Anemia versus transfusion: does blood conservation increase the risk of complications?

Mullis B, Fisk E, Weaver D, Zhao Q, Daggy J, Di Cesare PE.

Abstract

Orthopedic trauma patients are routinely transfused for anemia even when asymptomatic at rest, despite there being relatively little scientific evidence as to what level of anemia can be safely tolerated. Some surgeons prefer a more liberal approach, transfusing to keep hemoglobin (Hgb) levels at 7.0 g/dL or higher; others prefer a more conservative approach, allowing Hgb levels to drop below 7.0 g/dL. We conducted a study to determine if a more conservative approach might put patients at higher risk of complications of severe anemia. We retrospectively reviewed the cases of 104 patients who were treated by a single surgeon at a level I academic trauma center and who were followed up for at least 1 year. Patients (ages 18-50 years) were divided into 2 groups by lowest Hgb level before first transfusion — under 7.0 g/dL and 7.0 g/dL or higher — and then by whether they had been transfused. Logistic regression analysis was performed. The primary outcome was postoperative complication. There was no increased risk of complication related to anemia (P = .3). However, there was a significant risk of complication related to transfusion (P < .01). Furthermore, there was a dose-dependent effect with each unit transfused (P = .02). In young, healthy, asymptomatic orthopedic trauma patients, a more conservative transfusion strategy (vs a more liberal strategy) did not appear to carry higher risk.

Darbepoeitin alfa for anemia with myelodysplastic syndrome.

Seastone DJ, Gerds AT.
Abstract

The myelodysplastic syndromes are characterized by refractory cytopenias that lead to symptomatic anemia, bleeding, and increased risk for infections. For almost two decades, the use of darbepoetin and other erythropoietin stimulating agents to treat symptomatic anemia in lower-risk myelodysplastic syndromes has been a standard of care. This practice is supported by numerous Phase I/II studies and one Phase III study demonstrating the benefit of using erythropoietin stimulating agents alone, or in combination with granulocyte colony stimulating factor, for treatment of symptomatic anemia with the goal of decreasing red blood cell transfusion requirements. This review summarizes the published experience regarding the use of erythropoietin stimulating agents, with a special focus on darbepoetin, in patients with myelodysplastic syndrome and symptomatic anemia.

ANEMIA MANAGEMENT

HEMATINICS


Pre-operative anaemia.

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Abstract

Pre-operative anaemia is a relatively common finding, affecting a third of patients undergoing elective surgery. Traditionally associated with chronic disease, management has historically focused on the use of blood transfusion as a solution for anaemia in the peri-operative period. Data from large series now suggest that anaemia is an independent risk associated with poor outcome in both cardiac and non-cardiac surgery. Furthermore, blood transfusion does not appear to ameliorate this risk, and in fact may increase the risk of postoperative complications and hospital length of stay. Consequently, there is a need to identify, diagnose and manage pre-operative anaemia to reduce surgical risk. Discoveries in the pathways of iron metabolism have found that chronic disease can cause a state of functional iron deficiency leading to anaemia. The key iron regulatory protein hepcidin, activated in response to inflammation, inhibits absorption of iron from the gastrointestinal tract and further reduces bioavailability of iron stores for red cell production. Consequently, although iron stores (predominantly ferritin) may be normal, the transport of iron either from the gastrointestinal tract or iron stores to the bone marrow is inhibited, leading to a state of "functional" iron deficiency and subsequent anaemia. Since absorption from the gastrointestinal tract is blocked, increasing oral iron intake is ineffective, and studies are now looking at the role of intravenous iron to treat anaemia in the surgical setting. In this article, we review the incidence and impact of anaemia on the pre-operative patient. We explain how anaemia may be caused by functional iron deficiency, and how iron deficiency anaemia may be diagnosed and treated.
PREPARE: the prevalence of perioperative anaemia and need for patient blood management in elective orthopaedic surgery: A multicentre, observational study.

Lasocki S¹, Krauspe R, von Heymann C, Mezzacasa A, Chainey S, Spahn DR.

Abstract

BACKGROUND:
Patient blood management (PBM) can prevent preoperative anaemia, but little is known about practice in Europe.

OBJECTIVE:
To assess the pre and postoperative prevalence and perioperative management of anaemia in patients undergoing elective orthopaedic surgery in Europe.

DESIGN:
An observational study; data were collected from patient records via electronic case report forms.

SETTING:
Seventeen centres in six European countries. Centres were stratified according to whether they had a PBM programme or not.

PATIENTS:
One thousand five hundred and thirty-four patients undergoing major elective hip, knee or spine surgery [49.9% hip, 37.2% knee, 13.0% spine; age 64.0 years (range 18 to 80), 61.3% female].

MAIN OUTCOME MEASURES:
Prevalence of preoperative (primary endpoint) and postoperative anaemia [haemoglobin (Hb) <13g dl (male), Hb <12g dl (female)], perioperative anaemia management, time to first blood transfusion and number of transfused units. Data are shown as mean (SD) or median (interquartile range).

RESULTS:
Anaemia prevalence increased from 14.1% preoperatively to 85.8% postoperatively. Mean Hb decrease was 1.9 (1.5) and 3.0 (1.3) g/dl in preoperatively anaemic and nonanaemic patients, respectively (P<0.001). In PBM (n=7) vs. non-PBM centres, preoperative anaemia was less frequent (8.0 vs. 18.5%; P<0.001) and iron status was assessed more frequently (ferritin 11.0 vs. 2.6%, transferrin saturation 11.0 vs. 0.1%; P<0.001). Perioperative anaemia correction (mainly transfusion) was given to 34.3%. Intraoperatively, 14.8% of preoperatively anaemic and 2.8% of nonanaemic patients received transfusions [units per patient: 2.4 (1.5) and 2.2 (1.4), median time to first intraoperative transfusion: 130 (88, 158) vs. 179 (135, 256) min; P<0.001]. Postoperative complications were more frequent in preoperatively anaemic vs. nonanaemic patients (36.9 vs. 22.2%; P=0.009).

