ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 10, Issue, 04, pp. 35041-35044, April, 2020

RESEARCH ARTICLE OPEN ACCESS

MAJORAPPROACHES OF BLOOD TRANSFUSION IN POLYTRAUMATIZED PATIENTS: A SYSTEMATIC REVIEW

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ARTICLE INFO

Article History:
Received 06th January, 2020
Received in revised form
19th February, 2020
Accepted 03rd March, 2020
Published online 29th April, 2020

Key Words:
Polytrauma. Transfusion Blood Components. Survival. Epidemiologic Data. Time to Hemostasis. Derivatives Volume.

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ABSTRACT

Introduction: Experimental Clinical studies have shown that loss of up to 75% of red cell mass can be tolerated as long as it kept the blood volume. However, blood volume loss of about 30% are fatal. The initial attention in patients with bleeding should be given to maintain blood volume and oxygen transport. **Objective:** Review and discussion of literature findings blood transfusion (blood components gradient) in polytrauma patients. **Methods:** The model followed for the review was PRISMA. We used the databases as Scielo, Lilacs, Google Scholar, PubMed articles and works of scientific and doctoral theses master. **Discussion:** According to the discussion in literature, the acute bleeding of large volume are challenges to emergency services. Accordingly, the need to support hemotherapeutic led to the development of protocols for more rational utilization of the monitored blood components. **Conclusion:** hemotherapy services have adopted a very dynamic vision to forecast the clinical condition presented by patients, the need for four or more red blood cell units.

Citation: ***Ana Cristyna Saad Murad, Laura Marcelino Gomes Nogueira, Victor Nagib Queiroz Balech et al.,*** "Majorapproaches of blood transfusion in polytraumatized patients: A systematic review*", International Journal of Development Research*, 10, (04), 35041-35044.

INTRODUCTION

In the United States the trauma is a major cause of death among people 1-44 years and the third leading cause of death among others. Approximately 20% to 40% of trauma deaths or cardiovascular surgery occur after admission and result from massive hemorrhage (Braunstein, 2019). There multicenter studies or randomized clinical corroborating with the practice of resuscitation with blood products, so there are many conflicting recommendations (Bonet, 2018). In the other Western countries is the third cause death after cardiovascular diseases and cancers, and those below 45 years of age, the leading cause of death (Ashley, 2016). According to the Ministry of Health, there were 127,633 deaths from trauma in Brazil in 2005, representing 12.67% of total deaths.

In December 2015, there were 86,583 hospitalizations for trauma in the country (Ashley Martin, 2016). Experimental clinical studies have shown that loss of up to 75% of red cell mass can be tolerated as long as it kept the blood volume. However blood volume loss of about 30% are fatal (Brit Long, 2016 and Chiara, 2009). The initial attention in patients with bleeding should be given to maintain blood volume, and we should then stick to the oxygen-carrying capacity. The patient should be evaluated clinically in order to quantify blood loss, which is often difficult for a patient with bleeding. Therefore, it is recommended by the ATLS (Advanced Trauma Life Support) (Chiara, 2009 and Michael Amatto, 2016). In general, there is no need for red blood cell transfusion for patients with acute trauma of Class I and II, particularly in young patients who can adapt well to anemia due to acute loss, and should

receive crystalloid solutions (Steinmetz, 2016). If more than 40% of the blood volume has been lost (Class III and IV) in young patients or less in elderly patients who may have already beforehand critically impaired physiological functions in addition to receiving crystalloid solutions, need to restore the ability of oxygen delivery, and eventually replacement elements responsible for hemostasis (Steinmetz, 2016). The prospective observational multicenter study of transfusion in trauma (The Prospective Observational Multicenter Major Trauma Transfusion Trial) showed that doctors were transfundindo patients with blood products in a 1:1:1 or 1:1:2 - relative to plasma, platelets and red blood cells (Jones, 2016). It was also demonstrated that early plasma and platelet transfusion associated with improvement in survival at 6 hours after admission (Holcomb). Among patients with severe trauma, and severe hemorrhage, the early administration of plasma, platelets and CHAD in the ratio 1: 1: 1 compared to a ratio of 1: 1: 2 resulted in no significant differences in mortality at 24 hours and mortality 30 days. However, more patients in group 1: 1: 1 obtained homeostasis and lower mortality due to exsanguination in 24h. Although there was an increase in the use of plasma and platelets transfused group 1: 1: 1, no other significant differences identified between the two groups (Jones, 2016). This study aimed to make a literary discussion of blood transfusion (blood components gradient) in polytrauma patients, correlating the statistical data of the main continuous and categorical predictors (polytrauma) with the main predictors of response (fluid replacement).

