Feasibility Of Day Blood Transfusion Programe For Children In A Developing Country

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Citation

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Abstract

To determine the feasibility of day transfusion programme in children in a developing country like Nigeria, 118 children with severe anaemia were recruited out of 1249 children's emergency ward admissions over a 12-month period giving an incidence of 9.4%. Following blood transfusion and treatment of underlying aetiology of anaemia mean haematocrits at 12, 24 and 48hr post-transfusion were 24.41± 5.56%, 25.12± 5.59% and 23.99± 5.9% respectively. There was high correlation between the three timed post-transfusion haematocrits (p=0.001) but no significant difference between the means of the 12 and 48hr (p=0.854) as well as between 24 and 48hr (p=0.227) post-transfusion haematocrits values. Malaria was the commonest aetiology for severe anaemia in these patients. Fever, the commonest (92.5%) presenting symptom subsided by 24hr in 85.5% of the 62 children in whom it was documented on admission. Mortality from severe anaemia in this study was 1.9%.

INTRODUCTION

Severe anaemia remains one of the commonest paediatric emergencies in this country as well as in sub-Saharan Africa, and from our medical records it constitutes over half of all children's emergency ward (CEW) admissions in Wesley Guild Hospital (WGH), Ilesa, Nigeria. CEW constitutes the major entry point for in-hospital care of childhood illnesses in many developing countries and most hospitals with this facility have beds far too few for the patient inflow. In WGH, Ilesa, there are only seven CEW beds compared with 77 in the paediatric convalescent wards while in Federal Medical Centre, Owo, there were five CEW beds compared with 40 in other children's wards at inception of the facility. After giving emergency care, patients are transferred to the convalescence wards for further routine or ongoing care. Therefore any means of rapid patient turnover is both inevitable and desirable.

However, the speed and personalisation of care received in our CEW so impress many mothers that they object to their children being transferred out of the CEW. This leads to congestion of this small but vital unit, which in turn adversely affects the chances of other children requiring emergency services. In most government hospitals in Nigeria, patients pay for hospital services, including exhorbitant deposits before getting admitted into the convalescent wards. This makes parents and relatives choose local traditional remedies and has led to significant reduction in utilisation of hospital services. [1] The results of studies on early discharge of oncology patients presenting with fever and treatment-induced neutropenia, the patients being discharged on subsidence of fever but before resolution of neutropenia were fascinating. [23]

The standard practice here like in other places [4] is to check post-transfusion haematocrit in our patients after 48hours of blood transfusion and ensure subsidence of symptoms before deciding on discharge to outpatient follow-up. It is thought that if quick discharge home from CEW is feasible, especially for some cases of severe anaemia, it may ease the frequent congestion in CEW, reduce the cost of hospital care and so improve the confidence in and utilisation of government hospital services in this country. The prospective study being here reported was carried out to assess the feasibility of quick discharge from hospital for some children with severe anaemia.

PATIENTS AND METHODS

The study was carried out at the Federal Medical Centre, Owo, a tertiary hospital serving Ondo and Ekiti States in the South Western part of Nigeria with a combined population of about 5.7million. [5] It was part of a programme to assess the functionality of the Pediatric Department of the hospital. The hospital also serves the training of medical interns as well as resident doctors in Family Medicine.

The Patients were consecutive children admitted over a twelve-month period into CEW and managed for severe anaemia with blood transfusion at a dose of 15ml/kg sedimenting red cells as well as treatment of the underlying aetiology of the anaemia. Children admitted for surgery were excluded, as these were likely to require blood transfusion and stay on admission beyond requirement for correction of anaemia. Data collected from each patient included the age, sex, presenting clinical signs, symptoms and diagnosis as well as progress on treatment. Post-transfusion haematocrits were checked at 12, 24 and 48 hours after blood transfusion. No patient was discharged prematurely. Data analysis was by simple descriptive statistics as well as difference of means between the variables as appropriate.

RESULTS

One hundred and eighteen (118) patients were managed for severe anaemia out of a total of 1249 CEW admissions over the 12month period giving an incidence of 9.4%. Twelve of these 118 patients who had to be transfused twice within 48hr of admission or who had clerical errors or mix-up in their timed post-transfusion haematocrits results were excluded from further analysis. Of the remaining 106 patients, there were 52 males and 54 females giving a male: female ratio of 1:1.04. The ages of the patients varied widely ranging from one month to 11yrs (Table 1) with a mean of 26.67 ± 26.12 months. Over two-thirds of the 106 patients were 24mo and below while 6.6% were over 5yrs.