CONCLUSION:

Most patients who underwent elective orthopaedic surgery had normal preoperative Hb levels but became anaemic after the procedure. Those who were anaemic prior to surgery had an increased intraoperative transfusion risk and postoperative complication rate. PBM measures such as iron status assessment and strategies to avoid transfusion are still underused in Europe.

The pathogenesis of traumatic coagulopathy.

Cap A, Hunt BJ.

Author information

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Abstract

Over the last 10 years, the management of major haemorrhage in trauma patients has changed radically. This is mainly due to the recognition that many patients who are bleeding when they come in to the emergency department have an established coagulopathy before the haemodilution effects of fluid resuscitation. This has led to the use of new terminology: acute traumatic coagulopathy, acute coagulopathy of trauma shock or trauma-induced coagulopathy. The recognition of acute traumatic coagulopathy is important, because we now understand that its presence is a prognostic indicator, as it is associated with poor clinical outcome. This has driven a change in clinical management, so that the previous approach of maintaining an adequate circulating volume and oxygen carrying capacity before, as a secondary event, dealing with coagulopathy, has changed to haemostatic resuscitation as early as possible. While there is as yet no universally accepted assay or definition, many experts use prolongation of the prothrombin time to indicate that there is, indeed, a coagulopathy. Hypoxia, acidosis and hypothermia and hormonal, immunological and cytokine production, alongside consumption and blood loss, and the dilutional effects of resuscitation may occur to varying extents depending on the type of tissue damaged, the type and extent of injury, predisposing to, or amplifying, activation of coagulation, platelets, fibrinolysis. These are discussed in detail within the article.
Modified laparoscopic splenectomy and azygoportal disconnection combined with cell salvage is feasible and might reduce the need for blood transfusion.

Jiang GQ¹, Bai DS¹, Chen P¹, Qian JJ¹, Jin SJ¹, Yao J¹, Wang XD¹.

Author information

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Abstract

AIM:

To investigate perioperative outcomes in patients undergoing modified laparoscopic splenectomy and azygoportal disconnection (MLSD) with intraoperative autologous cell salvage.

METHODS:

We retrospectively evaluated outcomes in 79 patients admitted to the Clinical Medical College of Yangzhou University with cirrhosis, portal hypertensive bleeding and secondary hypersplenism who underwent MLSD without (n = 46) or with intraoperative cell salvage and autologous blood transfusion, including splenic blood and operative hemorrhage (n = 33), between February 2012 and January 2014. Their intraoperative and postoperative variables were compared. These variables mainly included: operation time; estimated intraoperative blood loss; volume of allogeneic blood transfused; visual analog scale for pain on the first postoperative day; time to first oral intake; initial passage of flatus and off-bed activity; perioperative hemoglobin (Hb) concentration; and red blood cell concentration.

RESULTS:

There were no significant differences between the groups in terms of duration of surgery, estimated intraoperative blood loss and overall perioperative complication rate. In those receiving salvaged autologous blood, Hb concentration increased by an average of 11.2 ± 4.8 g/L (P < 0.05) from preoperative levels by the first postoperative day, but it had fallen by 9.8 ± 6.45 g/L (P < 0.05) in the group in which cell salvage was not used. Preoperative Hb was similar in the two groups (P > 0.05), but Hb on the first postoperative day was significantly higher in the autologous blood transfusion group (118.5 ± 15.8 g/L vs 102.7 ± 15.6 g/L, P < 0.05). The autologous blood transfusion group experienced significantly fewer postoperative days of temperature > 38.0 °C (P < 0.05).

CONCLUSION:

Intraoperative cell salvage during MLSD is feasible and safe and may become the gold standard for liver cirrhosis with portal hypertensive bleeding and hypersplenism.
Practical management of major blood loss.

Gill R1.

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Abstract

The pathophysiology of bleeding, regardless of cause, is complex and ill understood. For traumatic or sudden unexpected haemorrhage, the use of transfusion packs with red cells, fresh frozen plasma, cryoprecipitate and platelets being given in ratios of between 1:1 and 1:3 seems reasonable. This removes the requirement for 'wait and see tests' and should be part of an overall resuscitation and stabilisation plan that may improve outcome following sudden haemorrhage. The replacement of fresh frozen plasma and cryoprecipitate with low-volume, targeted concentrates is attractive. There is increasing evidence for the efficacy and safety of fibrinogen concentrates as a single agent. The combination of fibrinogen and prothrombin complex concentrates could be powerful and has the possibility to the management of bleeding and improve outcome in patients but, as yet, remains unproven.

Frontispiece: high impact of uranyl ions on carrying-releasing oxygen capability of hemoglobin-based blood substitutes.

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Abstract

Hemoglobin In their Full Paper on page 520 ff., J. Li et al. show how hemoglobin (Hb) microspheres fabricated by porous template covalent layer-by-layer assembly were utilized as artificial oxygen carriers: blood substitutes. Magnetic nanoparticles Fe3 O4 were loaded in porous CaCO3 particles for magnetically assisted chemical separation. It was found that UO2 (2+) was highly loaded in the magnetic Hb microspheres, and they show that the presence of UO2 (2+) in vivo seriously destroys the structure and oxygen-transport capability of Hb microspheres. In view of the high adsorption capacity of UO2 (2+) , the as-assembled magnetic Hb microspheres can be considered as a novel, highly effective adsorbent for removing the metal toxins from radioactively contaminated bodies or from nuclear-power reactor effluents before discharge into the environment.
Value of Adjusted Blood Requirement Index in determining failure to control bleed in patients with variceal bleeding.


