



Direct-Push Blood Transfusion Practice in the Neonatal Unit of a Tertiary Hospital in South-South, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Introduction: Transfusion of blood is a life-saving intervention in the care of ill neonates. Donated blood is a scarce national resource and must be used in the most efficient way. Exchange blood transfusion using the blood bag is the commonest mode of blood delivery employed. Other modalities of safe and sustainable blood delivery should also be explored, especially where paucity of funds predominates. This study aims to assess the usefulness of the direct push method where applicable, as an alternative to blood bag delivery in neonatal units of resource poor settings.

Methods: A two year retrospective study of newborns admitted in the neonatal wards of the University of Uyo Teaching Hospital. Data obtained were the age, gender, indication for admission, packed cell volume (PCV) before and after transfusion. Blood transfusion was done in aliquots over 24 hours under aseptic conditions, via a peripheral vein. The push and pull method was employed, with no anticoagulant in the syringe. Post-transfusion PCV was done at least 24 hours after the procedure.

Results: Of the one thousand and seventy-seven (1077) admitted neonates, two hundred and thirty-nine (22.2%), received blood products. Of these, twenty-one (8.8%), received a direct whole blood transfusion. Age (days) of the neonates transfused ranged from 1 to 26 days, with a mean of 10.4 ± 8.13 . The Packed Cell Volume (PCV) pre-transfusion ranged between 20% - 44%, with a

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mean of 30.05 ± 6.39 while post-transfusion PCV ranged between 31% to 51%, with a mean of 38.17 ± 5.52 (Fig. 1). The commonest indication for transfusion was prematurity, 9(42.8%) and neonatal sepsis 5 (23.8%).

Conclusion: The direct transfusion of blood occasionally used, seems a relatively safe practice to correct mild/moderate anaemia. It also provides sufficient blood, with the advantage of usage when the umbilical cord access is no longer feasible and where cost of blood would otherwise, hinder quick intervention. This practice may need further evaluation by other centers.

Keywords: Blood transfusion; anaemia; neonatal.

1. INTRODUCTION

Transfusion of blood is a life saving intervention in the newborn period. It is often indicated for various reasons in infants requiring hospitalization. Indications for transfusion in the newborn include severe neonatal jaundice, anemia of prematurity, haemorrhagic disease of the newborn and disseminated intravascular coagulopathy amongst other conditions [1,2,3]. Work done in different regions show that a great percentage of preterm babies, especially the extremely low birth weight usually require some form of transfusions. Exchange blood transfusions using the standard blood bag packaging is the common mode of blood delivery employed in the correction of anaemia, management of hyperbilirubinemia, and many other conditions requiring transfusion [4-8].

With the unacceptably high percentage of newborn mortality in Nigeria, and the importance of reducing significantly these deaths, it has become imperative to source for the most sustainable yet safe alternative to urgently intervene in life-saving transfusions when necessary amidst the paucity of funds as is almost always seen in these settings. This is expedient because care givers of many neonates who require transfusion do not always have the resources nor timely access to safe blood, yet providing safe and adequate blood should be an important and integral component of every country's national health care policy and infrastructure [9-11].

Donated blood is a scarce national resource and must be used in the most efficient and effective way. Children account for a high proportion of blood usage in low income countries [12]. Moreover, paediatric transfusions have unique aspects different from adults with respect to transfusion decisions, indications and doses which should all be taken into consideration when evaluating clinical blood transfusion in this age group [12]. Exchange blood transfusions

using the standard blood bag packaging is the commonest mode of blood delivery employed by most neonatal units, but there is need to explore other modalities of safe and sustainable blood delivery to neonates, especially where paucity of funds predominates and financing of wholistic care is still far-fetched. The direct blood transfusion method could be found a useful alternative where applicable to treat anaemia, while reducing significantly cost implications. This direct transfusion requires donor-recipient proximity and relies on quick transference to mitigate clotting [13].

Multiple small-volume transfusions are often required in most neonatal intensive care units to cater for many pre-term infants who require prolonged hospitalization for various clinical problems including anaemia. Subsequently, exposure to multiple donors in red blood cell transfusion causes concerns due to the high risk of transfusion-transmissible infections [14]. Therefore, to reduce the exposure rate of these vulnerable neonates, and avoid wastage of large volume of blood, single donor program is a remarkable strategy to achieve cost-effective neonatal transfusion [14]. The advantage is that, whenever transfusion is required, an appropriate blood volume from the donor is directly transfused to the recipient neonate.

