



Türkiye’de Plazmanın Klinik Kullanımı

Doç. Dr. Dilek GÜRLEK GÖKÇEBAY

Ankara Şehir Hastanesi Çocuk Hematoloji Kliniği

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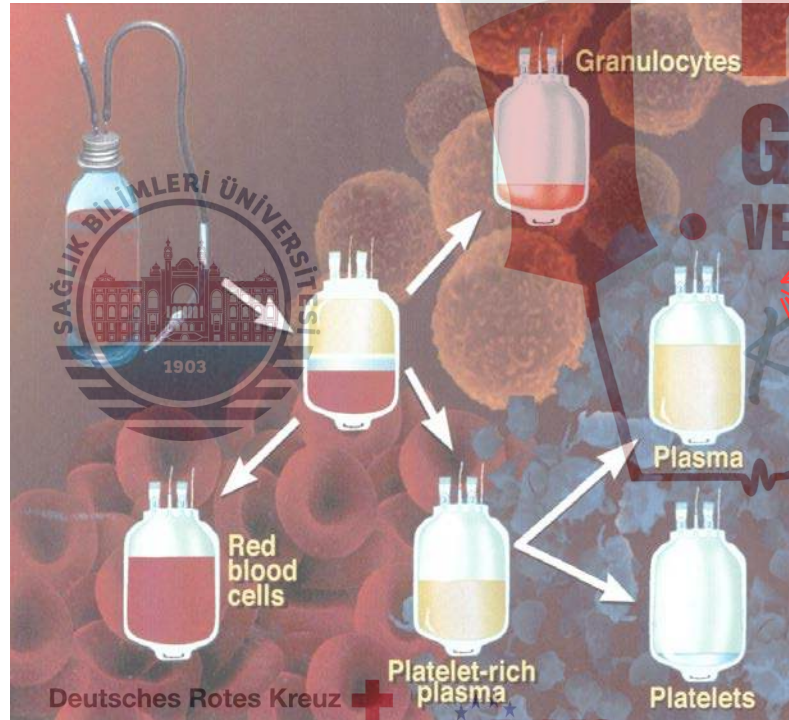
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Plazma Ürünleri



PF24

TDP

Eritilmiş plazma

Likid plazma

S/D inaktive plazma

Cryo-poor plazma

Dried plazma

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Taze Donmuş Plazma (TDP)

- Albumin, globulin, fibrinojen ve koagülasyon faktörlerini içerir
- II. Dünya Savaşı sırasında volum genişletici olarak kullanılmış
- Dr. Charles R. Drew (1941) plazma preservasyon tekniklerini geliştirmiş

TDP

ULUSLARARASI

- Donörden alınan tam kanın bileşenlerine ayrıldıktan sonra 8 saat içinde dondurulması ve $<-18^{\circ}\text{C}$ 'de saklanması

$<-40^{\circ}\text{C}$; 24 ay

$-30 -40^{\circ}\text{C}$; 12 ay

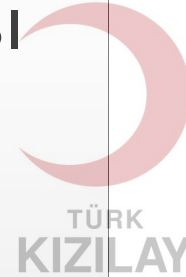
$-25 -30^{\circ}\text{C}$; 6 ay

$-18 -25^{\circ}\text{C}$; 3 ay

- Kullanmadan önce $30-37^{\circ}\text{C}$ de 20-30 dk su banyosunda eritilmeli



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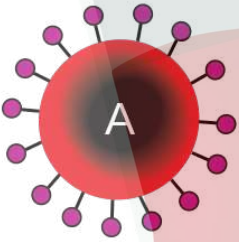
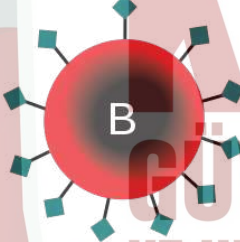
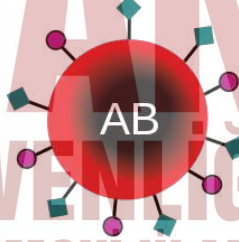
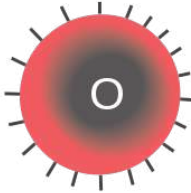



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ULUSLARARASI

- Hacmi 250-300 ml (ort 273 ml)
- Eritildikten sonra mümkün olan en kısa sürede kullanılmalı
- Kullanılmayacaksa +4 °C'de saklanarak 24 saat içinde kullanılmalı
- 10-15 ml/kg dozunda 10-20 ml/kg/sa hızında infüzyon yapılmalı (yaklaşık 30

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma			None	
Antigens in Red Blood Cell	A antigen	B antigen	A and B antigens	None

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AB plazma universal donör

Endikasyonları

- Kanayan hastada kumadin etkisini acilen geri çevirmek için (Öncelikle protrombin kompleks konsantresi (PCC) tercih edilmeli)
- Masif transfüzyon, kardiyak by-pass, karaciğer hastalığında labil koagülasyon faktörleri replasmanında

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Endikasyonları

- DIK ilişkili anormal koagülasyonda
- Spesifik konsantrisi olmayan koagülasyon faktör eksikliklerinde
- Edinsel TTP'de plazmaferezde veya konjenital TTP'de plazma infüzyonu

Warfarin etkisinin geri çevrilmesi

Clinical Situation	Guideline
INR > therapeutic but < 5, no significant bleeding	Lower anticoagulant dosage. Temporarily discontinue drug if necessary.
INR > 5 but < 9, no significant bleeding	Omit 1-2 doses; monitor INR. Resume oral anticoagulation when INR is in therapeutic range or, if patient is at increased risk of hemorrhage, omit a dose and give 1-2.5 mg vitamin K ₁ orally. For rapid reversal before urgent surgery: 2-4 mg vitamin K ₁ orally; repeat dose with 1-2 mg at 24 hours if INR remains elevated.
INR > 9, no significant bleeding	Omit warfarin; give 5-10 mg vitamin K ₁ orally. Closely monitor INR; give additional vitamin K ₁ if necessary. Resume warfarin at lower dose when INR is within therapeutic range.
Serious bleeding at any elevation of INR	Omit warfarin. Give 10 mg vitamin K ₁ by slow intravenous infusion. Supplement with plasma or prothrombin complex concentrate depending on urgency of correction. Vitamin K ₁ infusions can be repeated every 12 hours.
Life-threatening hemorrhage	Omit warfarin. Give prothrombin complex concentrate with 10 mg vitamin K ₁ by slow intravenous infusion. Repeat as necessary, depending on INR.