Author information

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Abstract

INTRODUCTION:

Variceal bleeding is a serious complication in patients with cirrhosis. Among the criteria that were proposed in Baveno conferences, the Adjusted Blood Requirement Index (ABRI) has not been validated prospectively in clinical practice. We therefore aim to evaluate the measurement of ABRI as a marker of failure to control bleeding and to evaluate the consistency of ABRI in relation to other criteria of failure to control variceal bleeding.

PATIENTS AND METHODS:

All patients with variceal bleeding who presented to Aga Khan University Hospital from January 2010 to December 2012 who were administered transfusion of packed red blood cells were included after obtaining informed consent. All patients were managed as per the standard protocol with intravenous terlipressin along with band ligation and injection of cyanoacrylate in cases of esophageal and fundal varices, respectively. Hemoglobin and hematocrit were measured every 6 h for 48 h and then every 12 h until 5 days of index bleed in each patient. Packed cells were transfused if hemoglobin decreased below 8 g/dl. The number of blood units transfused, change in hemoglobin values, and ABRI were calculated after each unit of blood transfusion till 120 h. In patients in whom bleed could not be controlled, an ABRI value of 0.75 or more was compared with other Baveno IV-based parameters that define failure to control bleeding.

RESULTS:

During the study period, 137 eligible patients with variceal bleed were admitted. The mean age of the patients was 52±12 years. The majority of patients (50.4%) were in Child-Pugh class B, followed by 38% in Child-Pugh class C. According to the Baveno IV criteria, overall failure to control acute variceal bleeding occurred in 52 (37.9%) patients. Excluding ABRI, failure to control bleeding was found in 22/137 (16%) patients, whereas ABRI-based criteria showed that in 34/137 (24.8%) patients, bleeding could not be controlled. There were only four (2.9%) patients with variceal bleeding in whom ABRI and other additional Baveno IV-based criteria for failure to control bleeding were present. When ABRI was compared with other criteria for failure to control bleeding, it showed a sensitivity and specificity of 19 and 25%, respectively.

CONCLUSION:

This study showed that ABRI is not a useful additional tool to define failure to control bleeding after variceal hemorrhage in cirrhotic patients.

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How is national recipient hemovigilance conducted in the United States?

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Author information

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Abstract

A national recipient hemovigilance system was introduced in the United States in 2010, when voluntary enrollment began as part of the National Healthcare Safety Network (NHSN) Hemovigilance Module. NHSN is a secure, Web-based surveillance system operated by the Centers for Disease Control and Prevention and used by US health care facilities to report a variety of patient safety information. The Hemovigilance Module is used for comprehensive monitoring of transfusion-related adverse events. Participating facilities can utilize analytic tools available within the module to identify opportunities for enhancing transfusion safety, evaluate the effectiveness of interventions, and compare facility specific transfusion-related data to aggregate national estimates. Data may be voluntarily shared by facilities with external partners for patient safety improvement initiatives and to fulfill reporting mandates. We describe the key characteristics of the Hemovigilance Module, highlight the benefits for participating facilities, and discuss the use of reported data for establishing national estimates of transfusion-associated adverse events to identify gaps in transfusion safety and opportunities for interventions. National hemovigilance systems are essential to recognize gaps in transfusion safety and identify opportunities for interventions to improve patient safety and outcomes.


Evidence and triggers for the transfusion of blood and blood products.

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Author information

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Abstract

Allogeneic red cell transfusion is a commonly used treatment to improve the oxygen carrying capacity of blood during the peri-operative period. Increasing arterial oxygen content by increasing haemoglobin does not necessarily increase tissue oxygen delivery or uptake. Although the evidence-base for red cell transfusion practice is incomplete, randomised studies across a range of clinical settings, including surgery, consistently support the restrictive use of red cells, with no evidence of benefit for maintaining patients at higher haemoglobin thresholds (liberal strategy). A recent meta-analysis of 7593 patients concluded that a restrictive transfusion strategy was associated with a reduced risk of healthcare-associated infections (pneumonia, mediastinitis, wound infection, sepsis) when compared with a liberal transfusion strategy. The degree to which the optimal haemoglobin concentration or transfusion trigger should be modified for patients with additional specific risk factors (e.g. ischaemic heart disease), remains less clear and requires further research. Although most clinical practice guidelines recommend restrictive use of red cells, and many blood transfusion services have seen marked falls in overall usage of red cells, the use of other blood components such as fresh frozen plasma, platelets, and cryoprecipitate has risen.
In clinical practice, administration of fresh frozen plasma is usually guided by laboratory tests of coagulation, mainly prothrombin time, international normalised ratio and activated partial thromboplastin time, but the predictive value of these tests to predict bleeding is poor.


**Blood transfusion in primary total hip and knee arthroplasty. Incidence, risk factors, and thirty-day complication rates.**

**Hart A, Khalil JA, Carli A, Huk O, Zukor D, Antiou J.**

**Author information**

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**Abstract**

**BACKGROUND:**

The aim of this study was to analyze NSQIP (National Surgical Quality Improvement Program) data to better understand the incidence, risk factors, and thirty-day complication rates associated with transfusions in primary total hip and knee arthroplasty.