Reducing wastage of blood supplies which this method offers, as well as reducing the risk of multiple donors eventually improves cost effectiveness which is an important consideration to improving overall child health indices. Thus, this study aims to assess the usefulness of employing the direct push method where applicable, as an alternative to the blood bag delivery in neonatal units of resource poor settings.

2. MATERIALS AND METHODS

A two year retrospective review of records of newborn babies admitted between January 2017

to December 2018 was done. Records of all neonates who were transfused on account of anaemia using the direct blood transfusion method, were extracted. Data obtained were the age on admission, gender, indication for admission/transfusion, packed cell volume (PCV) before and after transfusion. Blood screening was performed according to quality system requirements. All blood donations were screened for infections such as hepatitis B, hepatitis C, HIV and Syphilis. Blood samples of the donors were properly screened and matched against both the baby and the mother's. Under aseptic conditions, each of the neonates received whole blood at 20 mls per kilogram body weight in 3 to 4 aliquots given 6 to 8 hours apart using a peripheral vein. This was done via the push and pull method from the donor to the recipient using a disposable syringe.

The procedure was well tolerated with documentation of vital signs before, during and after the procedures. None of the neonates had a transfusion related adverse reaction. Subsequently, their post transfusion packed cell volumes were done at least 24 hours after the procedure, and it showed an increment in the values, indicating correction of anemia.

2.1 Data Analysis

Data generated was entered into the computer, and analysis carried out with the Microsoft Excel. Descriptive statistics was used to present the data. Frequency tables and percentages were also used to present the results.

3. RESULTS AND DISCUSSION

Of the one thousand and seventy-seven (1077) neonates admitted in the study period, two hundred and thirty-nine (239), constituting 22.2% received blood products. Of these, twenty-one (21) [male =7, female =14], representing 8.8% received a direct whole blood transfusion. The gestational age at birth ranged from 26 to 42 completed weeks, with a mean of 35.4 ± 4.89 weeks. Age (days) of the neonates transfused ranged from 1 to 26 days (Table1), with a mean of 10.4 ± 8.13 days. Fig. 1 shows that the pre transfusion Packed Cell Volume (PCV) ranged between 20 and 44, with a mean of 30.05 ± 6.39 while post-transfusion PCV ranged from 31 to 51, with a mean value of 38.17 ± 5.5 .

The present study showed that 22.2% of admitted newborn babies needed blood

transfusion. This finding is comparable with another study in Ogun state, south-west Nigeria, which recorded 27.9% in neonatal transfusions [15].

It is however higher than the 11.7% documented from another hospital in Ogbomoso, still in south-western Nigeria [16] and studies by Pam et al in Jos, northern Nigeria which documented 16.5% neonatal transfusions. It is lower than the 30.8% reported by Ayede et al. [17].

It has been documented that neonates are one of the most groups of patients needing transfusion in many hospitals. This need results from a lot of factors including the relative quiescence of the bone marrow, in the neonatal period which accounts for the relatively high incidences of anaemia in this age group.

Table 1. Age of directly transfused neonates (days)

Age (days)	N (%)
0 -7	9 (42.8)
8-14	6(28.6)
15- 21	5 (23.8)
22 – 28	1 (4.8)
Total	21 (100.0)

The finding in this study which indicates preterm infants as the dominant group needing blood transfusion had been earlier documented by several researchers [16,18,19,17,20,21]. Also, neonatal sepsis, severe birth asphyxia and neonatal jaundice were respectively noted as common causes of neonatal transfusion. This is similar to reports from studies in Ogbomoso and Ibadan, both in south-west Nigeria [16,18]. They also had prematurity ranking as the highest cause of neonatal transfusion, as well as neonatal sepsis.

Preterm infants are among the most frequently transfused groups in the neonatal units. The aetiology of anaemia in these age group may be physiological or pathological. A majority of them experience an exaggerated physiologic anaemia which requires treatment, as a consequence of the inadequate maternal-fetal transfer of iron in-utero being born before term, as well as poor post-natal production of endogenous erythropoietin.