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INR = international normalized ratio.

Adapted from guidelines developed by the American College of Chest Physicians.¹⁷⁴

Use and effectiveness of prothrombin complex concentrates vs fresh frozen plasma in gastrointestinal hemorrhage due to warfarin usage in the ED.

Karaca MA¹, Erbil B², Ozmen MM³.

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Abstract

OBJECTIVES: High International Normalized Ratio (INR) level resulting from warfarin use increases the risk of gastrointestinal hemorrhages. We aimed to compare the efficacy of prothrombin complex concentrates (PCC) and fresh frozen plasma (FFP) at lowering the INR level, decreasing active hemorrhages visible by endoscopy, and shortening the length of stay at the emergency department (ED).

METHOD: This study is a prospective cohort study of consecutive patents with gastrointestinal hemorrhages that received either PCC or FFP. With strict exclusion criteria, only patients over 18 years of age with a high INR level (>2.1) due to warfarin usage were included.

RESULTS: A total of 40 patients (18 female) were included in the study, 20 each in the PCC and FFP groups. For the PCC group, the mean INR levels at the second and sixth hours were lower than those for the FFP group (second hour INR: 1.53 vs 4.50, $P<.01$, sixth hour INR: 1.52 vs 2.41, $P<.01$). Seven patients experienced active bleeding (Forrest 1) in the FFP group, whereas no patient experienced active bleeding in the PCC group based on the Forrest classification (35% vs 0%, $P<.01$), and only 3 patients in the FFP group underwent invasive/surgical treatment (15% vs 0%, $P<.01$). The ED length of stay was lower for the PCC group (1.62 days vs 3.46 days, $P<.01$).

CONCLUSION: For patients experiencing a gastrointestinal hemorrhage, INR levels were reversed more quickly, there was less active bleeding on endoscopy, and the ED length of stay was lower in the PCC group than in the FFP group.

Karaciğer yetmezliği

- Proakoagülan ve antikoagülan faktörlerin sentez defekti
- Portal ven basıncının artması nedeniyle GIS kanama
- PT ve aPTT kanamayı öngörecektir şekilde trombin oluşumunu yansıtmaz

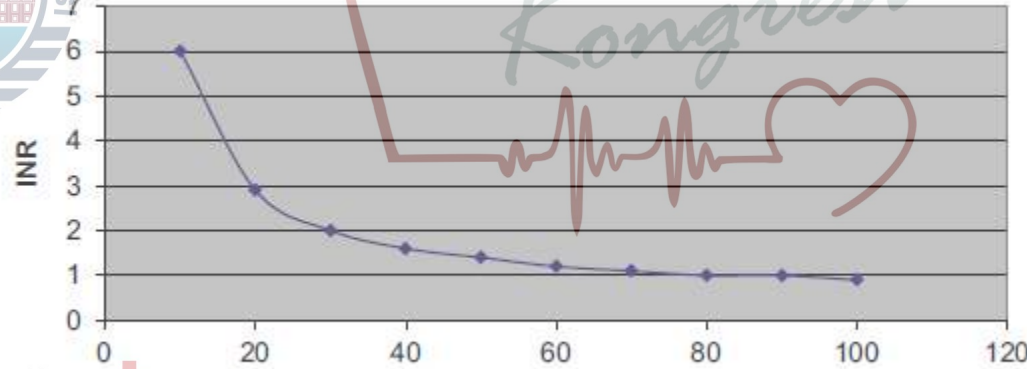
■ Viskoelastik testler (TEG) daha duyarlıdır

Karaciğer yetmezliği

- Asemptomatik hastada INR yüksekliğinde K vitamini tercih edilmeli
- Kanama durumunda veya invaziv girişimler öncesinde ise TDP verilebilir

Anormal koagülasyon testleri

PT/INR ile dolaşımdaki pıhtılaşma faktörlerinin oranı eksponansiyel bir ilişki göstermekte

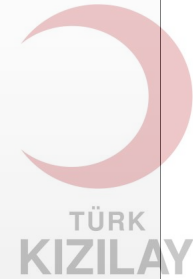


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Effect of fresh-frozen plasma transfusion on prothrombin time and bleeding in patients with mild coagulation abnormalities.

Abdel-Wahab OI¹, Healy B, Dzik WH.

Author information

1 Department of Internal Medicine, Massachusetts General Hospital, Boston, Massachusetts 02114, USA.

Abstract

BACKGROUND: Fresh-frozen plasma (FFP) is frequently transfused to patients with mild prolongation of coagulation values under the assumption that FFP will correct the coagulopathy. There is little evidence to support this practice, however. To determine the effect of FFP on coagulation variables and correlation with bleeding in patients with mildly prolonged coagulation values, a prospective audit of all FFP transfusions at the Massachusetts General Hospital between September 2, 2004, and September 30, 2005, was performed.

STUDY DESIGN AND METHODS: All patients transfused with FFP for a pretransfusion prothrombin time (PT) between 13.1 and 17 seconds (international normalized ratio [INR], 1.1-1.85) and with a follow-up PT-INR within 8 hours of transfusion were included. Of 1091 units of FFP transfused, follow-up coagulation values within 8 hours were available for 121 patients (324 units).

RESULTS: Transfusion of FFP resulted in normalization of PT-INR values in 0.8 percent of patients (95% confidence interval [CI], 0.0020-0.045) and decreased the PT-INR value halfway to normalization in 15.0 percent of patients (95% CI, 0.097-0.225). Median decrease in PT was 0.20 seconds (median decrease in INR, 0.07). Pretransfusion PT-INR, partial thromboplastin time, platelet count, and creatinine values had no correlation with red blood cell loss.

CONCLUSION: It is concluded that transfusion of FFP for mild abnormalities of coagulation values results in partial normalization of PT in a minority of patients and fails to correct the PT in 99 percent of patients.

Paucity of studies to support that abnormal coagulation test results predict bleeding in the setting of invasive procedures: an evidence-based review.

Segal JB¹, Dzik WH; Transfusion Medicine/Hemostasis Clinical Trials Network.