**METHODS:**

We identified 9362 total hip and 13,662 total knee arthroplasty procedures from the database and separated those in which any red blood-cell transfusion was performed within seventy-two hours after surgery from those with no transfusion. Patient demographics, comorbidities, preoperative laboratory values, intraoperative variables, and postoperative complications were compared between patients who received a transfusion and those who did not. Multivariate logistic regression was used to identify independent risk factors for receiving a transfusion as well as for associated postoperative complications (thirty-day incidences of infection, venous thromboembolism, and mortality).

**RESULTS:**

The transfusion rate after total hip arthroplasty was 22.2%. Significant risk factors for receiving a transfusion were age (OR [odds ratio] per ten years = 10.1), preoperative anemia (OR = 3.6), female sex (OR = 2.0), BMI (body mass index) of <30 kg/m(2) (OR = 1.4), and ASA (American Society of Anesthesiologists) class of >2 (OR = 1.3). Multivariate logistic regression analysis indicated that adjusted odds of infection, venous thromboembolism, and mortality did not differ significantly between patients who received a transfusion and those who did not. The transfusion rate after total knee arthroplasty was 18.3%. Risk factors for receiving a transfusion were age (OR per ten years = 10.2), preoperative anemia (OR = 3.8), BMI of <30 kg/m(2) (OR = 1.4), female sex (OR = 1.3), and ASA class of >2 (OR = 1.3). Multivariate logistic regression indicated that a transfusion was significantly associated with mortality (OR = 2.7) but not with infection or venous thromboembolism.

**CONCLUSIONS:**
We did not find a strong association between perioperative red blood-cell transfusion and thirty-day incidences of infection, venous thromboembolism, or mortality; however, the odds of mortality were higher in patients who received a transfusion during total knee arthroplasty.

COST EFFECTIVENESS


Patient Cost Sharing and Receipt of Erythropoiesis-Stimulating Agents Through Medicare Part D.

Davidoff AJ1, Hendrick FB2, Zeidan AM1, Baer MR1, Stuart BC1, Shenolikar RA1, Gore SD1.

Author information

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Abstract

PURPOSE:

Medicare Part D prescription benefits cover injected medications, normally covered under Part B, when administered outside of physician offices. Erythropoiesis-stimulating agents (ESAs) used for chronic anemia management in patients with myelodysplastic syndromes (MDS) are commonly injected in a physician office but can be administered safely at home. In this study, we explored out-of-pocket (OOP) costs and receipt of Part D-covered ESAs in Medicare beneficiaries with MDS.

MATERIALS AND METHODS:

Patients with MDS enrolled in Medicare Parts A, B, and D were identified using diagnosis codes from 100% claims from 2006 to 2008. OOP costs for the mean erythropoietin alfa claim were compared for Parts B and D. Multivariable models examined the effect of low-income subsidy (LIS) and other Part D cost sharing on receipt of any ESA and any Part D-covered ESA.

RESULTS:

A total of 13,117 (62.9%) of 20,848 patients received ESAs, but only 1,436 (6.9%) had any Part D claim. OOP payment was $348 under Part D versus $161 under Part B. Among patients with ESA use, those with LIS were 4× more likely to receive Part D ESAs (P < .01).

CONCLUSION:

Few patients with MDS received ESAs through Part D. OOP payments required under Part D were substantially higher than under Part B. Cost sharing, as reflected by LIS receipt, likely affected decisions to prescribe ESAs outside of the physician office. Improved coordination between Part B and D benefits
regarding issues of home injection of medications may create incentives that improve patient access and convenience and reduce costs associated with administration.

COAG/ANTI COAG


Impacts of leukocyte filtration and irradiation on coagulation factors in fresh frozen plasma.

Li DY¹, Zhang HW¹, Feng QZ¹, Zhao H².

Author information

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- ²Department of Clinical Laboratory, The Affiliated Hospital of Luzhou Medical College, Luzhou, Sichuan 646000, P.R. China.

Abstract

This study aimed to compare and analyze the changes in the coagulation factors in fresh frozen plasma (FFP) prior to and following leukocyte filtration and irradiation. In total, 30 bags of FFP from healthy donors were processed: One-third of the FFP of each bag was left within the original bag (the A group), the other two-thirds of the FFP of each bag were passed through a disposable leukocyte filter, then divided equally into two parts. One of these was designated as the B group, and the other was designated the C group (subjected to 30 Gy irradiation). All samples were analyzed to evaluate 16 coagulation indicators. Analysis of variance revealed that there were statistically significant differences in the levels of fibrinogen (FbgC) and coagulation factor VIII (FVIII:C) among the groups (P=0.044 and P=0.015, respectively); the Dunnett's t-test revealed that there was a statistically significant difference in the level of FbgC between the A and B groups (P=0.025), and there was a statistically significant difference in the level of FVIII:C between the A and C groups (P=0.009); while the remaining 14 coagulation parameters were not significantly different among the groups. Although the levels of FbgC and FVIII:C in the FFP were reduced following treatment, this would not affect the clinical effect of the FFP.


Evaluation of the appropriateness of frozen plasma usage after introduction of prothrombin complex concentrates: a retrospective study.

Shih AW¹, Kolesar E, Ning S, Manning N, Arnold DM, Crowther MA.

Author information

- ¹Department of Medicine, McMaster University, Hamilton, ON, Canada.

Abstract

BACKGROUND:
Prothrombin complex concentrates (PCCs) can be used instead of frozen plasma (FP) transfusion to reverse the effect of warfarin. Audits have demonstrated over usage of FP transfusions even before the introduction of PCC. The objective of this study was to determine the appropriateness of current FP transfusion practice in the current era since the introduction of PCCs.

