Where Does Blood Go? Study on Transfusion Practices in SAQR Hospital, Ras Al Khaimah, UAE

Agarwal Anshoo[1], Begum Saidunnisa[2], Chudasama Meghna[3], Raidullah Emadullah[4]

[1]Chairperson Pathology, Ras Al Khaimah Medical and Health Sciences University, Ras Al Khaimah United Arab Emirates

[2] Chairperson Biochemistry, Ras Al Khaimah Medical and Health Sciences University, Al Khaimah United Arab Emirates

[3] Doctor, LVIV National Medical University, UKRAINE

[4] Final year Medical student, Ras Al Khaimah Medical and Health Sciences University, Ras Al Khaimah United Arab Emirates

Abstract: ***Blood transfusion is a complex activity in healthcare, constitutes an important part of various treatment protocols. Thus the indications for ordering blood must be fully justified to avoid over or misusage of this resource. In a 5 year retrospective study, details of patient's diagnosis and indications for transfusion are correlated with whole blood and components transfused from the blood bank data base in SAQR Hospital, in Ras Al Khaimah UAE. It was found that 7,045 blood units which were transfused, maximum blood was supplied to surgical wards; most common indications for transfusion were injuries during road traffic accidents, orthopedic surgeries and cardiovascular surgeries. Nearly half (52%) of all blood was given to female recipients. UAE nationals received the maximum units of blood; most prevalent blood group among blood transfusion recipients was O +ve. Major usage of blood products transfused were packed RBC's. The study concludes that regular assessment of blood component usage followed by academic sessions for clinicians is recommended for effective and efficient use of available blood to patients in a life-threatening situation.***

Keywords: Transfusion, Packed Red blood cell, Blood usage, Blood groups, Road traffic accidents

1. Introduction

After the first successful human blood transfusions in the 17th century, James Blundell, the English obstetrician who undertook some of the early procedures, cautioned that blood transfusion should be reserved for emergencies [1]. Modern transfusion began with the identification of the major blood groups in 1901 and subsequent use of the agglutination technique for compatibility testing in 1907 [2]. The development of anticoagulant-preservative solutions led to the establishment of World War I blood depots in British Casualty Clearing Stations [3]. The quality of these early red blood cell (RBC) components was not well documented, but by all accounts, war-time transfusions saved lives [4] .Clinicians now have an array of RBC components, and the physiology of oxygen delivery has been researched extensively.

Blood is a vital healthcare resource used in a broad range of hospital procedures, viz. accidents, emergency obstetric services, and other surgeries. It is also a potential vector for harmful and infectious diseases, such as HIV, hepatitis B and C. As per a global database, 6 million of 81 million units of blood collected annually in 178 countries are not screened for transfusion- transmissible infections [5].

Worldwide, more than half a million women die each year during childbirth or in the postpartum period [6]. Severe bleeding during delivery or after childbirth is the most common cause of maternal mortality globally (25%) and contributes to around 31% of maternal deaths in Asia [7].

Because of the unpredictable nature of postpartum bleeding, blood transfusion has been identified as one of eight key life-saving functions that should be available in healthcare facilities providing comprehensive emergency obstetric care [8, 9] . Access to a safe and sufficient blood supply could help prevent deaths of a significant number of mothers and their newborn children.

Every year, about 75 million units of blood are collected worldwide. Despite serious immunological and non-immunological complications, blood transfusion holds a therapeutic index that exceeds that of many common medications. To improve quality within transfusion practice, treatment with blood components was started. Studies regarding information on the use of blood components and transfusion practices in Ras Al Khaimah are limited.

2. Aim & Objectives

To study indications of blood transfusion, clinical profile and demographic details of patients receiving blood transfusion at SAQR Hospital, Ras Al Khaimah, United Arab Emirates. To study the prevalence of different blood groups among patients receiving blood transfusion at SAQR Hospital, Ras Al Khaimah., United Arab Emirates.

3. Materials and Methods

A 5-year retrospective study (2007 – 2011) of the transfusion practices at SAQR Hospital, in Ras Al Khaimah was done.

The information was obtained by analyzing the records from files obtained from the blood bank of SAQR hospital, Ras Al Khaimah. Included in the study were transfusions given for routine surgery, road traffic accidents, bleeding during delivery, inherited and acquired anemia based on where maximum number of units were consumed. We analyzed the results by units used within each category. We did not combine information from individual patients who received more than one transfusion during the study period.