- İnvaziv işlemlerden önce alınan PT ve APTT'nin kanama riskindeki artışı öngörmediğini göstermiş
- Bu nedenle, ciddi karaciğer hastalığı olan hastalarda, şiddetli kanama durumları dışında koagülasyonu normale çevirmek için TDP infüzyonuna gerek yok

Routine Preoperative Coagulation Tests in Children Undergoing Elective Surgery or Invasive Procedures: Are They Still Necessary?

Alzahrani A¹, Othman N¹, Bin-Ali T¹, Elfaraidi H¹, Al Mussaed E², Alabbas F¹, Sedick Q³, Albatniji F¹, Alshahrani Z¹, Asiri M³, Alsuhaibani O³, Elyamany G³.

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- 3 Department of Central Military Laboratory and Blood Bank, Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

Abstract

INTRODUCTION: Preoperative coagulation screening tests in pediatric patients was once routine clinical practice globally and still used as standard practice in some countries before surgical procedures to assess of perioperative bleeding risk.

OBJECTIVE: The study aimed to evaluate unselected routine preoperative coagulation testing in children undergoing elective or invasive surgery to predict abnormal perioperative bleeding. The study also aimed to provide a rational approach of determining bleeding and family history of coagulation disorders as a predictive risk for bleeding.

METHODS: This retrospective study conducted between 2014 and 2015 (1 year) on normal healthy children aged under 15 years admitted to the hospitals for elective mild to intermediate surgery or invasive procedures. We reviewed and collected the details of the clinical history, previous surgery, trauma, family history, detail of anti-thrombotic medication and coagulation tests performed (prothrombin time (PT), the activated partial prothrombin time (APTT), and international normalized ratio (INR)) at the time of admission.

RESULTS: Among 2078 cases, 1940 cases had normal coagulation tests (93.4%), 77 cases had abnormal coagulation results (3.7%), and 61 patients underwent surgery without preoperative coagulation screening (2.9%). In 15 of 77 patients, coagulation tests were normal on repeat testing. A total of 52 were confirmed to have abnormal screening testing. Among these 52 cases, 45 had normal factors assay; where seven patients had abnormal factors assay. Postoperative bleeding occurred only in three cases (0.14%), two cases due to surgical procedures with normal preoperative testing and one due to hemophilia A which was detected postoperatively as no preoperative testing was performed.

CONCLUSIONS: Routine coagulation screening before surgery or invasive procedures to predict perioperative bleeding in unselected patients is not recommended. Our study emphasizes that selective preoperative testing is more appropriate. Selective criteria for consideration of the latter includes physical examination, type of surgery, family and bleeding history, and concomitant use of antiplatelet and anti-thrombotic therapy.

Masif transfüzyon

- Hastaya 24 saat içinde total kan volümüne eşit miktarda kan transfüzyonu yapılması
- 10 Ü'den fazla tam kan veya 20 Ü'den fazla eritrosit süspansiyonu (ES) verilmesi
- Üç saat veya daha az bir süre içinde sirkülasyondaki kan volümünün %50 den fazlasının replasmanı

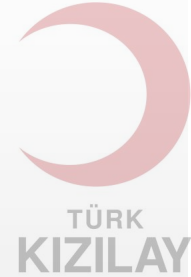
Masif transfüzyon

- Dilüsyonel koagülopati
- Travmaya bağlı faktör tüketimi
- Fibrinoliz aktivasyonu
- Hipotermi ve asidoz
- Bu durumda eritrosit ve trombosit transfüzyonları ile birlikte TDP infüzyonu hayat kurtarıcı olabilir



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Plazmaferez

- Plazma hacminin tamamen veya kısmen değiştirilmesi işlemi
- Kullanılan replasman sıvısı kristalloid, kolloid veya plazma olabilir

Plazmaferez

J Clin Apher. 2016 Jun;31(3):149-62. doi: 10.1002/jca.21470.

Guidelines on the Use of Therapeutic Apheresis in Clinical Practice-Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Seventh Special Issue.

Schwartz J¹, Padmanabhan A², Aqui N³, Balogun RA⁴, Connelly-Smith L⁵, Delaney M⁶, Dunbar NM⁷, Witt V⁸, Wu Y⁹, Shaz BH^{1,10,11}

Author information

Abstract

The American Society for Apheresis (ASFA) Journal of Clinical Apheresis (JCA) Special Issue Writing Committee is charged with reviewing, updating, and categorizing indications for the evidence-based use of therapeutic apheresis in human disease. Since the 2007 JCA Special Issue (Fourth Edition), the Committee has incorporated systematic review and evidence-based approaches in the grading and categorization of apheresis indications. This Seventh Edition of the JCA Special Issue continues to maintain this methodology and rigor to make recommendations on the use of apheresis in a wide variety of diseases/conditions. The JCA Seventh Edition, like its predecessor, has consistently applied the category and grading system definitions in the fact sheets. The general layout and concept of a fact sheet that was used since the fourth edition has largely been maintained in this edition. Each fact sheet succinctly summarizes the evidence for the use of therapeutic apheresis in a specific disease entity. The Seventh Edition discusses 87 fact sheets (14 new fact sheets since the Sixth Edition) for therapeutic apheresis diseases and medical conditions, with 179 indications, which are separately graded and categorized within the listed fact sheets. Several diseases that are Category IV which have been described in detail in previous editions and do not have significant new evidence since the last publication are summarized in a separate table. The Seventh Edition of the JCA Special Issue serves as a key resource that guides the utilization of therapeutic apheresis in the treatment of human disease. *J. Clin. Apheresis* 31:149-162, 2016.

Spesifik faktör replasmanı

J. Pediatr. Hematol. Oncol. 2013 Oct;35(7):551-3. doi: 10.1097/MPH.0b013e3182755c38.

Successful treatment of congenital TTP with a novel approach using plasma-derived factor VIII.

Naik S, Mahoney DH.