**METHODS:**

A retrospective cohort study of consecutive patients receiving FP over 3 months was carried out. Each episode of FP use over a 24-h period was adjudicated independently by two reviewers as appropriate (consistent with Canadian/AABB guidelines), appropriate but inconsistent with guidelines or inappropriate. Discrepancies were resolved by a third reviewer. Use of FP to reverse warfarin was considered inappropriate. FP usage from previous years was assessed as baseline.

**RESULTS:**

During the study period, 111 FP transfusions were administered. 74·8% of FP usage occurred in the ICU. The proportion of FP transfusions that were deemed appropriate, inconsistent yet appropriate or inappropriate were 33/89 (37·1%), 16/89 (18·0%) and 40/89 (44·9%), respectively, when use of FP for therapeutic plasma exchange was excluded. The most common reasons for inappropriate use were the absence of bleeding with an increased INR or warfarin reversal.

**CONCLUSION:**

Our study is the first to audit FP transfusions in the post-PCC era in Canada. FP usage remains inappropriately high in INR prolongation without another indication or to reverse warfarin. Targeted interventions to reduce FP usage in the future should focus on the ICU and on education about warfarin reversal.


**Evaluation of the appropriateness of frozen plasma usage after introduction of prothrombin complex concentrates: a retrospective study.**

Shih AW¹, Kolesar E, Ning S, Manning N, Arnold DM, Crowther MA.

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- ¹Department of Medicine, McMaster University, Hamilton, ON, Canada.

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ETHICS


Responses of advanced directives by Jehovah’s Witnesses on a gynecologic oncology service.

Nagarsheth NP1, Gupta N2, Gupta A3, Moshier E4, Gretz H5, Shander A6.

Author information

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6Department of Anesthesiology, Englewood Hospital and Medical Center, Englewood, NJ, USA.

Abstract

OBJECTIVES:

To review the responses of advance directives signed by Jehovah’s Witness patients prior to undergoing surgery at a gynecologic oncology service.
STUDY DESIGN:

A retrospective chart review of gynecologic oncology patients undergoing surgery at a bloodless surgery center from 1998-2007 was conducted. Demographic, pathologic, and clinical data were recorded. The proportion of patients who accepted and refused various blood-derived products was determined and was compared to previously published results from a similar study of labor and delivery unit patients.

RESULTS:

No gynecologic oncology patients agreed to accept transfusions of whole blood, red cells, white cells, platelets, or plasma under any circumstance, whereas 9.8% of pregnant patients accepted transfusion (P=0.0385). However, 98% of gynecologic oncology patients agreed to accept some blood products, including fractions such as albumin, immunoglobulins, and clotting factors, while only 39% of pregnant patients agreed (P<0.0001). In addition, all gynecologic oncology patients (100%) accepted intraoperative hemodilution, compared to 55% of pregnant patients (P<0.0001).

CONCLUSION:

Our results confirm the commonly held belief that the majority of Jehovah's Witness patients refuse to accept major blood components. However, Jehovah's Witness patients at a gynecologic oncology service will accept a variety of blood-derived products (minor fractions) and interventions designed to optimize outcomes when undergoing transfusion-free surgery. Patients presenting to a gynecologic oncology service respond differently to advanced directives related to bloodless surgery, as compared to patients from an obstetrical service.

HEMOSTATIC MANAGEMENT


[Thromboelastometric profile of unwashed shed blood after primary knee arthroplasty.]

[Article in French]


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- 4Département d'anesthésie réanimation, hospices civils de Lyon, CHU de Lyon Sud, 69310 Lyon, France.

Abstract

INTRODUCTION:
Knee arthroplasty causes significant blood loss. Different blood-saving measures exist like retransfusion of unwashed salvaged blood. Some studies question the quality of this blood and in particular its ability to clot. These studies use "static" coagulation tests reflecting only partially the reality, unlike viscoelastic methods. The main objective of this study was to evaluate the salvaged blood thromboelastometric profile using ROTEM® system and to compare these results with patient venous blood.

MATERIALS AND METHODS:

We performed an observational, prospective, single-center study conducted over 3 months in 2013. Agreement of local ethical committee and patient consent were obtained beforehand. All adult patients who underwent a primary total knee arthroplasty were included. A thromboelastometric profile and standard laboratory tests (hemoglobin, platelets count, PT, aPTT, fibrinogen) were performed in the same time on patient venous blood and on unwashed salvaged blood in the PACU.

RESULTS:

Twenty patients were included. The median duration of surgery was 93 minutes. Thirteen patients (65%) received tranexamic acid during procedure. The median volume of shed blood was 225 mL. Two patients (10%) received a reinfusion. Analysis of shed blood showed a major deficiency of clotting factor in standard biology (PT<10%) and an absence of clot formation in thromboelastometric test (In-tem®, Ex-tem®, Fib-tem® or Ap-tem®). Compared to venous blood, shed blood had significantly lower hemoglobin levels: 8.8 vs 13.5 g/dL (P<0.0001). Allogenic transfusion concerned 5% of patients.

DISCUSSION:

In this work, we confirmed that shed blood was naturally uncoagulable probably due to a multifactorial mechanism involving a major clot factor deficiency and an activation of fibrinolysis.

HEMOSTATIC MANAGEMENT

DRUGS


Effect of low dose tranexamic acid on intra-operative blood loss in neurosurgical patients.

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Author information

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Abstract

BACKGROUND:

Blood loss is often a major complication in neurosurgery that requires transfusion of multiple units of blood. The purpose of this study was to assess the effect of tranexamic acid (TXA) on intraoperative blood loss and the need for blood transfusion in patients undergoing craniotomy for tumor excision.