4. Results

The records of 7,045 units which were transfused in SAQR Hospital were analyzed. In our study 33% (2345) of units were given to surgical patients, 27% (1902) to road traffic accident victims. 16% (1127) units were given to medical patients, and 8% (564) to obstetrics and gynecology patients. Hematological disorders accounted for 10% (705) of use. No clinical details were supplied regarding the indication for 1% (71) of transfused units, and 5% (352) units were reported as wasted (Fig-1). 52% of all blood was given to female recipients, and 48% to male recipients, the mean age of recipients of individual units was 43.9 years (Fig-2). The most common surgical indications for transfusion were injuries during road traffic accidents, orthopedic surgery and cardiovascular surgery. UAE nationals received maximum units of blood and the patients who received maximum number of blood units had O positive blood group (Fig-3, 4) . Among the blood products transfused the usage was as follows-majority was packed RBC's followed by fresh frozen plasma, single donor platelet, cryoprecipitate and irradiated RBC's (Fig-5).

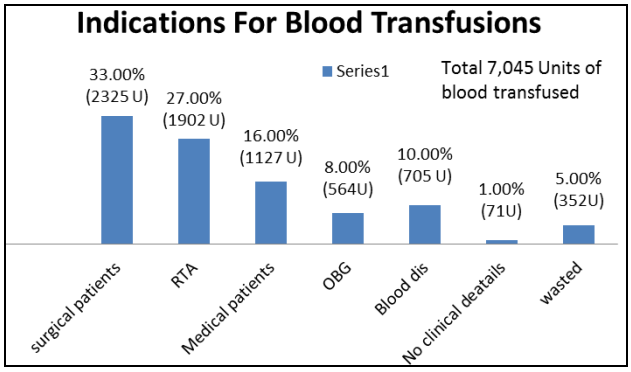

Figure 1: Indications for blood transfusions

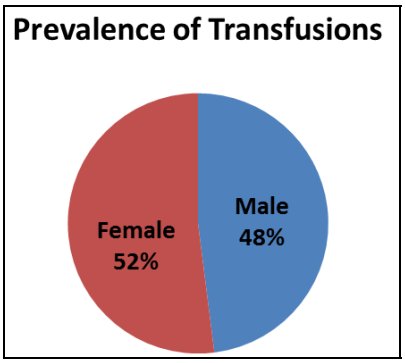

Figure 2: Prevalence of Transfusions

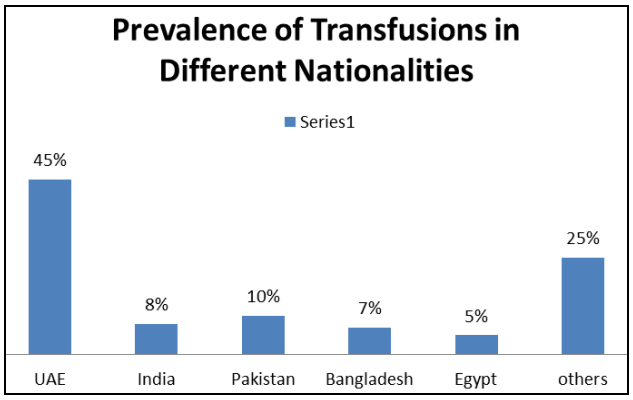

Figure 3: Prevalence of transfusions in different nationalities

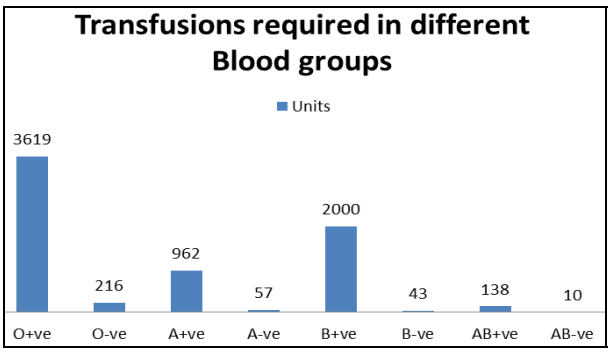

Figure 4: Transfusions required in different blood groups

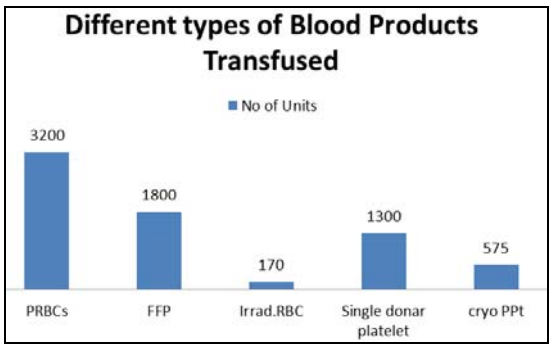

Figure 5: Different Types of blood products transfused

5. Discussion

In Ras Al Khaimah, which is one of the Emirates of United Arab Emirates, more than half of blood units are transfused for surgical indications followed by road traffic accidents and majority usage of blood products was packed RBC's and 52% of all blood units were used in female patients with road traffic accidents. For example, a 30.2% reduction of blood use in road traffic accident would reduce overall significant blood. Erythropoietin has the potential to reduce the figures in our study, though it is unlikely to be as successful as it has been in patients with anemia because of renal impairment.

In recent years, blood transfusion requirements have been increasing due to the increasing burden of chronic disease in an aging population, improvement in life-support technology, increasing severity of illness in patients treated in the ICU, and other blood-intensive surgical procedures [8,9] .On average, 16% of patients in medical ICUs and 27% of those in surgical ICUs receive transfusions every day in the United States [10]. For decades, blood donation and transfusion were considered to be a life-saving strategy, and an arbitrary threshold of 10 g/dL was used as a transfusion

trigger in critically ill patients [11]. However, it has become evident that blood transfusion has immunomodulating effects that may increase the risk of nosocomial infections and cancer recurrence, and the possible development of autoimmune diseases later in life [12,15] . Consequently, the safety of blood transfusions has been questioned and has led to a reevaluation of our blood transfusion practice.

