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Study of Packed Cell Volume Transfusion Therapy in Children's

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Abstract

Background: Anemia is common in critically ill children and is observed in 77% of hospitalized children. The transfusion of packed cell volume can be lifesaving in hemorrhagic shock as well as in critically ill children with severe anemia .Effective packed cell volume transfusion therapy depends upon the availability of different blood components. The packed cell volume transfusion, used can meet the transfusion need of most patients. Aim: Is to observe usage, various indication, to study incidence, outcome in recipient. **Method**: A prospective and observational study was conducted in department of paediatrics, in collaboration with department of IHBT & pathology at tertiary care hospital B.J. medical college, Ahmedabad from 01/01/2018 to 30/01/2019.Detail clinical history and physical examination was done according top rede fined proforma. Laboratory investigation done for the confirmation of diagnosis. Over a period of 18 month, packed cell volume transfusion were given to patients according to indication. **Result**: Most of the patients were discharged successfully. **Conclusion**: Early intervention, monitoring and regular follow up increases the life span.

Keywords: Packed Cell Volume Transfusion, Blood Component Therapy, Blood Group Compability

INTRODUCTION

Packed cell volume transfusion is the most commonly transfused blood component, can be obtained directly via apharesis or by centrifugation of whole blood .The transfusion of packed cell volume can be lifesaving in hemorrhagic shock as well as in critically ill children with severe anemia. Packed cell volume transfusion are indicated in management of acute

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blood loss, bone marrow failure and cardiac or respiratory dysfunction. Blood group compability between the component and the patients is considered during product selection and issue. Immediate goal of packed cell volume transfusion is to increase hemoglobin concentration with intent to improve oxygen delivery. While infectious risks are low, noninfectious serious hazard if transfusion such as transfusion associated circulatory overload are much more prevalent in critically ill children therefore, due to risks of complications, efforts are needed to ensure appropriate packed cell volume transfusion decision making.

MATERIALS & METHODS

Study setting-this study was conducted in department of pediatrics in collaboration with department of IHBT, PATHOLOGY at tertiary care hospital attached with medical college, Ahmedabad. Study design-prospective observational study. Study duration-1st January 2018 to 30th June 2019. Study sample-the study includes total 292 patients of age <12 years and more than 1 month who were admitted in pediatric ward and needed packed cell volume transfusion.

Inclusion criteria-
Children admitted > 1 month to <12 years of age group who has received packed cell volume transfusion therapy.

Exclusion criteria
1) All new born < 1month of age
2)Children with transfusion dependent thalassemia
3) Children with age >12 years.

Methodology

Detail clinical history and physical examination was done according to predefined proforma. All patient who were admitted and required blood component transfusion were included in my study except neonates and transfusional dependent tha lassemia from the time period of 1st January 2018 to 30th June 2019 at pediatric department, tertiary care hospital, Ahmadabad. Proper prior informed consent had been taken from the parents of the children who required blood component therapy after explaining study purpose and utilization. Proper epidemiological history like age, sex, socio-economical class, residency, and nutritional status were taken from the parents. Predefined age group was separated from < 4 month,4 month to 5 yr,5 yr to 10 yrs and >10 yrs based in the guideline of nelson textbook of paediatrics. Socioeconomic stratification was done according to modified kuppuswami scale on the basis of parameter like education, occupation and income. Nutritional status was assessed with iap classification. The general examination including vital data measurements and detailed systemic examination was done. The transfusional guidelines followed are from nelson textbook of pediatrics. Laboratory investigation were done

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according to symptomatology and provisional diagnosis including baseline investigation for the typing of anemia were done and specific investigation for done for the conformation of diagnosis were done as and when required.

Results and Discussion: Out of 557 patients who required various blood component transfusion, most of the patients were required packed cell volume transfusion. Among total patient who required packed cell volume therapy majority patients were males and patients were <5 year of age. Most common indication of pcv transfusion was disseminated intravascular coagulation and septicemia followed by iron deficiency anemia. Out of total 292 patients who required pcv transfusion 252 patients were discharged, 15 patients went dama, and 25 patients were expired.

Table 1: Blood component usage

Total number of admission during my study period	Patients who required blood component transfusion therapy(n=557)	Patients who required packed cell volume transfusion therapy(n=292)	% of patients who required blood component transfusion out of total admission	**Study conducted by NACO[1]**	**DJ Wake et all[2]**	**M ahmed et all[3]**
4320	557	292	12.89%	21.3%	11.24%	23.92%

Total paediatric admission in tertiary care hospital during my study were 4320 after excluding neonates, out of this 292 patients required packed cell volume transfusion .

Table 2: Gender wise distribution of packed cell volume requirement

Blood component	Number of patient	Males	Females	P value
PCV	292	169(57.87%)	123(42.12%)	0.74

Males Have More pcv transfusion Requirement As Compared To Females But This Is Because Of More Male Admission As Compared To Female Admission And More Awareness To Male Child.