MATERIALS AND METHODS:
A total of 100 patients aged 18-60 years, with American Society of Anesthesiologists physical Status 1 and 2 scheduled to undergo elective craniotomy for tumor excision were enrolled. Patients received 10 mg/kg bolus about 20 min before skin incision followed by 1 mg/kg/h infusion of either TXA or saline. Hemodynamic variables, intravenous fluid transfused, amount of blood loss and blood given were measured every 2 h. Laboratory parameters such as serum electrolytes and fibrinogen values were measured every 3 h. On the 5(th) postoperative day hemoglobin (POD Hb5), Hb estimation was done and the estimated blood loss (EBL) calculated. Patients were also monitored for any complications.

RESULTS:

The Mean heart rate in TXA group was significantly lower compared with the saline group. Mean arterial pressure and fibrinogen levels were higher in TXA group. The mean total blood loss in the TXA group was less than in the saline group. Blood transfusion requirements were comparable in two groups. The EBL and POD5 Hb were comparable in two groups.

CONCLUSION:

Even though, there is a significant reduction in the total amount of blood loss in TXA group. However, there was no reduction in intraoperative transfusion requirement.

HEMOSTATIC MANAGEMENT

SURGICAL


Systematic review of interventions for minimizing perioperative blood transfusion for surgery for craniosynostosis.

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Author information

\begin{itemize}
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\end{itemize}

Abstract

BACKGROUND:

Surgery for craniosynostosis is associated with the potential for significant blood loss. Multiple technologies have been introduced to reduce the volume of blood transfused. These are preoperative autologous donation; preoperative erythropoietin; intraoperative cell salvage (CS); acute normovolemic hemodilution; antifibrinolytic drugs such as tranexamic acid, \(\varepsilon\)-aminocaproic acid, and aprotinin; fibrin sealants or fibrin glue; and postoperative drain reinfusion.

METHODS:

All comparative studies with a treatment group and a control group were considered. There was a range of different study types from randomized controlled trials to case series with historic controls. These were intervention versus no intervention or a comparison of 2 interventions. Studies were identified by searching Cochrane CENTRAL, MEDLINE, and EMBASE; manufacturer's Web sites; and bibliographies
of relevant published articles. The primary outcome measures were the number of allogeneic blood donor exposures, the volume of allogeneic blood transfused, and the postoperative hemoglobin or hematocrit levels.

RESULTS:

A total of 696 studies were identified. After removal of duplicates and after exclusion criteria were applied, there were 18 studies to be included. Fourteen were case series with controls and 4 were randomized controlled trials.

CONCLUSIONS:

The production of high-quality evidence on the interventions to minimize blood loss and transfusion in children undergoing surgery for craniosynostosis is difficult. Most of the literature is nonrandomized and noncomparative. Several areas remain unaddressed. Erythropoietin and tranexamic acid are comparatively well studied; CS, acute normovolemic hemodilution, and aprotinin are less so. There is only 1 comparative study on the use of fibrin glue and drain reinfusion, with no studies on preoperative autologous donation and [Latin Small Letter Open E]-aminocaproic acid. Tranexamic acid is clinically effective in reducing allogeneic blood transfusion. There is some evidence that CS and erythropoietin may be clinically effective. None of the interventions studied are shown to be cost-effective because of lack of evidence.

IMMUNOMODULATION / STORAGE LESION


The pathophysiology and consequences of red blood cell storage.

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Author information

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Abstract

Red cell transfusion therapy is a common treatment modality in contemporary medical practice. Although blood collection and administration is safer and more efficient than ever before, red cells undergo multiple metabolic and structural changes during storage that may compromise their functionality and viability following transfusion. The clinical relevance of these changes is a hotly debated topic that continues to be a matter of intense investigation. In the current review, we begin with an in-depth overview of the pathophysiological mechanisms underlying red cell storage, with a focus on altered metabolism, oxidative stress and red cell membrane damage. We proceed to review the current state of evidence on the clinical relevance and consequences of the red cell storage lesion, while discussing the strengths and limitations of clinical studies.

OB/GYN


Prediction of escape red blood cell transfusion in expectantly managed women with acute anaemia after postpartum haemorrhage.
Abstract

OBJECTIVE:

To determine clinical predictors of escape red blood cell (RBC) transfusion in postpartum anaemic women, initially managed expectantly, and the additional predictive value of health-related quality of life (HRQoL) measures.

DESIGN:

Secondary analysis of women after postpartum haemorrhage, either randomly allocated to, or opting for expectant management.

SETTING:

Thirty-seven hospitals in the Netherlands.

POPULATION:

A total of 261 randomised and 362 nonrandomised women.

METHODS:

We developed prediction models to assess the need for RBC transfusion: one using clinical variables (model 1), and one extended with scores on the HRQoL-measures Multidimensional Fatigue Inventory (MFI) and EuroQol-5D (model 2). Model performance was assessed by discrimination and calibration. Models were internally validated with bootstrapping techniques to correct for overfitting.

MAIN OUTCOME MEASURES:

Escape RBC transfusion.

RESULTS:

Seventy-five women (12%) received escape RBC transfusion. Independent predictors of escape RBC transfusion (model 1) were primiparity, multiple pregnancy, total blood loss during delivery and haemoglobin concentration postpartum. Maternal age, body mass index, ethnicity, education, medical indication of pregnancy, mode of delivery, preterm delivery, placental removal, perineal laceration, Apgar score and breastfeeding intention had no predictive value. Addition of HRQoL-scores (model 2), significantly improved the model's discriminative ability: c-statistics of model 1 and 2 were 0.65 (95% CI 0.58-0.72) and 0.72 (95% CI 0.65-0.79), respectively. The calibration of both models was good.