The current trend of replacing the lost blood volume by components, instead of whole blood unit, often leads to situations where 1 unit of PRBC is transfused along with 1 unit each of FFP and platelet concentrate, with the aim of reconstitution of whole blood in the recipient's circulatory system. It is important to recognize uncommon blood types, antibodies, and special transfusion requirements, especially if frequent or large-volume transfusion is expected. During hospitalization, the sample in the blood bank must be renewed periodically due to the possible appearance of new antibodies, unless the patient has no recent (past three months) history of transfusion or pregnancy.

Several developments promise to revolutionize RBC transfusion. The genes encoding the major blood group antigens have been cloned, and differences in DNA sequence have been associated with erythrocyte surface antigen expression. Molecular technology has already been used to determine fetal Rh blood group in the maternal circulation. Using a microarray chip format, rapid screening for single-nudeotide polymorphisms (SNPs) in blood group coding sequences have suggested that a new generation of fully automated DNA analyzers could replace agglutination for blood typing, for selecting the best donors for patients with multiple alloantibodies [16] . Integrated microchip arrays or nanotechnology are being developed to enhance rapid screening of donated blood for any number of infectious agents [16, 17] .

Better understanding of microcirculatory control and sensitive measures of tissue hypoxia promises to provide a more objective basis for initiating, continuing, or discontinuing RBC transfusion [18, 19]. To circumvent RBC compatibility problems, methods to remove and mask blood group antigens are being investigated [20, 21]. Large-scale ex-vivo production of mature human erythrocytes from hematopoietic stem cells has been achieved [22]. Whereas creating tens of millions of RBCs seems improbable, the technology might be useful for rare donor units. Finally, although RBCs substitutes have been unsuccessful until now, new products are now entering late-stage clinical trials and could ultimately prove important for trauma resuscitation and problems with red-cell compatibility [23].

6. Conclusions

Our study provides information on blood component usage in a tertiary care hospital. Highlights the increase supply of blood in the surgical wards due to large incidences of road traffic accidents in RAK Emirate, UAE. There is immediate need to develop a comprehensive policy and programs to promote safe driving in the RAK Emirate, to reduce the burden of RTA in the country so that large number of blood units can be saved and made available to patients in a life threatening situations.

7. Acknowledgement

Blood bank, SAQR Hospital, Ras Al Khaimah. No funds or grants from any source were used to conduct this study.