Figure 1

Table 1. Age distribution of the patients studied

Age (mo)	No.	%
<12	45	42.5
13-24	28	26.4
25-36	10	9.4
37-48	11	10.4
49-60	05	4.7
>60	07	6.6
Total	106	100.0

The commonest presenting symptoms in the patients were fever 98(92.5%), cough 40(37.7%), vomiting 28(26.4%), weakness 10(9.4%) and breathlessness 11(10.4%) while the commonest signs on physical examination were pallor 103(97.2%), splenomegaly 85(80.1%) and hepatomegaly 79(74.5%). Convulsion and jaundice were each seen in 18(17%) of the patients while congestive cardiac failure was present on admission in 17(16%). There was a reasonable increase from the mean pre-transfusion haemetocrit of 12.88+/- 3.3% to a mean post- transfusion haematocrit value of 24.41+/- 5.6% at 12hrs, 25.12+/- 5.6% at 24hrs and 23.99+/-6.0% at 48hrs.

Figure 2

Table II: Statistical analysis for the variable pairs analysed

Paired variables	No	Pearson's Correlation	p-value	Post hoc (ANOVA) Mean diff.	p-value
Timed PCV @					
12 vs 24 Hr	91	0.782	0.001	-0.71	0.313
12 vs 48 ,,	77	0.600	0.001	0.25	0.738
24 vs 48 ,,	81	0.733	0.001	0.73	0.191
Age vs PCV @ 12 Hr	91	-0.133	0.210		
,, vs ,, ,, 24 ,,	97	-0.096	0.348		
,, vs ,, ,, 48 ,,	81	-0.095	0.409		
Post-AFD vs Pre AFD	60	0.051	0.696		
,, vs Ta	62	0.116	0.370		
,, vs Age	62	0.110	0.395		
		Pearson Chi sq	p value		
Sex vs PCV @ 12 Hr	91	20.66	0.602		
,, vs ,, ,, 24 ,,	97	30.24	0.143		
,, vs ,, ,, 48 ,,	81	19.66	0.765		
,, vs Post-AFD	62	19.99	0.522		
,, vs Age	106	22.10	0.683		

(Post-AFD = post- admission fever duration, Pre AFD = pre-admission fever duration

Ta = temperature at admission)

Table II suggests that there is high correlation between the haematocrit figures obtained at 12, 24, and 48 hrs post transfusion (p= 0.001). However, age did not correlate significantly with these post transfusion haematocrits (p= 0.210, 0.348 and 0.409 respectively). Also, there was no significant difference between the means of the 12hr vs 24hr, 12hr vs 48hr and 24hr vs 48hr post-transfusion haematocrits values (p=0.313, 0.738 and 0.191 respectively). At admission, only 62(58.5%) of the patients had documented fever though fever was the commonest (92.5%) presenting complaint in them. Following blood transfusion for severe anemia and treatment for the presumed etiology of the anemia (especially malaria) fever subsided (T 37oC) by 12hr of admission in half of the patients 35 (56.1%) and by 24hr in 53(85.5%) implying that only 9(14.5%) febrile patients needed more than 24hr for subsidence of their fever. Also from Table II, time taken for fever subsidence ie post-admission fever duration had no significant correlation with the pre-admission fever duration (p=0.696), height of admission temperature, Ta (p=0.370) and age of the patient (p= 0.395). Also, using Pearson chi square test there was no significant difference between the sexes with regards to the timed post-transfusion haematocrits at 12hr (p= 0.62), 24hr (p= 0.143), 48hr (p= 0.765), age (p= 0.683) and duration of post-admission fever (p=0.522).

The diagnoses encountered as the aetiologies of severe anaemia in this study were Malaria in 94/106(88.7%) of the patients, Septicaemia in 8/106 (7.5%), G6PD deficiency in 4/106 (3.8%) and bronchopneumonia in 2/106 (1.9%). Few of the patients had multiple diagnoses. There was a case of severe anemia associated with Kwashiorkor (0.01%). Only 2 of the 106 patients in this study died giving 1.9% mortality. The deaths were not related to the blood transfusion.

DISCUSSION

In underdeveloped, resource-poor nations with most of orthodox healthcare located in the few available hospitals [4] in the cities, emergency services will remain high priority and with the very small number of CEW beds compared with convalescent wards, it is natural for turnover in these over-burdened CEWs to be high.

From the results of this study, incidence of severe anaemia is highest among infants up to 2yrs and rare in older children above 5yr. This follows the pattern of malaria infection being commonest in the under-fives while those above would have acquired their own immunity following repeated attacks during infancy and therefore be protected from severe complications of the disease. Also septicaemia, another common aetiology of severe anaemia is more frequent in the under-fives.

In man, circulation time is known to be 1minute. [6] While venous pressure increases from 0-10cm of H_2O during transfusion, it returns to 1cm of H_20 in 15min post transfusion [7] and plasma volume normalises by 24hr post transfusion [8] , even in the neonate [9] . This implies that cardiovascular haemodynamic disturbance as resulting from transfusion settles by 24hr after and there should normally be no complication of circulatory overload subsequently. By

this time presumably, a transfused child could be released from close observation.