CONCLUSIONS:
In postpartum anaemic women, several clinical variables predict the need for escape RBC transfusion. Adding HRQoL-scores improves model performance. After external validation, the extended model may be an important tool for counselling and decision making in clinical practice


**Responses of advanced directives by Jehovah's Witnesses on a gynecologic oncology service.**

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**Abstract**

**OBJECTIVES:**

To review the responses of advance directives signed by Jehovah's Witness patients prior to undergoing surgery at a gynecologic oncology service.

**STUDY DESIGN:**

A retrospective chart review of gynecologic oncology patients undergoing surgery at a bloodless surgery center from 1998-2007 was conducted. Demographic, pathologic, and clinical data were recorded. The proportion of patients who accepted and refused various blood-derived products was determined and was compared to previously published results from a similar study of labor and delivery unit patients.

**RESULTS:**

No gynecologic oncology patients agreed to accept transfusions of whole blood, red cells, white cells, platelets, or plasma under any circumstance, whereas 9.8% of pregnant patients accepted transfusion (P=0.0385). However, 98% of gynecologic oncology patients agreed to accept some blood products, including fractions such as albumin, immunoglobulins, and clotting factors, while only 39% of pregnant patients agreed (P<0.0001). In addition, all gynecologic oncology patients (100%) accepted intraoperative hemodilution, compared to 55% of pregnant patients (P<0.0001).

**CONCLUSION:**
Our results confirm the commonly held belief that the majority of Jehovah's Witness patients refuse to accept major blood components. However, Jehovah's Witness patients at a gynecologic oncology service will accept a variety of blood-derived products (minor fractions) and interventions designed to optimize outcomes when undergoing transfusion-free surgery. Patients presenting to a gynecologic oncology service respond differently to advanced directives related to bloodless surgery, as compared to patients from an obstetrical service.


Blood transfusion in obstetrics.
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Abstract

Transfusion of blood and blood components is a common practice in obstetric wards but it is not without risk. The incidence of transfusion reactions varies from 4 in every hundred transfusions for non-haemolytic reactions to one in every 40,000 for haemolytic transfusion reactions. The physiological basis of blood transfusion is outlined in this article. Most of the donated blood is processed into components: packed red cells (PRBCs), platelets, and fresh frozen plasma (FFP) or cryoprecipitate. Various alternatives to blood transfusion exist and include autotransfusion, pre-autologous blood storage, use of oxygen carrying blood substitutes and intraoperative cell salvage. Despite the risks associated with transfusions, obstetricians are frequently too aggressive in transfusing blood and blood products to their patients. Acute blood loss in obstetrics is usually due to placenta praevia, postpartum blood loss and surgery related. An early involvement of a consultant obstetrician, anaesthetist, haematologist and the blood bank is essential. There are no established criteria for initiating red cell transfusions and the decision is purely based on clinical and haematological parameters, which have been discussed along with the general principles of blood transfusion in obstetrics and some practical guidelines.

PATIENT OUTCOMES


The association of perioperative transfusion with 30-day morbidity and mortality in patients undergoing major vascular surgery.
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4Spectrum Health System, Grand Rapids, Mich.
Abstract

OBJECTIVE:

Blood transfusions are common among patients undergoing major vascular surgery. Prior studies suggest an association between blood transfusion and increased morbidity and mortality among patients undergoing cardiac surgery. The predictors of perioperative transfusion and its impact on patients undergoing vascular surgery have been poorly defined.

METHODS:

We examined data from a large multicenter quality improvement vascular surgical registry of all patients undergoing elective or urgent open peripheral arterial disease procedures, endovascular aneurysm repair, or open abdominal aortic aneurysm (AAA) repair between January 2012 and December 2013. Emergency cases, carotid endarterectomy, and carotid artery stenting were excluded. Univariate and multivariate logistic regression modeling was used to identify predictors of transfusion and association of transfusion with outcomes. All regression models had Hosmer-Lemeshow P > .05 and area under the receiver operating characteristic curve of >0.8, confirming excellent goodness of fit and discrimination.

RESULTS:

Our study population comprised 2946 patients who underwent open peripheral arterial disease procedures (n = 1744), open AAA repair (n = 175), or endovascular aneurysm repair (n = 1027) at 22 hospitals. The overall transfusion rate was 25%, at a median nadir hemoglobin level of 7.7 g/dL. Independent factors predicting transfusion included female gender (odds ratio [OR], 2.6; 95% confidence interval [CI], 2.1-3.2), nonwhite race (OR, 2.7; 95% CI, 1.4-5.2), preoperative admission status (ie, acute care hospital) (OR, 2.6; 95% CI, 1.3-5.3), preoperative anemia (OR, 4.2; 95% CI, 3.3-5.1), congestive heart failure (OR, 1.4; 95% CI, 1.1-1.9), prior myocardial infarction (OR, 1.3; 95% CI, 1.01-1.6), clopidogrel (OR, 1.4; 95% CI, 1.2-1.8), open AAA repair (OR, 25; 95% CI, 17-39), open bypass (OR, 3.5; 95% CI, 2.7-4.6), and urgent procedures (OR, 1.4; 95% CI, 1.1-1.8). With adjustment for major covariates, perioperative transfusion was independently associated with death (OR, 6.9; 95% CI, 3.2-15), myocardial infarction (OR, 8; 95% CI, 3.7-17), and pneumonia (OR, 7.4; 95% CI, 3.3-17).