Table 3: Socio-economic status wise distribution of packed cell volume requirement

Type of blood component	Total patients	Upper	Middle upper	Middle lower	Lower upper	Lower	P value

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PCV	292	23(7.93%)	59(20.34%)	76(26.02%)	45(15.51%)	91 (31.37%)	0.0006

Packed cell volume Requirement Were More Common In Lower Than Middle Lower Class Population Because Of More Prevalence Of Nutritional Anemia In Those Group.

Table 4: Indication of PCV transfusion

Indication	<4 months	>4 months	Total patients	**NACO[1]**	**Praveen khilani et all[4]**	**Sameer et all[5]**
DIC+septicaemia	19(42.22%)	59(23.88%)	78(26.71%)	53.2%	23.5%	31.7%
Iron def anemia	8(17.77%)	38(15.38%)	46(15.75%)	18.1%	19.5%	
Severe acute malnutrition	6(13.33%)	30(13.36%)	36(12.32%)			
Dimorphic anemia	4(8.88%)	29(11.74%)	33(11.30%)			
B 12 def anemia	3(6.66%)	27(10.93%)	30(11.30%)			
Chronic disease	1(2.22%)	20(8.09%)	21(7.19%)	2.4%		
Intra cranial hemorrahge	4(8.88%)	31(12.55%)	35(11.98%)			
Dengue		3(1.21%)	3(1.02%)	3.2%	7.9%	9.1%
Sickle cell disease		4(1.61%)	4(1.36%)			
Bone marro failure		4(1.61%)	4(1.36%)			
Autoimmune haemolytic anemia		2(0.80%)	2(0.68%)			

19 patients were diagnosed with disseminated intravascular coagulation complicated by sepsis and other were suffering from nutritional cause like 8 with iron deficiency anemia,6 with failure to thrive (4 were preterm and 2 were having congenital heart disease as a cause of

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not gaining weight),4 having dimorphic anemia.4 having intra cranial hemorrhage (3 with following trauma,1 with late haemolytic disease due to vit k deficiency),and 1 with chronic kidney disease.

Table 5: Geographical distribution of patients received packed cell volume transfusion

Bloodcomponent	Total patients(n=557)	Urban	Rural
PCV	292	180(61.64%)	112(38.35%)

Table 6: Age wise distribution of packed cell volume requirement

Type of blood component	Total patients	< 4 month	>4 month	5 yr to 10 yr	10 yrs
PCV	292	45	116	103	28

Among 292 patients who required PCV transfusion 45 were of < 4 months of age group.

Table 7: Patients who required multiple transfusions

Indication	Total patient	1 transfusion	2 transfusion	3 transfusion
B 12 def anemia	33	30	2	1
Iron def anemia	46	38	6	2
Dimorphic anemia	31	29	2	0
SAM	35	20	11	4
Septicemia	78	45	28	5
Dengue	31	24	5	2
Intracranial hemoorhage	8	5	3	0
Sickle cell disease	20	12	8	0
CKD	4	3	1	0
Bone marrow failure	4	3	1	0
Autoimmunity	2	1	1	0

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Table 8: Total patients who required PCV Transfusion

Total patients	N=292
<4 months	45(14.95%)
>4 months	247(85.04%)

Among total 292 patients who required PCV transfusion 45 were < 4 month of age and 247 were > 4 months of age group.

Table 9: Comparison between nutritional and non-nutritional cause for PCV transfusion

	Nutritional	Non-nutritional
<4 months(n=45)	15(33.33%)	30(66.66%)
>4 months(n=247)	110(42.96%)	137(57.03%)

Out of 45 pateints who required PCV transfusion in < 4 month of age around 33 .33 % patients were transfused due to nutritional cause and remaining were transfused with non-nutritional cause.

Table 10: Relation between pre transfusion HB level and mortality

Pre transfusion HB level	Total number of patients	Expiry
<7	112	13
7-8	96	10
8-9	65	2
>9	20	0
TOTAL	292	25

In my study there were no co-relation in between pre-transfsuion hb level and mortality as p value is 0.368325 The result is not significant at p<0.05 as there were certain other factor also influences like shock, sepsis, ongoing hemolysis, and other co-morbid condition.

Table 11: Outcome of the patients who required PCV transfusion

Outcome	Number of patients(n=292)	Tinuade et all(6)	Daniel et al(7)l
Discharge	252(86.30%)	75.9%	69.1%
DAMA	15(5.13%)	2.5%	5.1%
Expiry	25(8.56%)	21.5%	25.8%

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Out of total 292 patients who required PCV transfusion 252 patients were discharged ,15 patients went DAMA and 25 patients were expired which was around 8.56% of children who required PCV transfusion.

CONCLUSION

Packed cell volume transfusion used for replacement of volume in acute hemorrhage and improve oxygen carrying capacity in disseminated intravascular coagulation and also used in nutritional anemia, if patient has severe anemia with impending cardiac failure associated with cardio respiratory disease. Detailed blood grouping of the recipient should be done before the first transfusion. Sepsis remains the major cause for PCV transfusion followed by nutritional cause and dengue. Sepsis is the most common indication in age group of <4 months as well as in > 4 months of age group but in nutritional cause was seen in age group of > 4month as nutritional anemia were present in these age group. No relation has been found between pre-transfusion HB level and mortality.

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