



ORIGINAL ARTICLE

Impact on costs related to inadequate indication of blood transfusion

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Abstract

Introduction: Blood component wastage has become a financial and ethical challenge in everyday hospital practice. Inadequate indication of blood products has been reported in up to 57.3% of cases. This has caused a significant increase in the costs associated with blood transfusion. The aim of this study was to establish the impact of inadequate indication of blood products on costs related to blood transfusion in a university hospital.

Material and methods: A retrospective, descriptive, observational study was conducted to evaluate blood product transfusions performed between January 1 and June 30, 2015, based on the criteria of the American Association of Blood Banks. The direct cost of blood product units was determined and transfusions were classified by type of indication, and the service ordering the transfusion.

Results: Based on the American Association of Blood Banks guidelines, 1028 transfusions were evaluated and 47.8% of these had an inadequate indication, equivalent to an estimated \$38,766.87 USD for direct processing costs. According to the type of blood product transfused, 29.4% of fresh frozen plasma, 38.6% of packed red blood cells, and 68.2% of platelet concentrates had an inadequate indication.

Conclusions: An inadequate blood transfusion indication produces a high impact on costs related to blood transfusion involving an estimated yearly unnecessary expense of \$860,766.64 USD in our hospital.

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Introduction

Preventive strategies are needed for the identification, evaluation and treatment of anemia, to optimizing hemostasis and to establish decision thresholds to minimize inadequate use of blood and its products.¹ According to the American Association of Blood Banks (AABB), approximately 15 million units of packed red blood cells (RBC) are transfused in the United States and almost 85 million are transfused annually worldwide.² In 2013, the National Blood Transfusion Center in Mexico (CNTS, in Spanish) reported that 5,933,405 units were dispensed; however, to date the total number of units transfused at the national level has not been published.³

In the state of Nuevo Leon, in 2014, a total of 235,935 units⁴ were dispensed; of these, according to reports from the State Center for Blood Transfusion (CETS), 162,340 (68.8%) were transfused.⁵ At the University Hospital of the Autonomous University of Nuevo Leon (HU-UANL) during 2014, a total of 22,808 units of blood products were transfused.⁶

The AABB has published guidelines that establish the different criteria for transfusing fresh frozen plasma (FFP),⁷ RBC, and platelet concentrates (PC).⁸ In 2007, The Mexican Association of Transfusion Medicine (AMMTAC, in Spanish) published the Guidelines for the Clinical Use of Blood, which provides clinical and laboratory criteria for the use of blood and blood products.⁹

According to the literature 0.3–57.3% of transfusions are inadequate.¹⁰ Regarding the type of blood product transfused, for RBC, up to 70% of transfusions are inadequate, while for FFP it has reached 87.5%.¹¹ Nationally, the percentage of inadequate transfusions reached 45%.¹² According to a study by González-Villanueva et al. performed from 2009 to 2011 in patients from the Internal Medicine, Orthopedics, Gynecology and Surgery Services of “Dr. José Eleuterio González” University Hospital, in Monterrey, Mexico, 16.2% of transfusion were inadequate based on AMMTAC criteria.¹⁰ However, the percentage of inadequate transfusions in other areas of this hospital is unknown.

The use of methods for risk reduction and the development and implementation of new technologies for donation and transfusion have contributed to a significant increase in the cost of blood transfusion.¹³ Currently, 1% of total hospital costs are attributed to blood transfusion; however, this may vary by disease and procedure. For example, in treatments such as liver and bone marrow transplants, blood transfusion plays an important financial role representing 5% to 9% of total hospital costs, which can easily exceed \$3800 USD per treatment.¹⁴ A study published by Sanchez-Alvarez et al. in 2000, reported a RBC unit cost of \$1750 MXN (equivalent to \$98.59 USD) in a public hospital, while in a private hospital the cost was \$5232.25 MXN, (equivalent to \$294.77 USD), thus establishing a significant difference in costs related to transfusion in the public versus the private sector.¹⁵

In 2004, Juárez-Rangel et al. published a retrospective study from the CNTS, which reported that up to 63.3% of blood products were inadequately transfused, with an estimated impact of \$1,700,000.00 MXN, equivalent to about \$95,775 USD, annually in direct costs.¹²

Numerous studies have established the benefits of implementing restrictive transfusion strategies.^{2,16–20} Since these

strategies are currently being implemented in our hospital, we considered it important to assess proper adherence to international guidelines (AABB) and its impact on costs related to blood transfusion.

Material and methods

This is a retrospective, observational, descriptive study of transfusion of blood products (RBC, FFP and PC) performed at the “Dr. José Eleuterio González” University Hospital in Monterrey, Mexico, from January 1 to June 30, 2015. The study was based on the number of blood products transfused, registered in the CiBank blood bank hospital system during 2014. Using the formula for calculating proportions in finite populations with an expected rate of 50%, an accuracy of 0.03 and a confidence interval of 95%, we obtained a sample size of 1019 transfusions. In order to project with greater adherence the hospital’s transfusion behavior, the sample was randomly distributed over a period of 6 months using Epidat version 4.1.

Transfusions of RBC, FFP and PC in hospitalized patients older than 18 years were included.

Transfusions in pediatric patients were not included in this study, since the indication for transfusion in these patients includes different criteria for transfusion of blood components in adults, cryoprecipitate transfusions were not included because of the special requirements for transfusion, apheresis platelet transfusions were not included, because in our hospital they are performed under the express request of the treating physician and pre-programming of the procedure; records with incomplete data were excluded.

The medical record of each patient was reviewed and the presence of acute bleeding was assessed according to the classification of the AMMTAC.⁹ The indication of transfusion of blood products was evaluated according to the recommendations of the AABB.^{2,7,8}

For cost analysis, an estimate was made considering costs directly related (resources) to the processing of units (blood donor selection, collection, analysis, fractionation, storage, and compatibility testing) according to current market prices without considering the annual inflation rate. Costs were pooled by units transfused in each service and costs per unit transfused with an inadequate indication. Conversion of Mexican pesos (MXN) to United States dollars (USD) was performed according to the Exchange Rate to Settle Liabilities Denominated in United States Dollars Payable in Mexico, published by the Bank of Mexico on March 7, 2016.

Statistical analysis was performed using SPSS version 20.0 for Windows; for categorical variables frequency and percentage tables were used and bar and sectors graphs were created. For numeric variables, measures of central tendency and location, such as median and interquartile ranges was used. Pearson’s Chi square test was used for comparison of categorical variables, considering a value $\leq .05$ as statistically significant.

Results

In total, 1447 units of blood products transfused between January 1 and June 30, 2015 were selected for analysis. Of

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