Indications for blood transfusion among children in a suburban teaching hospital

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Abstract

Blood transfusion (BT) has remained a valuable treatment modality in children. Though lifesaving it has associated risks. Thus, its use has to be judicious. There is a lack of information on the indications for BT, which may impact the prevalence of these in children in sub–Saharan Africa. Evidence-based information on the indications for BT in children will be useful in ensuring the safety of BT amongst children and possibly its prevention. Objective: To determine the indications for blood transfusion among paediatric patients in Irrua Specialist Teaching Hospital (ISTH). Material and Methods: This was a 12-month retrospective study conducted in the Department of Paediatrics of ISTH (from 1st May 2008 to 30th April 2009). The case files of children, who had blood transfusion orders, were retrieved from the medical records department and relevant data was extracted. The data was analysed for age groups, wards and indications for blood transfusion. Results: The prevalence of blood transfusion is 14.3% with a blood transfusion rate of 5.1 per week. Blood transfusion was highest in the Children Emergency Room, commonest age group (60.4%) was > 28 days to 5 years with severe malaria as the commonest (46.4%) indication. Neonatal jaundice was the most common indication (48.5%) for transfusion amongst neonates and in SCBU. Conclusion: Malaria control programmes including malaria vaccine and surveillance for neonatal jaundice need to be strengthened to reduce blood transfusion rates.

Keywords: Blood transfusion, Indications, Children, Suburban, Teaching hospital

Introduction

Severe or life-threatening anaemia is a major health problem among children in developing countries.[1] Blood transfusion (BT) has remained a valuable healthcare intervention amongst anaemic children. [2]Although BT is a lifesaving measure, it is associated with well-documented risks.[3] Hence, there is a need to have clear-cut indications for blood transfusion before the procedure is commenced. The rate of transfusion varies with the geographical region and level of health care provided.[4] Transfusion data may be used in connection with demographic data in geographical areas and thus be used for the calculation of specific values of risk of transfusion or unit incidence rate.[4] Diagnoses may be used to determine and forecast BT.[5-7]

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There is a dearth of data on the indications for BT in children in sub-Saharan Africa.[8,9] Preventive efforts to reduce childhood morbidity and mortality from anaemia require sufficient data on the aetiologies and demographic distribution in the region. Periodic appraisal of blood transfusion practices may improve its impact on causes of anaemia in children. Evidence-based information on the indications for BT in children will be useful in the strategy for policy design and implementation to reduce the need for BT.[9] It will also be used for formulation of BT policy in children.

Materials and Methods

The study was a descriptive, retrospective study conducted at the Paediatrics Department of the ISTH which is situated in a suburban region in Southern Nigeria and renders health care services to Edo, Delta, Kogi and Ondo States. It has a functional blood bank that supplies all departments in the

hospital. Blood supply is sourced locally as there is no supply from the National Blood Service Commission; although the bank is connected to the commission. Services provided by the blood bank include blood grouping and cross-matching, screening for HIV, hepatitis B and hepatitis C; and supply of whole blood and other blood products like packed cells.

A review of the records of all children from birth to sixteen years of age who received blood transfusions over one year from 1st May 2008 to 30th April 2009 was conducted. Information extracted included the age, sex, diagnoses necessitating the blood transfusion as well as the wards in which they were managed. The wards were the Children Emergency Room (CHER), which is one of the main entry points into the Paediatrics Department of the hospital and where acutely ill children are admitted, resuscitated and stabilized before transfer into the Paediatric ward where care is given till discharge. CHER also serves as a point of entry for ill newborns, into the Special Care Baby Unit, who are coming from home or other health facilities. Children involved in accidents requiring care from the trauma unit are usually stabilized in the Accident and Emergency (A & E) unit. The analysis was done using SPSS version 10.

Results

Of the 2,869 blood transfusion orders made during the period under review in the hospital, 652 (22.7%) transfusion orders were requested from the Paediatrics Department for a total of 459 patients.

A total of 1,856 paediatric admissions occurred during the period under review. Of the 459 patients who had blood transfusion orders, 269 (58.6%) records were completely retrieved and 265 patients received blood transfusion giving a prevalence of BT of 14.3%. A blood transfusion order rate of 12.5 per week and a blood transfusion rate of 5.1 per week were computed; as not all transfusions ordered were carried out. There were 163 males and 102 females giving a male-to-female ratio of 1.6: 1. In all, 226 (85.3%) of the transfused patients were under five years of age. This is shown in table 1.