Author information

1 Texas Children's Hospital, Houston, TX.

Abstract

We describe a 19-year-old boy who was diagnosed with congenital thrombotic thrombocytopenic purpura (cTTP) at 7 months of age. He was subsequently treated with fresh frozen plasma infusions every 3 to 4 weeks for the next 15 years at which point he developed significant hypersensitivity reactions to fresh frozen plasma. He required immunosuppressive therapy with systemic desensitization in the intensive care unit but did not tolerate this regimen and suffered debilitating adverse effects. On the basis of the observations from United Kingdom, he was started on a trial with Koate, a plasma-derived factor VIII concentrate with ADAMTS-13 activity that is commercially available in the United States. He tolerated Koate without any complications and attained a target platelet count of $>100,000/\mu\text{L}$. He has now been in remission for 36 months and responds to exacerbations of cTTP with additional doses of Koate. For patients with cTTP who are intolerant to plasma infusions, therapy with select plasma-derived factor concentrates with ADAMTS-13 activity may represent a reasonable alternative therapy.

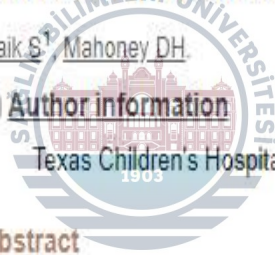
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Olası komplikasyonlar

- Viral enfeksiyon bulaşı
- Aşırı intravasküler volüm yükü
- Allerjik reaksiyonlar
- IgA eksikliğinde anafilaksi
- Transfüzyon ilişkili akciğer hasarı (TRALI)

Önerilmeyen durumlar

- Spesifik faktör konsantrasi bulunan koagülopatiler (FVIII,IX)
- Plazma değişiminde rutin olarak
- Hipoproteineminin düzeltilmesi
- Kanaması olmayan kronik karaciğer hastalığı
- Hafif uzamış INR (<2.0)
- **Volüm replasmanı için kullanılmamalı!**

Albumin

- Plazma fraksinasyonu ile elde edilir
- Volum genişletici, plazma onkotik basıcının %80'ini oluşturur
- Yarı ömrü 16 saat
- Maliyeti yüksek
- Sıvı resüsitasyonu amaçlı kullanımının saline üstünlüğü gösterilememiş

Albumin

- Diğer endikasyonları:
 - parasentez sonrasında
 - Kısa zincirli peptid suplementasyonuna rağmen devam eden diare (>2 L/d) veya hipoalbuminemi (<2.0 g/dL)
 - Plazmaferez

Albumin

- %20lik human albumin: 100 ml 469 ₺
- 1 ünite TDP: 69 ₺

4.2.27.Ç - Human albumin kullanım ilkeleri

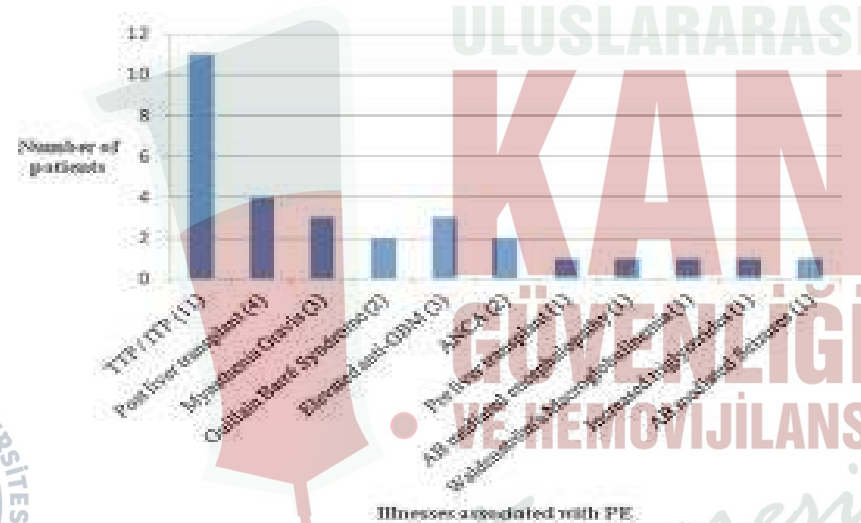
(1) Human albümin preparatları, yalnızca yatarak tedavi gören hastalara, albümin düzeyi 2.5g/dl ve altında ise uzman hekimlerce reçete edilebilir. Laboratuvar sonuçları ve kullanılan miktar epikrizde belirtilir.

(2) Yatarak tedavilerde Kurumla sözleşmeli resmi sağlık kurumunca temin edilememesi durumunda, günlük doz ve tedavi protokolünü ve kan albümin düzeyinin 2.5g/dl ve altında olduğunu gösterir uzman hekim raporuna dayanılarak en fazla 3 günlük dozda "Eczanemizde Yoktur, Yatan Hasta" kaşesi basılıp başhekimlik onayı ile reçete düzenlenmesi kaydıyla karşılanır ve ödenen tutar ilgili sağlık kurumunun alacağından mahsup edilir. Mahsup edilen ilacın/ilaçların sağlık kurumunca ihale yöntemi ile temin edilemediğinin başhekimlik onayı ile belgelendirilmesi halinde mahsup edilen tutar sağlık kurumuna iade edilir.

(3) Plazmaferezde veya karaciğer nakli yapılmış hastalarda kan albümin düzeyi şartı aranmaz.

Plasma exchange in the intensive care unit: a 10 year retrospective audit.

Paton E¹, Baldwin IC².



Illnesses associated with PE

Disease or illness	Substance for removal	Rationale	Suggested regimen		Frequency
			Fluid	Amount ^a	
Thrombotic Thrombocytopenic Pürpura (TTP)	Antibodies that inhibit ADAMTS13	A deficiency of ADAMTS13 enzyme is a result of auto-antibodies ^{4,21}	FFP ^{4,26,11}	4-6L 1-1.5 PV ^{4,21,8}	Daily or twice daily ^{4,23,8}
Guillain-Barré Syndrome (GBS)	Antibodies	Prompt commencement is most effective ^{4,12}	Albumin ^{4,14}	4-6L 1-1.5 PV ^{4,14}	2nd daily ⁴
Myasthenia Gravis (MG) NB 2nd line or treatment in a crisis	Acetylcholine receptor (AChR) antibodies	PE is fast acting (days) with a short duration of action (weeks). ¹⁰ Most beneficial in a myasthenic crisis or as a bridging tool ¹⁰	Albumin ^{4,14}	4-6L 1-1.5 PV ^{4,14}	2nd daily ¹⁵⁻¹⁷
Waldenström's Macroglobulinemia (WM)	Immunoglobulin (IgM)	Increased IgM creates hyperviscosity. ¹⁸ A single PV exchange will reduce circulating IgM by 50-60% ¹	Albumin ^{4,18}	4-6L 1-1.5 PV ^{4,18}	Daily ⁴
Anti-glomerular basement membrane (anti-GBM) disease	Anti-GBM antibodies	PE therapy removes anti-GBM antibodies therefore reversing the effect of the disease. ²¹	Albumin ^{4,17,21}	4-6L 1-1.5 PV ⁴	Daily ^{4,17,21}
Overdose of poisoning	Protein bound toxins	PE therapy removes highly protein bound toxins, but limited by unique characteristics of toxins ⁴	Albumin ⁴	4-8L 1-2 PV ⁴	Daily ⁴
ABO incompatible (ABOI) transplant	Anti-A and/or Anti-B antibodies	PE therapy can reverse the clinical and pathologic manifestations of rejection. ^{4,22}	Albumin ^{22,23}	4-6L 1-1.5 PV ^{4,22,23}	2nd daily pre-transplant ^{4,23} daily or 2nd daily post-transplant ⁴

