizing the utilization of drugs in neonates, thereby reducing the risk of adverse drug reactions and improving clinical outcomes. We examined the pattern of drug use in neonates admitted to a tertiary care NICU over a one-year period.

Subjects and Methods:

This is a record based retrospective study was conducted in a NICU attached to a private medical college in central India during the period 1st January 2021 to 31st December 2021. This study included all newborn admitted to the NICU during the study period, whether born inside or outside a medical college. A review of the case sheets, investigation reports, and treatment provided to all neonates admitted during the study period was conducted after approval from the institutional ethics committee. During the data extraction process, demographic information, delivery details, the purpose of admission, final diagnosis, and medication was collected. We recorded all drugs given to the neonates, except intravenous fluids, nutritional supplements, vaccines, topical medications, oxygen, and blood products. According to the WHO-ATC classification system, prescribed drugs are divided into different groups based on their effects on different organs and systems or their therapeutic and chemical characteristics.

Statistical analysis:

Recorded data was entered in Microsoft excel sheet and analysed using SPSS-20. Results were expressed in terms of descriptive statistics.

Results:

The study includes 657 neonates admitted during study period. Out of which 356 (54.2%) were males and 301 (45.8%) were females. Majority of neonates were term accounting for 75.7% while 24.3% were preterm. 71.25% neonates were with normal birth weight while 28.75% were low birth weight.

Table 1: Distribution of general characteristics study population

Sr. no.	Characteristics		N=657	Percentage
1	Gender	Male	356	54.2%
		Female	301	45.8%
		Total	657	100%
2	Gestational period	Full term (>= 37 weeks	497	75.7%
		Pre-term (< 37 weeks)	160	24.3%
		Total	657	100%
3	Birth weight	>2.5 kg	468	71.25%
		1.5 – 2.5 kg	121	18.45%
		<1.5	68	10.3%
		Total	657	100%

Neonatal sepsis was the most common morbid condition observed (39.3%), followed by birth asphyxia (12.7%) and neonatal jaundice (11.4%).