MATERIALS AND METHODS

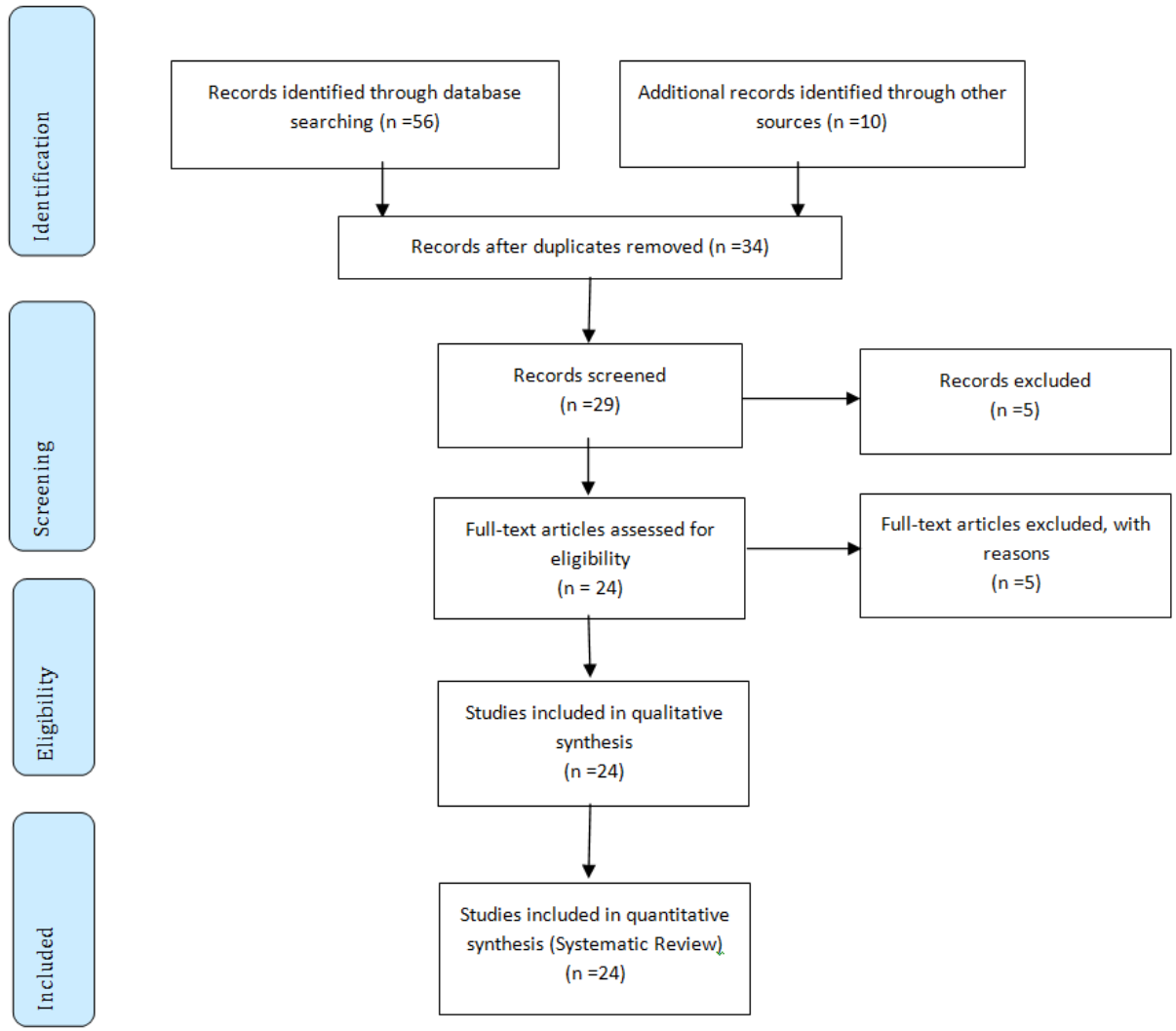
Search Strategy and Information Sources: The search strategy was carried out in the databases PubMed, Embase, Ovid and Cochrane Library, Web Of Science, ScienceDirect Journals (Elsevier), Scopus (Elsevier), OneFile (Gale) followed the following steps: - search by MeSH Terms: "polytrauma" "Transfusion Blood components", "Survival", "Epidemiological data", "time to hemostasis," "volume-based", as shown by Figures 1 and 2, and use ofBooleans “and” between mesh terms and “or” among historical findings.