References

[1] Blundell J. Some account of a case of obstinate vomiting in which an attempt was made to prolong life by the injection of blood into the veins. Med Chir Trans 1818; 10: 310-12.
[2] Landsteiner K. Uber Agglutinationserscheinungen normalen menschlidien Blutes. Klin Wschr 1901; 14:1132.
[3] Robertson OH. Transfusion with preserved red blood cells. Brit Med J. 1918; 1:691–695.
[4] Hess JR, Schrnidt PJ. The first blood banker Oswald Hope Robertson. Transfusion 2000; 40:110-13.
[5] World Health Organization. Global data baon blood safety-report 2001-02. Geneva: World Health Organization, 2004:5-17.
[6] Chandy BK. WHO fact sheet. Kuwait Med J 2007; 39(3):298-302.
[7] Cruz JR. Reduction of maternal mortality: the need for voluntary blood donors. Int J Gynecol Obstetr 2007; 98:291-3.
[8] Wells AW, Mounter PJ, Chapman CE, et al. Where does blood go? Prospective observational study of red cell transfusion in north England. BMJ 2002; 325:803
[9] National Blood Data Resource Center. Comprehensive report on blood collection and transfusion in the United States. Bethesda, MD: National Blood Data Resource Center, 2001
[10] Groeger JS, Guntupalli KK, Strosberg M, et al. Descriptive analysis of critical care units in the United States: patient characteristics and intensive care unit utilization. Crit Care Med 1993; 21:279-291
[11] Cane RD. Hemoglobin: how much is enough? Crit Care Med 1990; 18:1046-1047
[12] Hebert PC, Fergusson DA. Red blood cell transfusions in critically ill patients. JAMA 2002; 288:1525-1526
[13] Taylor RW, Manganaro L, O'Brien J, et al. Impact of allogenic packed red blood cell transfusion on nosocomial infection rates in the critically ill patient. Crit Care Med 2002; 30:2249-2254
[14] Vincent JL, Baron JF, Reinhart K, et al. Anemia and blood transfusion in critically ill patients. JAMA 2002; 288:1499-1507
[15] Martin L, Watier H, Vaillant L, et al. Sjogren's syndrome and vitiligo in a woman with posttransfusion microchimerism. Am J Med 2001; 111:419-421
[16] Hashmi G, Shariff T, Seul M, et al. A flexible array format for large-scale, rapid blood group DNA typing. Transfusion 2005; 45: 680-88.
[17] Clewley JP. A role for arrays in clinical virology: fact or fiction? J Clin Virol 2004; 29:2-12.
[18] Buehler PW, Alayash AI. Oxygen sensing in the circulation: "cross talk" between red blood cells and the vasculature. Antioxid Redox Signal 2004; 6:1000-10.
[19] Tsai AG, Cabrales P, Hangai-Hoger N, Intaglietta M. Oxygen distribution and respiration by the microcirculation. Antioxid Redox Signal 2004;6:1011-18

[20] Murad KL, Mahany KL, Brugnara C, Kuypers FA, Eaton JW, Scott MD. Structural and functional consequences of antigenic modulation of red blood cells with methoxypoly (ethylene glycol). Blood 1999; 93: 2121-27.
[21] Olsson ML, Hill CA, de la Vega H, et al. Universal red blood cells-enzymatic conversion of blood group A and B antigens. Transfus Clin Biol 2004; 11: 33-39.
[22] Giarratana MC, Kobari L, Lapillonne H, et al. Ex vivo generation of fully mature human red blood cells from hematopoietic stem cells. Nat Biotechnol 2005; 23: 69-74.
[23] Spahn DR, Kocian R, Artificial O2 carriers: status in. 2005. Curr Pharm Des 2005; 11: 4099-114.

Author Profile

Chairperson Pathology, Ras Al Khaimah Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates

Chairperson Biochemistry, Ras Al Khaimah Medical and Health Sciences University, Ras Al Khaimah, United Arab Emirates.

Doctor, LVIV National Medical University, UKRAINE

Emadullah Raidullah is a 5th year MBBS student of RAK Medical and Health Sciences University. In future his plan is to specialize in any branch of General Medicine. His research interests are in areas of Medicine as medical practice is becoming completely evidence based.