

PHLEBOTOMY BLOOD LOSS IN HOSPITALIZED NEONATES

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ABSTRACT

The care of neonates, especially preterm and extremely preterm infants in neonatal units, requires increasing blood investigations, which results in significant blood withdrawal from these neonates. This blood loss can lead to substantial anemia that may sometimes necessitate transfusions. This study aimed to assess the extent of blood loss in hospitalized neonates at a tertiary care hospital. It is a cross-sectional study using convenient sampling of 100 neonates. Data collected included baseline clinical information, delta hematocrit (discharge hematocrit minus admission hematocrit), volume of phlebotomy, RBC transfusions, number of tests, phlebotomy counts, and outcomes. The mean delta hematocrit was $8.14 \pm 5.60\%$, and the mean blood volume drawn through phlebotomy was 8.07 ± 4.96 ml (range: 1-21 ml). The average number of phlebotomy procedures was 3.40 ± 2.61 , and the average number of tests was 8.01 ± 5.31 . Eleven neonates required RBC transfusions. Neonatal units should evaluate their phlebotomy practices to reduce blood loss and prevent anemia of prematurity.

INTRODUCTION

In India the neonatal care is witnessing great improvements in recent years.^[1] The survival of preterm and low birth weight neonates has improved. The care of neonates, especially the preterm and extreme preterm neonates in neonatal care units, demands a larger number of blood investigations. These investigations require a significant amount of blood withdrawal from the neonates.^[2] The amount of blood drawn is influenced by factors such as duration of hospitalization, severity of illness, level of care, co-morbidities, lower gestational age and low birth weights. This blood loss leads to anemia, which is sometimes significant enough to warrant red cell transfusions.^[3] Many neonates who have graduated from the neonatal care unit after a prolonged duration of hospitalization, have anemia of prematurity.^[4] The anemia of prematurity is associated with many short-term and long-term neuro-developmental morbidities. There are many ways to reduce the blood loss reported in studies, use of smaller volume tubes, point of care testing and the use of non-invasive equipment like trans cutaneous bilirubinometer.^[5]

MATERIALS AND METHODS

In our neonatal unit, we conducted a study to estimate the extent of phlebotomy loss in neonates. It was a cross-sectional study with convenient sampling of 100 neonates admitted between November 2024 to January 2025. All neonates, term and preterm, inborn and outborn, were included. Neonates with major

congenital anomalies and chromosomal anomalies were excluded. Consent was obtained from parents. Institutional human ethics committee approval was obtained. The clinical data, including gestational age, birth weight, diagnosis, duration of hospitalization, on-admission hematocrit, on-discharge hematocrit, delta hematocrit (on-discharge hematocrit minus on-admission hematocrit), Red Blood Cell (RBC) transfusions, bleeding manifestations, and outcome, were collected. The collected data was tabulated and analysed statistically.

RESULTS AND DISCUSSION

The clinical profile of the study group is summarized in Table 1. The average gestational age was 34.41 ± 3.58 weeks, and the average birth weight was 2086.99 ± 801.31 grams. The average length of hospitalization was 5.52 ± 3.80 days. About 10% of neonates exhibited bleeding manifestations, and an 11% mortality rate was observed. The most common reasons for admission were respiratory distress syndrome (42%) and perinatal hypoxia (22%). The mean delta hematocrit was $8.14 \pm 5.60\%$, and the average blood volume obtained from phlebotomy was 8.07 ± 4.96 ml (Range: 1-21 ml). The mean number of phlebotomies was 3.40 ± 2.61 , and the average number of tests performed was 8.01 ± 5.31 . Eleven neonates required RBC transfusion.

The mean phlebotomy volume varies from study to study depending on the level of care, proportion of preterm and extreme preterm neonates, duration of stay and

diagnosis. In a study by Tyagi in India, the median blood loss by phlebotomy was 7(5,11) ml.^[6] A study by Agarwal et al reported that overdraw is an important contributor to phlebotomy loss, and they have reported overdraw to the extent of 300% in some neonates.^[2] For anemia of prematurity, the phlebotomy blood loss is an important contributor.^[3] The limitation of this loss will minimise anaemia of prematurity and its associated neuro-developmental consequences. The neonatal care

units should explore the ways to minimize this phlebotomy loss, including the use of small volume blood collection tubes, point of care testing, consolidating tests, minimizing the overdraw and training the phlebotomists.^[4] All the neonatal units should evaluate the phlebotomy practices in their units to minimize the phlebotomy blood loss and its consequent anemia of prematurity.

Table 1: Clinical profile of the study group.

Characteristic	Mean or Percentage
Mean gestational age (weeks)	34.41 ± 3.58
Mean birth weight (grams)	2086.99 ± 801.31
Mean hospitalisation days	5.52 ± 3.80
Bleeding manifestations	10%
Outcome – Expired	11%
Diagnosis	
Respiratory distress syndrome	42%
Perinatal Asphyxia	22%
Meconium aspiration syndrome	10%
Others	26%
Mean On-admission Hematocrit (% %)	52.48 ± 6.67
Mean On-discharge Hematocrit (%)	44.35 ± 7.76
Mean Delta Hematocrit (%)	8.14 ± 5.60
Mean Phlebotomy Volume (ml)	8.07 ± 4.96 (Range: 1-21ml)
Mean Phlebotomy count (no)	3.40 ± 2.61
Mean tests (no)	8.01 ± 5.31
RBC transfusion (no)	11%

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