European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 10, Issue 1, winter 2023

ORIGINAL RESEARCH

An audit of the use of blood components in acute systemic infections and its correlation with clinical outcome in children

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Received: 24 November, 2022 **Accepted:** 27 December, 2022

ABSTRACT

Background: *The present study was an audit for evaluating the use of blood components in acute systemic infections and its correlation with clinical outcome in children.*

Materials & methods: *A total of 100 subjects were enrolled. Any preterm and term neonates admitted to the NICU and Neonatal Intermediate Care Unit (NIMC) and receiving any transfusion, i.e., fresh frozen plasma (FFP), red cell concentrate (RCC), platelets, and exchange transfusion were included. The data was collected from the medical records. Patients were categorized according to the classification of neonatal conditions by the International Classification of Diseases 11th Revision (ICD-11).*

Results: *A total of 100 subjects were enrolled. Out of 100 neonates, 70 neonates received fresh frozen plasma. The platelet concentrate was received by 32 individuals whereas whole blood was received by 12 subjects. Transfusion data for all of the components yielded a statistically significant result. A condition chewing blood products are sepsis (82), meningitis (4). The other disorders comprise of 11 patients.*

Conclusion: *Over the few decades, there has been an increasing focus on use of blood components in managing pediatric patients with acute systemic infections. The exact ontogeny of individual components of the hematological system, and how they interact and drive the response to infectious agents, is of particular importance in understanding paediatric systemic infections. Hence; further studies are recommended.*

Key words: *Acute systemic infections, Blood components*

Introduction

Acute systemic infections are conditions encountered all too often. While these infections falls squarely within the purview of critical care medicine, many clinicians of various specialties are confronted with the task of diagnosing and initiating appropriate therapy for sepsis before, and hopefully to prevent, its progression to severe sepsis and septic shock. The diagnostic dilemma derives in large part from the fact that acute systemic infections, like other complex disease states such as cancer, is a syndrome rather than a discreet pathologic entity with a clear, unified, maladaptive process at its core.[1-3] It is not uncommon to observe a wide variation in blood transfusion practices among clinicians, as well as the indiscriminate and persistent use of whole blood and other blood components. This is most likely due to a lack of awareness in choosing the right component at the right dosage at the right time for the right patient. However, concerns about safety, cost, availability of blood components and associated risks and complications, such as transfusion reactions, transmission of infections and alloimmunization, have promoted the need for greater

scrutiny of blood transfusion practice.[4-7] Hence; the present study was an audit for evaluating the use of blood components in acute systemic infections and its correlation with clinical outcome in children.

Materials & methods

The present study was an audit for evaluating the use of blood components in acute systemic infections and its correlation with clinical outcome in children. A total of 100 subjects were enrolled. Any preterm and term neonates admitted to the NICU and Neonatal Intermediate Care Unit (NIMC) and receiving any transfusion, i.e., fresh frozen plasma (FFP), red cell concentrate (RCC), platelets, and exchange transfusion were included. The data was collected from the medical records. Patients were categorized according to the classification of neonatal conditions by the International Classification of Diseases 11th Revision (ICD-11). A descriptive statistical analysis was done using SPSS software. Chi-square test was done.

Results

A total of 100 subjects were enrolled. Out of 100 neonates, 70 neonates received fresh frozen plasma. The platelet concentrate was received by 32 individuals whereas whole blood was received by 12 subjects. Transfusion data for all of the components yielded a statistically significant result. A condition chewing blood products are sepsis (82), meningitis (4). The other disorders comprise of 11 patients.

Table: 1 proportion of neonates who received component transfusion

Component name	Number of individuals Status of transfusion	
	Received	Not received
RCC	47	53
FFP	70	30
PC	32	68
Whole Blood	12	88

RCC = Red Cell Concentrate, FFP = Fresh Frozen Plasma, PC = Platelet Concentrate

Table 2: Changes in haematological parameters before and after blood transfusion

Component name	Number of children	Mean	p- value
Hemoglobin before giving RCC	51	11.03	<0.001
Hemoglobin after giving RCC	51	15.32	
Hematocrit before giving RCC	51	35.62	<0.001
Hematocrit after giving RCC	51	40.96	
Platelet count before giving PC	26	0.89*	0.005
Platelet count after giving PC	26	1.12*	
Hemoglobin before giving WB	10	11.32	>0.05
Hemoglobin after giving WB	10	12.65	
PT before giving FFP	58	36.22	<0.001
PT after giving FFP	58	15.36	
aPTT before giving FFP	68	75.89	0.001
aPTT after giving FFP	68	35.12	
INR before giving FFP	60	2.12	<0.001
INR after giving FFP	60	1.43	