Table 1: Age Distribution

Age range	Frequency	Percentage (%)
0 – 28 days	66	24.9
29 days – 5 years	160	60.4
> 5 years	39	14.7
Total	265	100.0

Table 2: Sex Vs Ward Distribution

Wards	Male Transfused	Female transfused	Total Transfused (%)	Total Admissions (%)
Scbu	43	23	66 (24.9)	522 (12.6)
Cher	108	68	176 (66.4)	1152 (15.3)
P-ward	9	10	19 (7.2)	178 (10.7)
A & E*	3	1	4 (1.5)	
Total	163 (61.5%)	102 (38.5%)	265 (100.0%)	

*Accident and Emergency
($\chi^2 = 2.28$; df = 3, p = 0.51)

Table 3: Sex Vs Transfusion Distribution

Sex/ Transfusion	Yes (%)	No (%)	Total (%)
Male	163 (61.51)	902 (56.69)	1065 (57.38)
Female	102 (38.49)	689 (43.31)	791 (42.62)
Total	265 (14.28)	1591 (85.72)	1856 (100.0)

($\chi^2 = 2.89$; df = 1, p = 0.089)

Table 4: Indications for Transfusion

Indications	Frequency	Percentage(%)
Severe Malaria	123	46.4
Septicaemia	37	14.0
Neonatal Hyperbilirubinaemia	32	12.1
Disseminated Intravascular Coagulopathy	10	3.8
Anaemia of Prematurity	9	3.4
Haemorrhagic Disease of the Newborn	9	3.4
Lassa fever	8	3.0
Malignancies	8	3.0
Surgical	5	1.9
Trauma	4	1.5
Others	20	7.5
Total	265	100.0

Table 5: Indications for blood transfusion among the neonates / SCBU

Indications	Frequency	Percentage (%)
Severe Neonatal Hyperbilirubinaemia	32	48.5
Disseminated Intravascular Coagulopathy	10	15.2
Anaemia of Prematurity	9	13.6
Severe anaemia secondary to *HDN	9	13.6
Neonatal Sepsis	6	9.1
Total	66	100.0

Transfusion Rate = 1.3/WEEK

*Haemorrhagic Disease of the Newborn

Table 2 shows 66.4% and 24.9% of the transfusions took place in the Children's Emergency Room (CHER) and Special Care Baby Unit (SCBU) respectively. Table 3 is a sex vs blood transfusion distribution table. Table 4 shows the indications for blood transfusion in all the patients. The distributions of indications among the wards and age groups are shown in tables 5, 6, 7 and 8. At least, one baby received a form of blood transfusion every week in SCBU.

Table 6: Indications for blood transfusion among those aged > 28 days to 5 years

Indications	Frequency	Percentage (%)
Severe Malaria	117	73.1
Septicaemia	23	14.3
Lassa fever	5	3.1
Trauma	2	1.3
Probable Autoimmune haemolytic anaemia	2	1.3
Bacillary dysentery	2	1.3
Malignancy	1	0.6
Others	8	5.0
Total	160	100.0

Table 7: Indications for blood transfusion among those aged > 5 – 16 years

Indications	Frequency	Percentage (%)
Septicaemia	9	23.1
Malaria*	6	15.3
Trauma	5	12.8
Malignancy	4	10.3
Surgical	4	10.3
Lassa fever	3	7.7
Typhoid fever	2	5.1
Others	6	15.4
Total	39	100.0

* 2 with Sickle Cell Anaemia

Table 8: Indications for blood transfusion in CHER

Indications	Frequency	Percentage (%)
Malaria	121	68.8
Septicaemia	23	13.1
Lassa fever	6	3.4
Malignancies	4	2.3
Surgical	3	1.7
Trauma	2	1.1
Others	17	9.6
Total	176	100.0