Risk of Bias: According to the Cochrane model for the risk of bias in the present study, the global assessment resulted in 3 studies with a high risk of bias and 2 studies with uncertain risk. In addition, there was an absence of the funding source in 1 studies and 2 studies did not disclose information about the declaration of conflict of interest.

Continuous Predictors: The continuous predictors were polytrauma.

Response Predictor: The response was predictor volume replacement.

Flow chart



Primary Outcome: It was to assess the efficacy and safety of blood products in transfusions in patients with severe trauma and severe bleeding using plasma, platelets and red blood cells, based on results of a meta-analysis.

Secondary Outcome: To analyze the quality of life after transfusion of blood products.

RESULTS AND DEVELOPMENT

According to the literature, it was found several works and among them were highlighted the following in sequence, with a focus on blood transfusion (blood components gradient) in polytrauma patients (Braunstein, 2019; Bonet, 2018 and Ashley Martin, 2016). Thus, the first literary finding is reported to 720 military with at least one traumatic amputation and with a mean age of 24.3 years (Braunstein, 2019). The red blood cell transfusion average needs (in units) were packed (DAL) 18.6 (0-142), fresh frozen plasma (FFP) 17.3 (0-128), 3.6 platelets (0-26), and 5.6 cryoprecipitate (0-130). Traumatic amputation injuries required significant blood transfusion. Despite the high severity of the injury, 94% of traumatic amputation patients who are alive on admission to an installation of paper II / III will survive the transfer to facilities with higher acuity care (Braunstein, 2019). In this context, the transfusion is not without risk, including transfusion reaction, infection, and increased mortality.

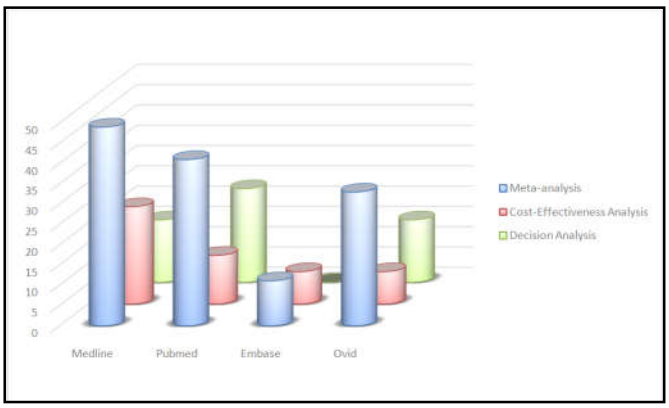


Figure 1. Graph showing the distribution of literature findings in databases on blood transfusion inpolytrauma

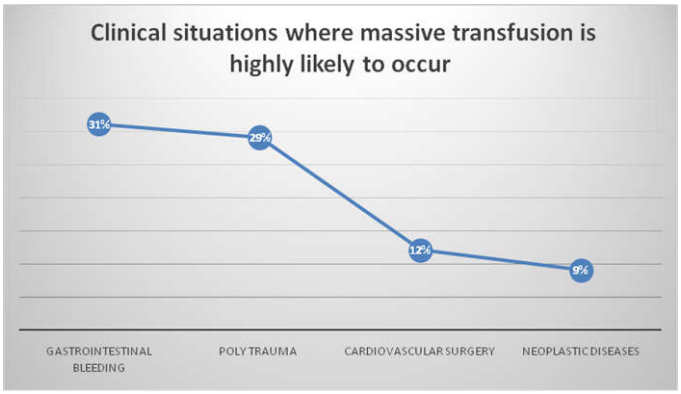


Figure 2. Graph representing the demand for blood transfusion percentage of mass in relation to various types of trauma, multiple trauma and the second largest