PV, plasma volumes; FFP, fresh frozen plasma (containing ADAMTS13 enzymes); CNS, central nervous system.

^a Volumes are given based on an 80 kg person (one plasma volume = 50 ml/kg).

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The single center registry for therapeutic apheresis in Turkey: 11-year activity

Gurhan Kadikoylu^{a,*}, Irfan Yavasoglu^a, Ayca Ozkul^b, Ali Akyol^b, Vahit Yukselen^c,
Engin Guney^d, Zahit Bolaman^a

A B S T R A C T

Therapeutic apheresis (TA) is used as primary and adjunctive therapy in the treatment of several diseases and syndromes. We retrospectively evaluated the results of therapeutic apheresis (TA) including therapeutic plasma-exchange (TPE), double filtration plasmapheresis (DFPP), therapeutic thrombocytapheresis and leukocytapheresis as 11-year activity during 2000–2011. A total of 845 TA procedures were performed in 114 patients (67 male and 47 female, with mean age 51 ± 17 years). Adverse events (AE) were seen in 8.6% of procedures. None of the patients died from any complication. TA is safely carried out in our center in several diseases which are similar to previous reports.

flow technique. Central venous catheter (91%) and peripheral veins (9%) were used as venous routes. Fresh frozen plasma (88%) and 5–20% albumin solutions (12%) were used as replacement fluids for TPE. While anticoagulation with citrate was used in TPE, therapeutic thrombocytapheresis and leukocytapheresis, PFPP was done with heparin.

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The evaluation of the audit of Fresh-Frozen Plasma (FFP) usage in emergency department.

Emektar E¹, Dağar S¹, Corbacioglu SK¹, Uzunosmanoglu H¹, Oncul MV¹, Cevik Y¹.

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Abstract

OBJECTIVES: In our study, the aim is to evaluate the use of Fresh-Frozen Plasma (FFP) in our emergency department and to assess its audit for transfusion.

METHODS: All the patients aged 18 and over who received FFP transfusion in the emergency department between March 1, 2013 and March 1, 2016 were included into the study. The audit of FFP use was evaluated by according to 'British Committee for Standards in Hematology Guideline-2004'.

RESULTS: Total 141 patients were identified to receive FFP transfusion in our emergency department. When the audit of FFP use was evaluated, 59.6% of all the practices were regarded as improper use. We identified that while the rate of improper use was 40.2% in patients with bleeding, it rose to 90.7% in patients without active bleeding or in those who used FFP with the aim of bleeding prophylaxis.

CONCLUSION: We have determined that FFP transfusions were conducted with improper indications at high rate in our emergency department. Preparing an up-to-date transfusion guideline for the practices in emergency departments in our country and training and supervising the medical staff at regular intervals may help prevent the shortcomings in FFP practices.

FFF use	Appropriate n (%)	Inappropriate n (%)	Total n (%)
Patients with bleeding	52 (59.8%)	35 (40.2%)	87 (61.7%)
No bleeding or prophylaxis for surgery	5 (9.3%)	49 (90.7%)	54 (38.3%)
Total	57 (40.4%)	84 (59.6%)	141 (100%)

Appropriate and inappropriate use of FFP in various conditions.

	Appropriate n (%)	Inappropriate n (%)
Warfarin overdose	33 (57.9%)	66 (78.6%)
Hepatic diseases	5 (8.8%)	6 (7.1%)
Massive transfusion/trauma	14 (24.6%)	4 (4.8%)
Prophylaxis for surgery	3 (5.3%)	5 (6%)
TTP/DIC	2 (3.5%)	3 (3.6%)
Total	57 (100%)	84 (100%)



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Inappropriate Fresh Frozen Plasma Use in Coagulation Disorder

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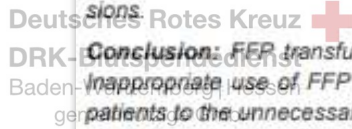
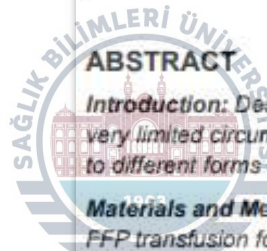
ABSTRACT

Introduction: Despite its frequent use in practice, current guidelines consider fresh frozen plasma (FFP) transfusions only under very limited circumstances. This study aimed to investigate the characteristics of the patients who received FFP transfusion due to different forms of coagulopathy and to assess whether FFP was used appropriately.

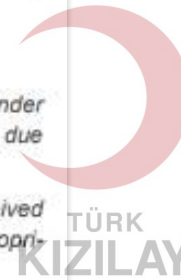
Materials and Methods: Patients older than 18 years of age, with an international normalized ratio (INR) > 1.2 and who received FFP transfusion for different disorders of coagulopathy, were included in this prospective and observational study. The appropriateness of the transfusion was judged according to the recommendations of current British guidelines.