RCC = Red Cell Concentrate, FFP = Fresh Frozen Plasma, PC = Platelet Concentrate, WB = Whole Blood, PT = Prothrombin Time, aPTT = Activated Partial Thromboplastin Time, INR = International Normalized Ratio

Table 3: Few most frequent ICD-11 diagnoses

Categories	**Number of patients**
Infections	
Sepsis	82
Meningitis	4
Hematologic disorders	
Intracerebral haemorrhage	2
Intraventricular hemorrhage	1
Others	11

Discussion

Patients in the pediatric intensive care unit (PICU) frequently receive transfusions of blood products. While these therapies are often beneficial, they can be associated with significant, yet often overlooked, risks. Clinical guidelines for blood product transfusions must be well defined in order to prevent misuse of this limited resource. It is important for the intensivist to have a thorough understanding of the indications for specific blood products, and the transfusion needs of particular patient populations.[6- 9] Hence; the present study was an audit for evaluating the use of blood components in acute systemic infections and its correlation with clinical outcome in children.

A total of 100 subjects were enrolled. Out of 100 neonates, 70 neonates received fresh frozen plasma. The platelet concentrate was received by 32 individuals whereas whole blood was received by 12 subjects. Transfusion data for all of the components yielded a statistically significant result. A condition chewing blood products are sepsis (82), meningitis (4). The other disorders comprise of 11 patients. In a similar study conducted by Amrutiya RJ et al, authors conducted an audit of neonatal blood transfusion indications and identifying the most commonly used component. Out of 340 neonates, 249 (73.2%) were low birth weight, 139 (40.9%) were small for gestational age (SGA), and 277 (81.5%) neonates required transfusion during the first week of life. The majority of neonates require multiple transfusions. Fourteen(4.12%) neonates required up to 10 transfusions, two neonates required up to 22 transfusions, and 58 neonates required more than five blood transfusions. The majority required transfusion due to neonatal sepsis, Disseminated intravascular coagulopathy, low birth weight, respiratory distress syndrome, and unconjugated hyperbilirubinemia. Thirty-seven point eighty-two percent (37.82%) transfusions were fresh frozen plasma, 31.34% transfusions were red cell concentrate, 28.14% transfusions were platelet concentrate, and 2.70% were whole blood. Out of 340 neonates, 317 survived and were discharged. The most commonly transfused component was fresh frozen plasma, the indication was neonatal sepsis, and the group was preterm.[10]

Currently, guidelines for the transfusion of red blood cells (RBC) generally follow a restrictive threshold. While there is some variation in the number for the threshold, 7 g/dL is an agreed-upon value for asymptomatic healthy patients. Multiple studies have shown this is an acceptable threshold in other patient populations, including those with gastrointestinal (GI) bleeding and critically ill patients. The guidelines recommend a value of 8 g/dL as the threshold in patients with coronary artery disease or those undergoing orthopedic surgeries. However, this may be secondary to the lack of literature on using a threshold of 7 g/dL in the evaluation studies of these patient populations. The guidelines and clinical trials on transfusion requirements in critical care (TRICC) also recommend a value of 7 g/dl as the threshold for critically ill patients.[11- 15]

Several platelet indices have been utilised as non-specific means of both prognostication and diagnosis in paediatric sepsis. Thrombocytopenia is a well-recognised component of both neonatal sepsis and severe paediatric sepsis. Thrombocytosis is a rarer finding in the septic child, and may represent a rebound phenomenon following a period of relative thrombocytopenia. Metrics such as platelet distribution width (PDW), which describes the range in platelet size, and mean platelet volume (MPV), the measure of average platelet size, have been used to predict outcomes in paediatric and neonatal sepsis. Changes in these parameters during sepsis offer a crude insight into the multiple roles played by platelets in sepsis pathophysiology.[15- 18]

Conclusion

Over the few decades, there has been an increasing focus on use of blood components in managing pediatric patients with acute systemic infections. The exact ontogeny of individual components of the hematological system, and how they interact and drive the response to infectious agents, is of particular importance in understanding paediatric systemic infections. Hence; further studies are recommended.

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