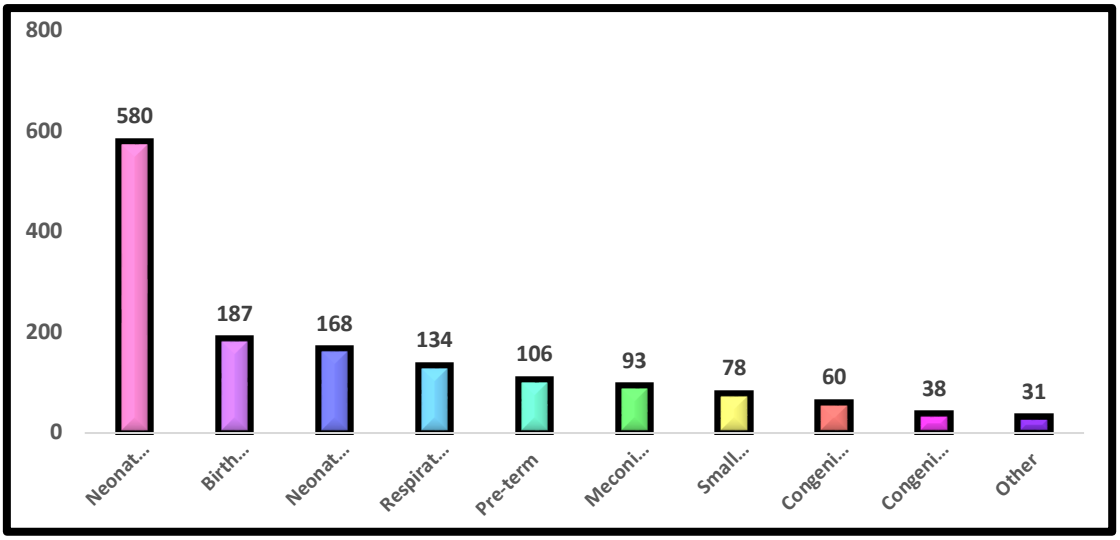

Figure 1: Distribution of morbidities in NICU neonates

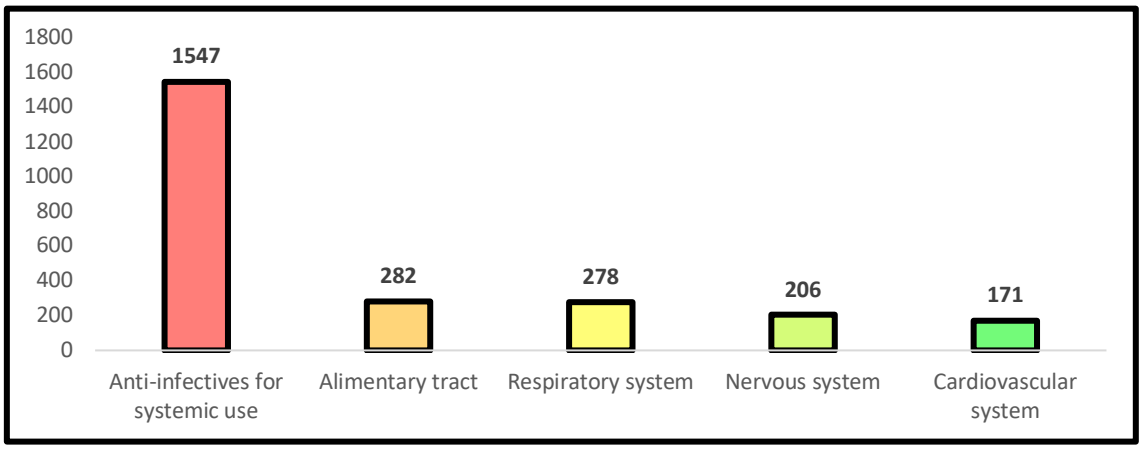

Figure 2: Utilization of drugs as per WHO-ATC classification system

In the majority of cases, anti-infectives (62.3%) were prescribed to neonates, and among anti-infectives ampicillin was the most commonly prescribed medicine.

Table 2: WHO core indicators

Who core indicators	Number / Percentages
Total no. of drugs prescribed	2484
Average no. of drugs per neonate	3.78
Percentage of drugs prescribed by generic name	83%
Percentage of antibiotics prescribed	62.3%
Percentage of injectables prescribed	89%

Total number of drugs prescribed was 2484 and average number of drugs per neonate was 3.78.

Discussion

Our study assessed the pattern of 2484 drugs prescribed to 657 neonates admitted to Neonatal Intensive Care Unit over a period of one year. Out of 657 neonates admitted in NICU, 54.2% were male which is in consistent with study done by Brijal et al, Choure et al and Jayaram KB et al in which 60.92%, 54.3% and 53.75% were male neonates respectively. [1,7,11] Gender discrimination in public health care and the need to immediately educate people about gender discrimination in the early stages of life are linked. It is important to pay special attention to neonates during the early neonatal period when they are susceptible to several conditions such as asphyxia, infection, and complications of premature birth. The majority of neonates admitted to NICUs had neonatal sepsis (39.3%), a finding that is consistent with a study by Brijal et al and Jayaram KB et al.[7,11] As shown in Table 2, WHO's core indicators for assessing drug utilization and setting a baseline for assessing disease management and drug selection are some of the strategies given by WHO. It shows that average number of drugs per neonate as 3.78 which is similar to a study by

Choure et al, and yet another reported average number of drugs per encounter as 4.8.[1,9,11] The majority of prescriptions during the study period were for antibiotics (62.3%), followed by alimentary system (11.3%) and respiratory system (11.2%). This is comparable to the study done by Neubert et al, in which 90% of the drugs prescribed were anti-infectives followed by respiratory and nervous system drugs. [3] Similarly Kashyap AS et al encountered 66.2% of the drugs prescribed were antibiotics followed by hematopoietic system drugs and nervous system drugs. [12] As of the end of the study, there were 1547 encounters with antibiotics, accounting for 62.3% of total drug prescriptions. Another studies showed 64.5%, 65.07% and 66.2% of neonates had been exposed to antibiotics. [7,8,12] NICUs are more likely to be exposed to antibiotics due to common practice of empirical therapy and lower literacy rates, as well as higher incidences of infection.[1] The most commonly prescribed antibiotics were ampicillin (63%), gentamycin (32.3%), cefotaxime (17.2%) and amikacin (16.7%) in the present study, which is comparable with another study conducted in India by Vaghela et al and Jayaram KB et al. [8,11] The same results were observed in other studies in which penicillin and aminoglycosides were commonly prescribed. [10]

In addition to framing hospital formularies and standard treatment guidelines according to the diagnosis, drug utilization studies are also beneficial for rationalizing drug use in countries with poor health systems so that treatment is affordable and beneficial to patients. Its strength is that it contributes to a broader assessment of the safety and efficacy of NICU drug prescription.

Conclusions

Study findings indicated that most of the drugs prescribed were for infection prevention and treatment. In addition, the results indicated that there were no evidence-based guidelines for the rational use of drugs in neonates. To conclude, periodic surveys should be conducted over time in order to facilitate rational drug use in neonates due to their immature bodies and to avoid adverse drug reactions in neonates. Therapeutic treatment guidelines are essential for preventing overuse of antibiotics and rationalizing drug use.

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