These infants are also more at risk of other serious illnesses with a greater likelihood of needing investigative blood work-up making

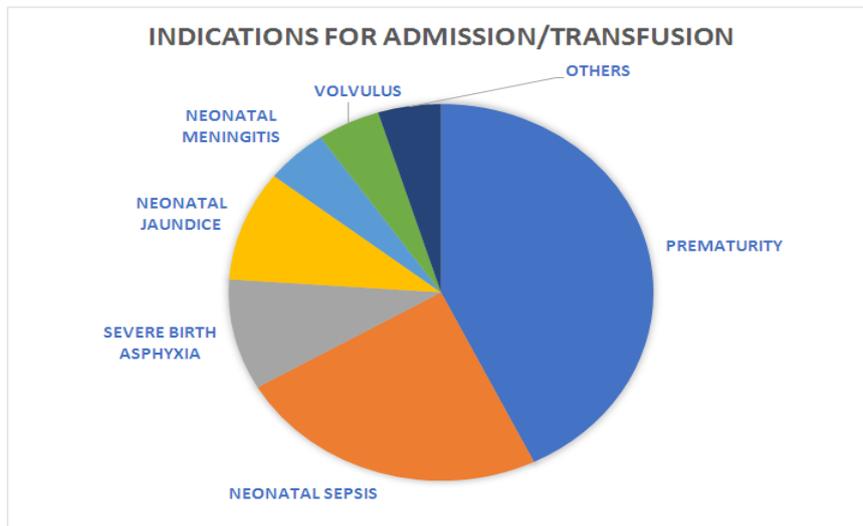


Fig. 1. Indications for admission/transfusion

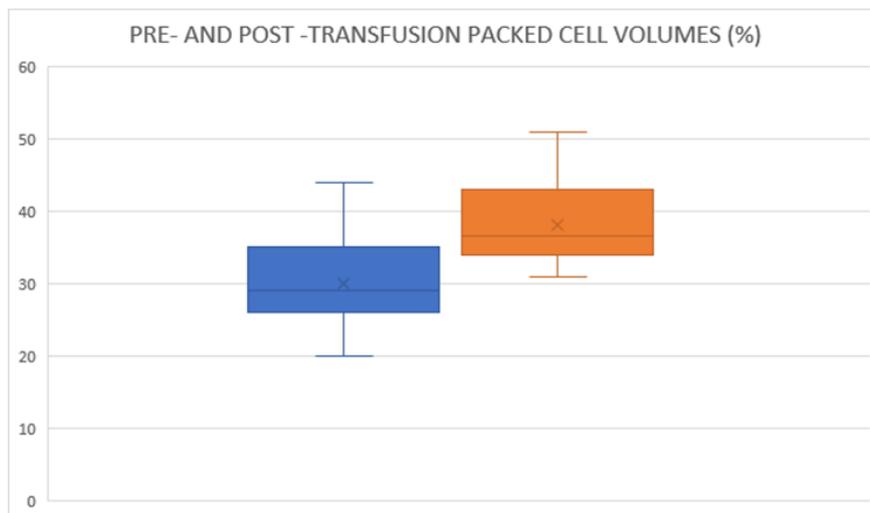


Fig. 2. Pre and post transfusion packed cell volumes

them more vulnerable to iatrogenic anaemia [16,18,19,17,20,21]. Replacement therapy with synthetic erythropoietin is readily available in the developed countries, while blood transfusion still remains a treatment option in Nigeria, and other developing countries, where recombinant erythropoietin is scarce and expensive [19,20].

A greater percentage of babies needing blood transfusion in this study were in their first two weeks of life, as was noted in another study in a study in Sagamu, western Nigeria [15].

The mean post-transfusion packed cell volume in the newborns studied was greater than the pre-transfusion packed cell volume which indicates

that the direct red cell transfusions done had a positive effect on the treatment of anaemia in this group. (Fig. 2)

4. CONCLUSION

The direct push method of blood delivery occasionally used, seems a relatively safe practice that can correct mild to moderate anaemia. It also provides sufficient and timely supplies of blood, with the advantage of usage when the umbilical cord access is no longer feasible and where cost of blood would otherwise, hinder quick intervention. This practice would need to be further evaluated in other centers.

The retrospective nature of this study, and small sample size under review, is acknowledged as a limitation. Larger prospective studies, across all geo-political zones of Nigeria is desirable.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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