Results: Four hundred fifty-six units of FFP were given to 204 patients who were admitted to Hacettepe University Hospital, Department of Emergency Medicine, during a six-month period. The common indications for FFP transfusions were as follows: 117 (57.4%) patients for warfarin anticoagulation, 27 (13.2%) patients for malignancy, 15 (7.4%) patients for liver disease, and 45 (22%) patients for other reasons. Inappropriate transfusion of FFP for bleeding or bleeding prophylaxis was determined in 137 (67%) patients. Of the 105 patients who received FFP transfusion for bleeding prophylaxis, inappropriate use was determined in 97 patients. Ninety-four of 97 patients received FFP only for high INR. Inappropriate transfusion of FFP was determined in 40 of 99 patients who received the transfusions for bleeding. None of the patients experienced any complications during the transfusions.

Conclusion: FFP transfusion in the treatment of coagulation disorders was determined to be inappropriate at a high rate. Inappropriate use of FFP not only increases the treatment costs, but also causes loss of productive power and exposes the patients to the unnecessary side effects of transfusion. Inappropriate FFP transfusions should be prevented by means of education, monitoring and feedback.



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ÖZGÜN ARAŞTIRMA

Bir Üniversite Hastanesi Acil Servisi'nde Taze Donmuş Plazma (TDP) Verilen Hastaların Retrospektif Analizi*

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ÖZET

Bu çalışmanın amacı bir Üniversite Hastanesi Acil Servisi'nde TDP kullanımının retrospektif olarak incelenmesi ve bu alandaki eksikliklerin ortaya konarak transfüzyon alanında iyileşmeye gidilmenin sağlanmasıdır. Çalışmaya 01.02.2014 - 01.02.2017 tarihleri arasında bir Üniversite Hastanesi Acil Servisi'nde TDP verilen tüm hastalar alınırken, 18 yaş altı ve gebeler çalışma dışı bırakılmıştır. Toplanan verilerin kaydedildiği çalışma formunda; hastanın adı soyadı, protokol numarası, yaşı, cinsiyeti, TDP verme endikasyonu, endikasyon uygunluğu, verilen TDP miktarı, beraberinde varsa verilen başka kan ürünü ve miktarı, transfüzyon sırasında gelişmiş komplikasyon türü, transfüzyon öncesi-ne ait hemoglobin ve trombosit değerleri, transfüzyon öncesi ve sonrası ait Protrombin Zamanı (PT), aktifte Parsiyel Tromboplastin Zamanı (aPTT), INR değerleri, hastaların sonuçlanma şekilleri (yatış, sevk, taburculuk ve ölüm) kaydedilmiştir. Acil serviste, TDP verilen hastaların %73.9'unda uygun endikasyon saptanırken, %26.1'inde hastalara endikasyon dışı TDP verildiği gözlemlendi. Sonuç olarak bu çalışmadan elde edilen bulgular doğrultusunda; bir Üniversite Hastanesi AS'inde azımsanmayacak oranda uygunsuz TDP transfüzyonunun yapıldığını söyleyebiliriz. Birçok çalışmada olduğu gibi, bu çalışmada da AS'de TDP verme endikasyonları arasında warfarin overdoz ilk sırada yer almaktadır. Uygunsuz TDP kullanımından kaçınmak için özellikle kanama bulgusu olmayan warfarin overdozu veya karaciğer hastalıkları nedeniyle koagülasyon parametrelerinde uzama olan hastalara TDP verilmesinden kaçınmamız gerekmektedir. Uygun TDP transfüzyonu için, mutlaka kılavuzlar kullanılmalı ve hastanelerin bu konuda kendi oluşturduğu protokolleri olmalıdır.

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	Uygun n=276 (%)	Uygun Değil n=97 (%)
Warfarin overdoz	93 (%33.77)	39 (%40.2)
Karaciğer hastalığı	65 (%23.55)	37 (%38.15)
GIS Kanaması**	40 (%14.5)	2 (%2.06)
Diğer ***	25 (%9.06)	6 (%6.19)
T travma/Masif Tx	9 (%3.26)	10 (%10.3)
İnvaziv girişim	23 (%8.33)	3 (%3.1)
Faktör eksikliği	13 (%4.71)	0
DIC	5 (%1.81)	0
Hereditör Anjioödem	3 (%1.08)	0
Toplam	276 (%73.9)	97 (%26.1)

* European Blood Inspection System
** The Public Health Programme of the
*** International SANCO - GA No. 2006202

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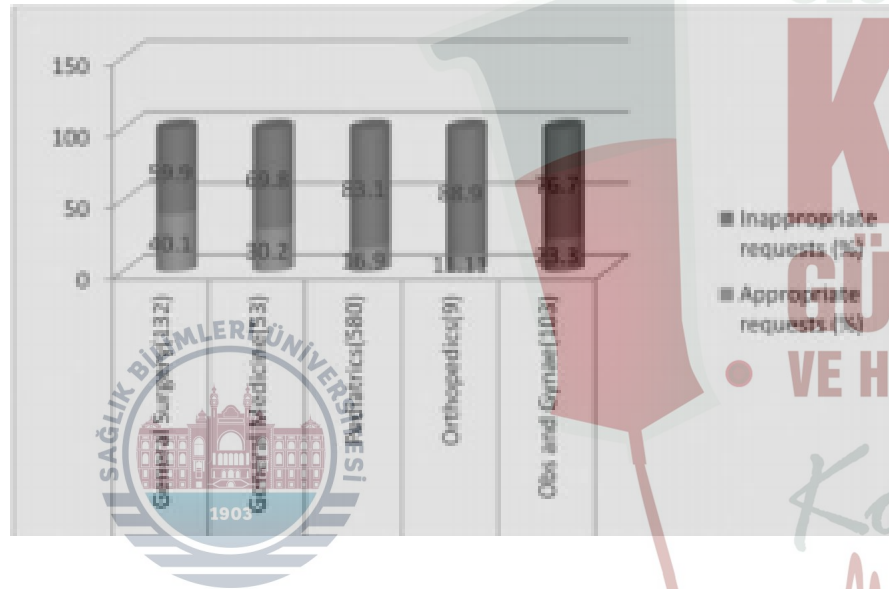
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Concurrent audit of fresh frozen plasma: experience of a tertiary care hospital.

Pahuja S¹, Sethi N, Singh S, Sharma S, Jain M, Kushwaha S.