Transfusion Rate = 3.4 / week

Discussion

Blood transfusion (BT) is an important procedure in paediatric practice which is used in a variety of medical conditions to replace lost components of the blood. It is therefore not surprising to find the high prevalence of BT demonstrated in this study. The overall prevalence of BT computed was 14.3% and all units of the paediatrics department were involved in the study. A higher prevalence was reported in Enugu (41.2%) where paediatric non-emergency blood transfusion was reviewed.[9] The exclusion of the population of patients in the Children Emergency Room may be the reason for the higher figure. Lower figures have been computed in many studies in which only children in the emergency paediatric unit were recruited.[4,5] However, similar rates were reported from Owerri and Benin City where only patients in Children Emergency Room were

recruited.[10,11] These rates may reflect differences in transfusion thresholds in the various hospitals. No local study was found to consider all the units in paediatrics as a whole as was done in this study. The computed BT rates were 5.1, 1.3 and 3.4 per week overall for SCBU and CHER respectively. A higher rate (8.6 per week) was computed for CHER alone in Benin City.[11] In the current study, 85.3% of the children transfused were under the age of five years. This is the age range of high vulnerability to morbidities such as malaria which can be complicated by anaemia. Other studies have demonstrated the same pattern.[10,11] No form of protein-energy malnutrition was found as an indication for transfusion in this study. This is against a rate of 5.9% reported in a north-central Nigerian study which was undertaken about the same period.[5] This may be attributable to the fact that most persons around the study location engaged in various levels of farming at the time of the study. However, there is an undocumented reversal of this trend in the facility as many of the children being seen now have various forms of under nutrition. This will require further research.

This study underscores the high burden of malaria as a cause of morbidity among children in our locale as seen in Benin City also.[11] The mechanism of anaemia in malaria infection includes haemolysis, reduced red blood cell production, disseminated intravascular coagulopathy and sequestration.[12]Severe malaria was the leading cause of morbidity that resulted in BT in the current study, in CHER and amongst the population aged > 28 days to five years. This is in tandem with the finding in Benin City where a higher figure was computed.[11] A contrary finding was reported in Jos, Nigeria, where malaria accounted for only 1.2% and sickle cell anaemia ranked the highest with 57.7%.[5] Perhaps, this may be due to the lower temperatures and higher altitude resulting in a lower partial pressure of oxygen in atmospheric air. The findings in the current study underscore the need for improving efforts aimed at reducing the malaria burden in our sub-region.

Severe neonatal hyperbilirubinaemia (NHB) was implicated as the commonest (48.5%) indication for BT amongst the neonates in this study. The newborns are either transfused with blood or receive an exchange blood transfusion. Exchange blood transfusion is a procedure in which a small volume of blood is removed and replaced with an equal volume of blood sequentially. It is one of the treatment modalities available for severe neonatal hyperbilirubinaemia. It is also used as a treatment modality in overwhelming sepsis and some conditions in sickle cell anaemia. Similarly, NHB was reported as the commonest indication of BT amongst neonates in Jos.[13] The high burden of NHB underscores the urgent need for interventions which will prevent such high levels of bilirubin requiring exchange BT.

Unlike most studies where sickle cell anaemia was reported as one of the indications for BT, in this study, the co-morbidity or complication in patients leading to BT was recorded as the indication and not just sickle cell anaemia. Lassa fever appears as an indication for BT in this study as against other studies. This is because Lassa fever is endemic in Irrua environs; a late complication of the disease is bleeding. Also, ISTH happens to be the centre of excellence for the management of viral haemorrhagic fevers in Nigeria, thus referrals may lead to a high prevalence of Lassa fever admissions. Perhaps in future studies, Lassa fever may feature in studies from other locations as epidemics of Lassa fever have been reported in other parts of the country. It is important to cut down unnecessary BT due to the complications that may be associated with the procedure.[13] It is therefore required that, careful consideration and critical evaluation of all the indications for BT is carried out.

This study found a high prevalence of BT amongst under-fives due to severe forms of malaria and NHB amongst the neonates. Since there is a scarcity in the supply of blood which is frequently required during emergencies, it is pertinent to address the causes of the anaemia. Strategies will include reinforcement of the malaria control programme and improving facilities for controlling hyperbilirubinaemia such as intensive phototherapy. Also, public enlightenment to improve health-seeking behaviour and early presentation will help prevent unnecessary BT. This buttresses the need for universal health insurance for the whole populace as it will encourage early

presentation. The scheme should cover blood transfusion when indicated

Conclusion

Due to the high need for blood transfusion in paediatric practice and the associated risks, it is pertinent to ensure the safe and rational use of blood. Malaria control programmes and surveillance for neonatal jaundice need to be strengthened to reduce transfusion rates. These measures will also go a long way to help achieve the Sustainable Development Goals.

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