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ORIGINAL RESEARCH

Evaluation of appropriateness of blood transfusions in healthcare: An insight into optimal practices

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Abstract

Background: Blood transfusion is a critical medical procedure essential for saving lives. However, the inappropriate use of blood transfusions poses risks to patients and strains healthcare resources. Recognizing the need for optimal blood utilization, this study evaluates the appropriateness of blood transfusions in a healthcare setting, emphasizing the need for implementation of stringent guidelines and judicious use of this scarce resource.

Materials and Methods: A descriptive, observational retrospective study was conducted at a Blood Bank attached to a Teaching Hospital & Medical College, lacking a Blood Components Separation facility. The study analyzed 375 whole blood units transfused from January 1 to December 31, 2010, to assess the appropriateness of blood usage across various departments. The criteria for transfusion appropriateness were based on pre-established clinical guidelines, focusing on indications such as acute blood loss leading to hypovolemia and exchange transfusion in children.

Results: Out of 375 whole blood units transfused, 144 (45.56%) were deemed appropriate, 162 (47.94%) avoidable, and 69 (6.49%) indeterminate. The study highlighted a significant portion of transfusions that could be classified as avoidable, with the highest appropriateness observed in the Department of Pediatrics (83.01%) and the lowest in the Department of Medicine (17.24%). The findings underscore the need for improved clinical practices and the potential benefits of blood components over whole blood transfusions.

Conclusion: The study reveals a considerable case of avoidable blood transfusions, suggesting an urgent need for enhanced transfusion practices, adherence to clinical guidelines, and the establishment of a Hospital Transfusion Committee (HTC). Implementing a Maximum Surgical Blood Ordering Schedule (MSBOS) and promoting the use of blood components could significantly improve the rational use of blood in healthcare settings.

Keywords: Blood transfusion, Appropriateness, Healthcare, Blood components, Clinical guidelines, Transfusion practices.

Introduction

Blood transfusion is an essential medical intervention, capable of saving lives across various clinical scenarios. However, its application must be judicious, given the potential risks associated with transfusion, including transfusion-transmissible infections and acute or delayed complications (1). The scarcity of blood underscores the importance of optimizing its use, ensuring that each unit transfused is done so appropriately and effectively (2). The decision to transfuse should hinge not solely on hematologic indicators but should also consider the patient's clinical status, with the overarching principle being the transfusion of blood only when it is likely to improve patient outcomes (3).

The introduction of guidelines and clinical pathways aims to refine transfusion practices, ensuring that blood is used only when necessary and in amounts that confer the maximum benefit while minimizing risks (4). Despite these efforts, studies suggest that a significant proportion of transfusions may not meet these criteria, indicating a gap between guideline recommendations and clinical practice (5). This discrepancy highlights the need for continuous evaluation and improvement of transfusion practices within healthcare systems.

In this context, the present study seeks to evaluate the appropriateness of blood transfusion practices within a healthcare setting. By analyzing transfusion decisions against established guidelines, the study aims to identify areas of improvement and recommend strategies to enhance the efficiency of blood use, ultimately contributing to better patient outcomes and more sustainable healthcare practices.

Materials and Methods

This descriptive, observational retrospective study was conducted at the Blood Bank of a Teaching Hospital & Medical College, which notably lacks a Blood Components Separation facility but hosts a component storage center of a private blood bank for procuring components. The study spanned one calendar year, from January 1st to December 31st, 2010, during which a total of 375 units of whole blood transfused were analyzed to evaluate the appropriateness of their usage across various departments within the hospital.

Study Design

The study employed a retrospective design, focusing on transfusions of whole blood and its components to patients admitted to the Teaching Hospital. This comprehensive approach allowed for an analysis of the distribution of blood to various departments, providing insights into the utilization patterns and identifying potential areas for improvement in blood transfusion practices.

Eligibility Criteria

Patients of all ages and genders who received whole blood transfusions during their admission at the Teaching Hospital were included in the study. The inclusion criteria specifically targeted all whole blood units transfused, regardless of the patients receiving single or multiple units. Exclusions were made for blood units reserved but not issued and units issued for patients admitted outside the Teaching Hospital.

Data Collection

Data were meticulously gathered through a review of blood requisition forms and patient files and records. This process aimed to ascertain the completeness of documentation and the rationale for transfusion based on several variables:

- Indication for transfusion

- Pre-transfusion investigation values
- Name, Age, Sex of the patient
- Department of admission
- Number of units ordered (Single/Multiple)
- Estimated/Actual blood loss
- Vitals of the patient

The assessment was based on predefined criteria for the appropriateness of whole blood transfusions, considering indications like acute blood loss leading to hypovolemia and the necessity for exchange transfusions in certain pediatric conditions.