Cause of inappropriate use	Number of requests	Percentage out of total inappropriate requests
Significant coagulopathy without any evidence of bleeding or not going for any invasive procedure (including inherited CF deficiencies for which viral safe products are not available)	225	32.8
Bleeding or non bleeding patients with PT/PTT non-availability or within normal limits (surgical, traumatic, obstetric, thrombocytopenic)	246	35.9
Liver disease with or without deranged PT/APTT but no evidence of bleeding and not undergoing any invasive procedure	170	24.8
Indication not available	45	6.6
Total	686	

Sl. No.	Disease category	Total requests (%)	Appropriate requests (%)	Inappropriate requests (%)
1	Multiple coagulation factor deficiencies/DIC (including neonates)	242 (27.6)	28 (11.5)	214 (88.4)
2	Surgical/traumatic bleeding/massive transfusion (including neonates)	359 (40.9)	113 (31.5)	246 (68.5)
3	Inherited deficiencies of single clotting factors	11 (1.2)	-	11 (100)
4	Liver disease	212 (24.2)	42 (21.9)	170 (80.19)
5	HDN	8 (9.1)	8 (100)	0
6	TTP	-	-	-
7	Reversal of warfarin effect	-	-	-
8	Indication not available	45 (5.13)	0	45 (100)
	Total	877	191 (21.8)	686 (78.2)



Utilization of frozen plasma in Ontario: a provincewide audit reveals a high rate of inappropriate transfusions.

Tinmouth A¹, Thompson T, Arnold DM, Callum JL, Gagliardi K, Lauzon D, Owens W, Pinkerton P.

Appropriateness of FP transfusions	Number of transfusions (% of FP requests)
Appropriate	314 (54.8%)
Coagulopathy other than warfarin or vitamin K deficiency. Bleeding <i>and</i> pre- or post- transfusion INR >1.5 and/or PTT >1x upper limit of normal.	96 (16.8)
Peri-surgical bleeding <i>and</i> pre- or post- transfusion INR >1.5 and/or PTT >1x upper limit of normal.	60 (14.0)
Coagulopathy other than warfarin or vitamin K deficiency. Urgent intervention or surgery <i>and</i> pre- or post- transfusion INR >1.5 and/or PTT >1x upper limit of normal.	43 (7.5)
Reversal of warfarin or vitamin K deficiency. Bleeding <i>and</i> pre- or post-transfusion INR >1.5 and/or PTT >1x upper limit of normal.	37 (6.4)
"Massive transfusion" <i>and</i> pre- or post- transfusion INR >1.5 and/or PTT >1x upper limit of normal.	35 (6.1)
Apheresis/plasma exchange or TTP regardless of coagulation status	23 (4.0)
Inappropriate	164 (28.6%)
INR 1.1–1.5 pre- transfusion/ normal PTT (and normal post-procedure if available). Irrespective of bleeding status or procedure status.	90 (15.7)
Reversal of coagulation defect due to warfarin or vitamin K deficiency. Absence of bleeding.	41 (7.2)
Reversal of coagulation defect other than warfarin or vitamin K or heparin. Pre- or post- transfusion INR >1.5 and/or PTT >1x upper limit of normal <i>and</i> no bleeding or surgery/procedure.	15 (2.6)
Heparin reversal (regardless of INR).	10 (1.7)
INR ≤ 1.0 pre- transfusion/normal PTT (and normal post-procedure if available) irrespective of bleeding status or procedure status.	7 (1.2)
Volume replacement.	1 (0.2)
Indeterminate	95 (16.6%)
Abnormal coagulation pre- or post- transfusion <i>and</i> bleeding unknown.	51 (5.4)
No laboratory coagulation data pre- or post- transfusion	27 (4.7)
No laboratory coagulation data pre- transfusion (with normal coagulation results post-procedure)	17 (3.0)
Abnormal coagulation—diagnosis unknown, not bleeding <i>and</i> procedure unknown	12 (2.1)
"Massive transfusion" <i>and</i> pre- or post- transfusion INR <1.5 and/or PTT <1x upper limit of normal or no laboratory coagulation data available	8 (1.4)

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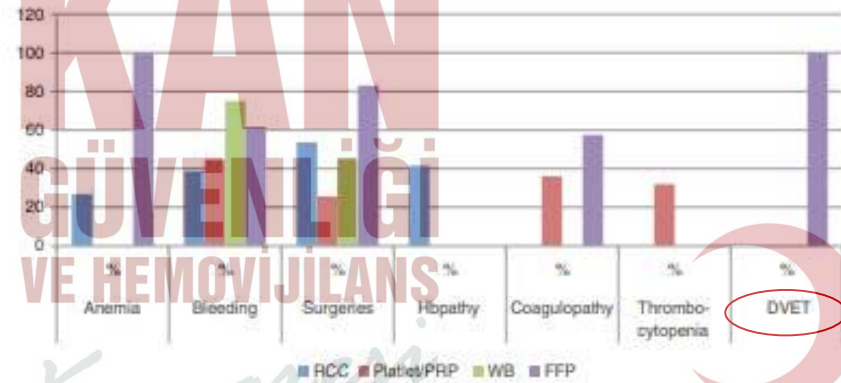
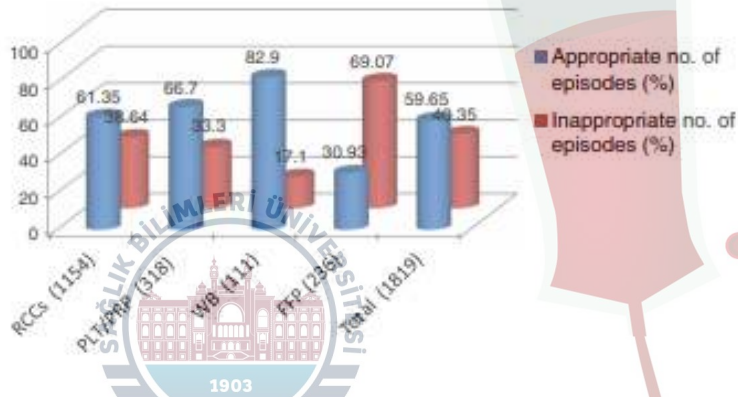
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Audit of Pediatric Transfusion Practices in a Tertiary Care Hospital

Shalini Bahadur · Neha Sethi · Sangeeta Pahuja ·
Chintamani Pathak · Manjula Jain



RESULTS: A total of 2,145 units of hemocomponents were transfused to children, including 1,181 units of red cell concentrates, 566 units of platelet concentrates/platelet rich plasma, 118 units of whole blood and 280 units of fresh frozen plasma in 1,819 episodes. Appropriate usage of blood components was 59.65%. Whole blood was most appropriately transfused (82.9%). Appropriate indications outnumbered inappropriate requisitions in Department of Pediatric Medicine (70.38 %), Nursery (82.54 %) and Thalassemia day care centre (55.63%). Red cell concentrate was most appropriately indicated in anemias (73.14%) and inappropriately in cases of surgeries (53.6%). Platelets were used more appropriately in all clinical indications. Whole blood was transfused most appropriately (100%) in double venous exchange therapy. Most appropriate indication of fresh frozen plasma usage was coagulopathy (42.57%).