A hemoglobin level of 7 g/dL is safe in the setting of critical illness, sepsis, gastrointestinal bleeding and trauma. The doctor should assess and transfusion based on clinical setting and hemodynamic status of the patient instead of using a specific limit (Bonet, 2018). Another study showed that the concentrate ready preventive fibrinogen administered to patients with trauma adults as first-line treatment of trauma bleeding will increase clot strength, as measured by thrombelastography, transfusion requirements and survival in patients receiving hemostatic resuscitation according to current standard of care (Brit Long, 2016). In addition, another study showed burns the importance of red blood cell transfusions may lead to the secondary hemochromatosis. Thus, a case was presented describing the acute development of secondary hemochromatosis multiple transfusions in a burned patient. Therefore, the secondary hemochromatosis was inevitable (Chiara, 2019). Based on other work, it was shown that most polytrauma geriatric patients with severe pelvic fractures were at a high risk of massive transfusion. Extravasation in enhanced computed tomography and abnormal levels of select serum blood markers may help in early identification of multiple trauma geriatric patients at risk for a serious medical outcome (Steinmetz, 2006). A systematic review study found that components that mimic whole blood can produce survival benefits in massively transfused patients after trauma. Twenty-one studies were included in the analysis. Those who received high experienced rates had higher survival benefit (Michael Amatto, 2016). A transfusion study in 24 patients with acute bleeding consisted of an average 16 to 18 units of red blood cells resuspended (ranging from 4.880 mL to 5.220 mL), fresh frozen plasma (980 mL to 1220 mL); cryoprecipitate (average 10 to 15 units or 500 to 750 mL) and concentrated platelets (approximately an average of 8 to 12 units ie, 240-360 mL). As a result, it was confirmed pathophysiological mechanism shown in the available medical literature that after the transfusion of large volumes of concentrated red cells, develops dilutional coagulopathy, caused by a sharp drop in the platelet count and reduced activity of labile coagulation factors the circulation of the patient (Shozo Kanezaki, 2016).

DISCUSSION

According to the discussion in literature, the acute bleeding of large volume are challenges to emergency services. In the historical context, the need to understand the pathophysiology of hemorrhagic shock and the adoption of appropriate therapy date back to World War I, although significant progress has only been made from the use of plasma volume expander as in World War II. In the 50's, the Korean conflict, and in the 60s and 70s, the Vietnam War, brought to American surgeons greater knowledge and experience of haemorrhagic shock (Braunstein, 2019). Accordingly, the need to support hemotherapeutic led to the development of protocols for more rational utilization of the monitored blood products (Stanković, 2016; Holcomb, 2015; Benfield, 2012). In shock by massive blood loss commitment of both tissue perfusion and oxygenation is critical, as well as complications from the base frame (shock and tissue hypoxia) and secondary to therapy (Fleming, 2011; Jacobs, 2014; Ramasamy, 2008). Thus, when there is massive bleeding in an emergency room or an operating room is necessary to make massive transfusion with replacement of at least one blood volume in a range of up to 24 hours, or to spare 50% of volume in three hours or do transfusion of more than 20 units of red blood cells (Kreuger, 2012 and Hoencamp, 2014). Important to remember that only a third of the administered crystalloid volume remains in the intravascular space, the rest spills quickly into the interstitial space, so blood loss when restored with crystalloid should

maintain the proportion of 03 volumes of crystalloid for each volume of blood lost (Penn-Barwell, 2014 and Belmont, 2010). Another detail periods tissue hypoperfusion variables determine significant changes in permeability of microcirculation, causing the distribution to the interstitial space is facilitated, that is alleviated by solutions that increase intravascular colloid osmotic pressure using human albumin solutions or plasma expanders, the use of these is not without complications as interference in hemostasis and anaphylactic reactions (Petersen, 2011 and Davis, 2005). Hematocrit is not a good parameter to guide the decision to transfuse or not to transfuse, due to the fact that only starts to decrease one to two hours after the onset of hemorrhage (Podoll, 2013 and Belmont, 2010).

Conclusion: Therefore, transfusion services have adopted a very dynamic vision to forecast the clinical condition presented by patients, the need for four or more red blood cell units. For more complete service of massive transfusions, it is imperative to review the concepts of volume / perfusion and tissue oxygenation, and the difference that exists between the concepts.

Acknowledgements: The work was supported by Faceres - Medical School - São José do Rio Preto - SP, Brazil.

Declaration of Potential Conflict of Interest: The authors declare no conflict of interest.

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