Also, studies have shown that red cell survival following transfusion is approximately 110days i.e. virtually normal with a loss of only about 1% per day . [10] This suggests that the post transfusion haematocrit at 24hr should not be remarkably different from the 48hr value. The post transfusion haematocrits obtained in this study showed significant correlation between the mean values at 12hr, 24hr, and 48hr (p= 0.001). Also post hoc multiple comparison analysis shows no significant difference between the means of the 12hr haematocrit compared to that at 24hr (p=0.313) and 48hr (p= 0.738) as well as between the 24hr and 48hr haematocrits (p=0.191). It is thus presumable therefore that any of the post-transfusion haematocrits could be representative of the others (Table II). This corroborates the work of Glatstein et al [11] who noted similar increases in haematocrit at 15minutes as well as 6hr post transfusion in haemodynamically stable neonates. Thus in the absence of any of the presenting symptoms and signs, if the post transfusion haematocrit is above 20%, a transfused child could be discharged by 24hr of the transfusion to be followed-up as necessary at the outpatient clinic with consequent saving in the socio-economic cost of care to both the family and the health care delivery system.

While home blood transfusion programme is a well known practice in the USA, [12] its consideration in Britain is a recent thing. [13] This practice has been found to give more comfort to patients, reduce absence from work and schooling as well as reduce bed occupancy with increased satisfaction to the patients and their relatives. In our setting, we can also expect positive attitude to the utilisation of hospital services as the fear of prolonged admission, social life disruption and cost of care to the families and government will be reduced. The results of this study show that if blood transfusion facilities are made available, in the urban and semi-urban areas of this country, then, day transfusion programme should be feasible with patients being discharged to outpatient unit for follow-up. Thus costly and elaborate hospital set-up will not be inevitable in catering for most cases of severe anaemia in this environment. This can make the local government area clinics and maternity centres busier and more efficient, thus freeing the larger secondary and tertiary centres to concentrate on bigger and more complex health problems or diseases.

Fever was the commonest presenting symptom in the patients with severe anaemia in this study, occurring in 92.5% of them. Its subsidence was therefore taken as reference outcome of wellness in the patients to qualify them for discharge to outpatient follow-up. With this fever abating by 24hr in 85.5% of the transfused children and malaria that was the aetiology of severe anaemia in about 90% of the patients being treatable at the out-patients clinic, then, baring any complication, it follows that over 4/5 of these children could be discharged to outpatient follow-up by 24hr of the transfusion thus saving significantly on CEW workload, personnel cost as well as socio-economic cost on the families of the patients. It is thought that this may have the advantage of increasing confidence in and utilisation of hospital services by the local population.

Since the treatment of septicaemia or bronchopneumonia requires few days of appropriately administered potent antibiotic before signs of improvement could be noticeable and getting rid of triggering oxidant agents from the body may require more than 24hr for subsidence of G6PD deficiency haemolysis, it follows that patients with these aetiologies for their severe anaemia must be excluded from the early discharge programme. Careful medical history and physical examination should identify such patients. We should however advice that relatives of children presenting with severe anemia secondary to malaria and being offered early discharged after blood transfusion will need to be counselled that should other symptom and signs of illness implying more sinister aetiologies of the severe anaemia occur after discharge, the patients will require re-admission for the specific treatment of these aetiologies.

Mortality from severe anaemia is unexpected if patients are presented early and compatible donor blood is available and given. The less than 2% mortality in this study confirms this assumption. One of the two patients that died in this study was an eighteen month old child that was force-fed on the fourth day of admission having been transfused, well and waiting for replacement of loaned blood by relatives. The other, a three and half year patient died of septicaemia. Thus in health facilities with blood transfusion services, severe anaemia per se should not be a major killer of children. It is thought that by reducing the duration of hospitalisation as well as cost of care, early presentation can be encouraged.

By our normal working protocol, no patient was discharged until relations were able to replace the donor blood which took up to a week or more in some of our patients hence we did not consider duration of admission as a reliable outcome indicator for analysis in this study. Ours is a society where

free blood donation even by close relatives is uncommon so, we rely on commercial donors i.e. “blood contractors” and the financial implication, in our experience, does often contribute to the length of needless stay in hospital. We may however speculate that the prospect of early discharge may encourage some family members especially parents to develop a positive attitude to voluntary blood donation. This also will require enhancement via continued education of the citizenry. Age, sex, height and duration of pre-admission fever are characteristics we thought might affect illness outcome. Since there was no significant relationship between these and the duration for subsidence of the fever post admission (Table II) they do not predict prolonged hospital stay on account of severe anaemia.

From the above, we may conclude that day transfusion programme is feasible for children with severe anaemia in a developing country.

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