Analysis

The analysis focused on determining the appropriateness of blood transfusions, classified as appropriate & unavoidable, unsuitable and avoidable, and indeterminate (where appropriateness could not be determined). This classification provided a clear framework for evaluating transfusion practices and identifying areas where adherence to guidelines could be improved

Results

The study analyzed a total of 375 units of whole blood transfused to 221 patients over the course of the year 2010 to assess the appropriateness of blood transfusion practices within the hospital. The findings are summarized under several key categories:

Blood Component Distribution

The distribution of blood components in 2010 revealed a significant reliance on whole blood transfusions, constituting 16% of all transfusions, with packed red blood cells (PRBCs) at 37%, fresh frozen plasma (FFP) at 26%, and platelets at 21%. This distribution underscores the potential for increased utilization of blood components over whole blood to enhance transfusion appropriateness and patient outcomes.

Appropriateness of Transfusion Practices The evaluation of transfusion practices based on the appropriateness criteria established for the study yielded the

Following results:

- Appropriate &Unavoidable Transfusions: Out of the 375 units analyzed, 144 (45.56%) were deemed appropriate, indicating a transfusion was necessary based on the clinical condition of the patient.
- Unsuitable & Avoidable Transfusions: A total of 162 units (47.94%) were classified as unsuitable, suggesting these transfusions could potentially have been avoided.
- Indeterminate: For 69 units (6.49%), the appropriateness could not be determined from the available data.
- Department-wise Analysis of Transfusion Appropriateness
- The study further dissected the data to understand the distribution and appropriateness of transfusions across different hospital departments:
- Surgery: Received the maximum number of units (103), with 51.15% deemed appropriate.
- Medicine: Had the lowest percentage of appropriate transfusions at 17.24%, indicating a significant portion of transfusions in this department could be avoidable.
- Pediatrics: Showed the highest appropriateness rate at 83.01%, reflecting a targeted and judicious use of transfusions in this vulnerable patient group.

- Obstetrics & Gynecology (OBGY) and Orthopedics: Also showed variability in the appropriateness of transfusions, with rates of 41.91% and 47.41%, respectively.

Table 1. Department-wise Analysis of Transfusion Appropriateness.

Department	Whole Blood Issued	C/T Ratio
Medicine	96	2.02
Surgery	103	3.91
Obstetrics & Gynecology (OBGY)	107	8.59
Pediatrics (Paeds)	53	1.88
Orthopedics (Ortho)	16	6.59

Table 2. Analysis of Appropriateness of Transfusion Practices

Department	Appropriate (Unavoidable)	Inappropriate (Avoidable)	Indeterminate	Appropriateness in %
Medicine	20	64	2	17.24%
Surgery	85	86	12	51.15%
OBGY	50	65	2	41.91%
Pediatrics	34	5	4	83.01%
Orthopedics	25	22	9	47.41%
Total	**144 (45.56%)**	**162 (47.94%)**	**69 (6.49%)**	

Analysis of Blood Requisition Forms The study revealed that a substantial number of blood requisition forms (95, 33.44%) were incompletely filled, missing critical information necessary for evaluating the rationale behind the transfusion requests. This lack of complete documentation represents a significant area for improvement in transfusion practices.

Single Unit Transfusions

The analysis identified a high rate of single unit transfusions, which constituted 96 (53.68%) of the cases. Given the World Health Organization's discouragement of single unit transfusions in adults due to associated risks, this finding highlights a critical area for practice improvement.

Discussion

This study revealed a significant portion of blood transfusions, nearly 47.94%, were deemed avoidable, highlighting a critical gap between current transfusion practices and established guidelines (1). The high rate of appropriate transfusions underscores a pressing need for enhanced education and adherence to transfusion protocols among clinicians, a finding that aligns with previous research indicating variability in transfusion practices across different healthcare settings (2,3). The department-wise analysis indicated the highest appropriateness in Pediatrics (83.01%) and the lowest in Medicine (17.24%), suggesting that transfusion decisions in the pediatric population are more carefully considered, possibly due to the heightened awareness of risks associated with transfusions in children (4). Conversely, the broad spectrum of conditions treated within the Medicine department might contribute to the lower rate of appropriateness, reflecting findings from Mozes et al., who reported a significant portion of transfusions in internal medicine could be avoided with stricter adherence to guidelines (5). The study also highlighted a concerning number of single unit transfusions, contrary to WHO recommendations, emphasizing the need for a shift towards more judicious use of blood components to minimize risks and optimize patient outcomes (6). This aligns with the perspective offered by Isbister, suggesting that the promotion of blood

component use over whole blood could significantly improve transfusion appropriateness (7). Moreover, the lack of complete information on a considerable number of blood requisition forms points to a systemic issue in documentation practices, which could hinder the accurate assessment of transfusion needs. This finding is consistent with the work of Addo-Yobo et al., who identified inadequate documentation as a barrier to evaluating the appropriateness of blood use (8). The establishment of a Hospital Transfusion Committee (HTC) and the formulation of a Maximum Surgical Blood Ordering Schedule (MSBOS) as recommended by the study could serve as pivotal steps towards improving transfusion practices (9). These strategies, coupled with regular audits of transfusion practices, have been shown to enhance the appropriate use of blood in hospitals (10).

Conclusion

The findings from this study illuminate the need for ongoing education, improved documentation, and stricter adherence to transfusion guidelines to enhance the appropriateness of blood transfusions in healthcare settings. Implementing structured protocols and regular audits could foster more judicious use of this vital resource, ultimately improving patient care and outcomes.

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