CONCLUSIONS: As the appropriate usage (59.65%) of blood components was low in the present study, regular auditing of transfusion practices from time to time is indicated. This not only helps guide their judicious use but also serves to evaluate and decrease their inappropriate usage.

Real-Time Clinical Decision Support Decreases Inappropriate Plasma Transfusion

Neil Shah, MD,¹ Steven A. Baker, MD, PhD,¹ David Spain, MD,² Lisa Shieh, MD, PhD,³ John Shepard, MBA, MHA,⁴ Eric Hadhazy, MS,⁴ Paul Maggio, MD,² and Lawrence T. Goodnough, MD^{1,3}

From the Departments of ¹Pathology, ²Surgery, and ³Medicine, Stanford University, Stanford, CA; and ⁴Stanford Health Care, Stanford, CA.

Key Words: Appropriate plasma use; Clinical decision support; Plasma utilization

Am J Clin Pathol August 2017;148:154-160

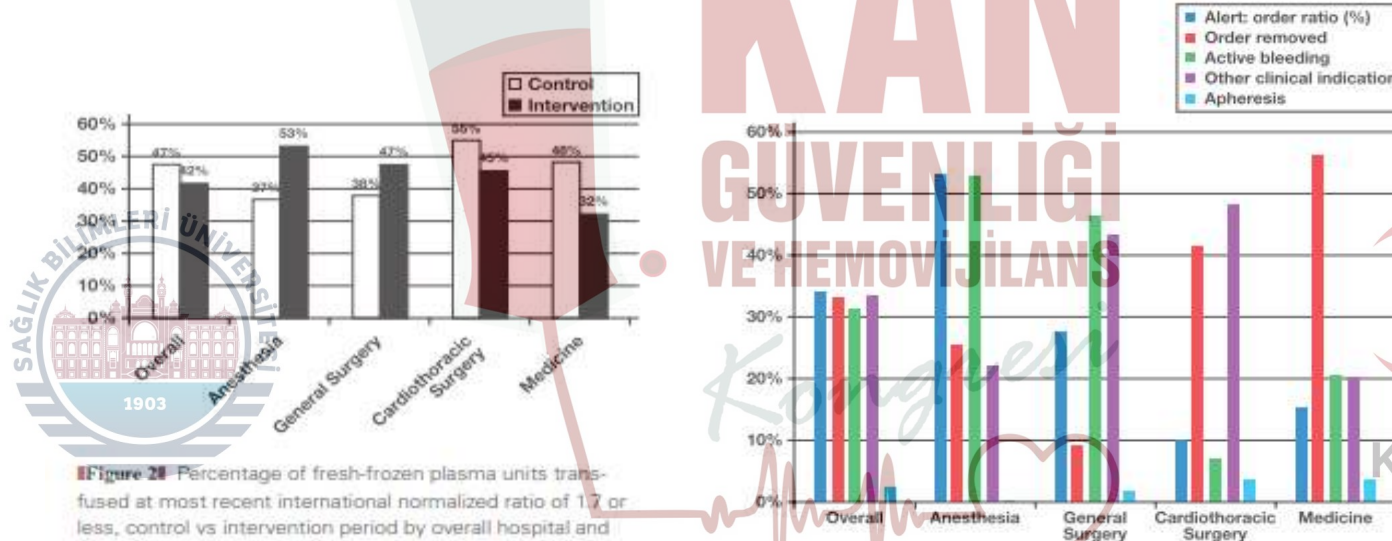


Figure 2 Percentage of fresh-frozen plasma units transfused at most recent international normalized ratio of 1.7 or less, control vs intervention period by overall hospital and high-use service lines. Control period was established for 7 months prior to go-live with the subsequent 4 months serving as the intervention period.

we instituted clinical decision support as an alert upon order entry if the patient's recent international normalized ratio (INR) was 1.7 or less.

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Directorate General SANCO - GA No. 2006202

Results: Monthly plasma utilization decreased 17.4%, from a mean \pm SD of 3.40 ± 0.48 to 2.82 ± 0.6 plasma units per hundred patient days (95% confidence interval [CI] of difference, -0.1 to 1.3). Plasma transfused below an INR of 1.7 or less decreased from 47.6% to 41.6% ($P = .0002$; odds ratio, 0.78; 95% CI, 0.69-0.89). The alert recommendation was accepted 33% of the time while clinical exceptions were chosen in the remaining cases (active bleeding, 31%; other clinical indication, 33%; and apheresis, 2%). Alert acceptance rate varied significantly among different provider specialties.

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Ülkemizde durum

	2018 Üretilen	2018 Kullanılan	2019* Üretilen	2019* Kullanılan
TAM KAN	55.346	51.322	34.628	27.338
ERİTROSİT	2.586.174	2.517.486	1.785.381	1.773.708
AFEREZ TROMBOSİT	176.152	165.129	126.101	122.476
TROMBOSİT TAM KANDAN	226.660	178.601	100.938	83.377
HAVUZ TROMBOSİT (4'LÜ)	264.580	178.790	188.982	142.840
TAZE DONMUŞ PLAZMA	1.385.485	1.302.545	1.005.885	909.035

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*İlk 8 aydaki verileri içermektedir
Veriler Sağlık Bakanlığı Kan, Doku ve Organ Nakli Daire Başkanlığı'nın izni ile alınmıştır.

Plazma kullanımı

- Tek kaynağı insan
- Enfeksiyon riski
- Uygun endikasyonlarla sınırlandırılmalı
- Fraksinasyon ürünleri tercih edilmeli