CONCLUSIONS:

Perioperative transfusion in vascular surgical patients is independently associated with increased 30-day morbidity and mortality. Given indeterminate causation, these data suggest the need for a prospective transfusion threshold study in vascular surgical patients.

Gastric Cancer. 2015 Jan 7. [Epub ahead of print]

Adverse prognostic impact of perioperative allogeneic transfusion on patients with stage II/III gastric cancer.


Author information
Abstract

BACKGROUND:

Allogeneic blood transfusions (BTFs) are sometimes required for radical gastrectomy with regional lymph node dissection for advanced gastric cancer (GC). The prognostic impact of perioperative BTF in GC is controversial.

METHODS:

Clinical data were collected retrospectively from 250 consecutive patients who underwent curative gastric resection for stage II/III GC. The prognostic impact of BTF on patient survival was evaluated. Subgroup analysis was performed according to units of blood transfused, timing of BTF, type of gastrectomy, splenectomy, intraoperative estimated blood loss, and year of surgery.

RESULTS:

Fifty-seven (22.8%) patients underwent perioperative BTF. Patients who received BTF experienced a significantly shorter disease-specific survival after curative surgery, and multivariable analysis identified perioperative BTF as an independent prognostic factor for cancer-related death (hazard ratio, 1.80; 95% confidence interval, 1.05-3.02; p = 0.032). The BTF group experienced significantly lower recurrence-free survival rate and a higher rate of initial peritoneal recurrence. The amount of blood cells transfused had less impact on prognosis. Pre- or postoperative BTF without intraoperative BTF had limited influence on postoperative prognosis. Prognosis of patients was affected by splenectomy. Even when intraoperative blood loss exceeded 800 ml, the prognosis of the non-BTF group was more favorable. The prognostic impact of BTF became less clear after introduction of adjuvant chemotherapy with S-1.

CONCLUSIONS:

BTF was an independent prognostic factor in patients with stage II/III GC after curative gastrectomy. To improve prognosis, BTF should be avoided when possible, particularly during surgery.

PATIENT BLOOD MGMT/PROGRAMS


How do I implement a more restrictive transfusion trigger of hemoglobin level of 7 g/dL at my hospital?

Boral LI, Bernard A, Hjorth T, Davenport D, Zhang D, MacIvor DC.

Author information

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Abstract
BACKGROUND:

The red blood cell (RBC) transfusion trigger is a major driver of transfusion practice and affects health care costs and in some instances patient outcomes. Reducing the transfusion threshold will decrease RBC utilization and hospital costs.

STUDY DESIGN AND METHODS:

The hospital transfusion committee, endorsed by the medical staff executive committee, developed an educational program for physicians, nurses, and blood bank staff focusing on the scientific basis for a transfusion trigger of hemoglobin (Hb) of 7 g/dL rather than 8 g/dL as well as a program to discourage the routine 2-unit RBC transfusion. RBC transfusion practice review was performed and those physicians transfusing outside of the new variables were questioned as to the necessity for the transfusion.

RESULTS:

A total of 4492 RBC units were saved and 662 patients were not transfused over the three fiscal years (FYs), 2010, 2011, and 2012, compared to 2009 baseline. Direct cost savings over 3 years with a transfusion trigger of Hb of 7 g/dL was $943,320. If activity-based costing is used, the savings may have reached as high as $5,314,036. The number of single-unit RBC transfusions increased steadily over the course of the study while the number of 2-unit transfusions remained relatively stable over the three FYs 2010 to 2012.

CONCLUSION:

A Hb level of 7 g/dL is the transfusion threshold which is being adopted by many hospitals. Institutional culture change to a Hb level of 7 g/dL can be implemented with the right champion when endorsed by upper echelon medical leadership and hospital administration


[Blood transfusion: The challenges for tomorrow?]

[Article in French]

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Abstract

As any therapeutic means, blood transfusion requires regular evaluation, particularly for its indications, effectiveness and risks. The availability of randomized clinical trials, the evolution of the quality of blood components, and the economic constraints shared by all countries, all lead to rethink both transfusion therapy as a whole and the organization of the transfusion chain from donor to recipient. The main tools
available to improve transfusion and the transfusion chain management are the following: programs of patient blood management (PBM) to optimize the use of blood products with a patient centred approach, blood supply management tools to improve the effectiveness and efficiency of the transfusion chain, donor management tools to adapt donor collections to the patients' needs in compliance with safety requirements for patients and donors, and coordination of these activities. A better understanding of these tools and their implementation will certainly be major challenges for transfusion medicine in the near future. Integrating these evolutions in regulations through the revision of the European Directives on blood and blood components (the review process is expected to be launched in 2015) should enroll them in the long term, for the benefit of patients, donors and all other stakeholders involved in the transfusion chain.


Patient blood management in cardiac surgery results in fewer transfusions and better outcome.

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Author information

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Abstract

BACKGROUND:

The aim of this study was to investigate the impact of the introduction of a patient blood management (PBM) program in cardiac surgery on transfusion incidence and outcome.

STUDY DESIGN AND METHODS:

Clinical and transfusion data were compared between the pre-PBM epoch (July 2006-March 2007) and the PBM epoch (April 2007-September 2012).

RESULTS:

There were a total of 2662 patients analyzed, 387 in the pre-PBM and 2275 in the PBM epoch. Red blood cell (RBC) loss decreased from a mean (±SD) of 810 ± 426 mL (median, 721 mL) to 605 ± 369 mL (median, 552 mL; p < 0.001) and pretransfusion hemoglobin decreased from 7.2 ± 1.4 to 6.6 ± 1.2 g/dL (p < 0.001) in the pre-PBM versus the PBM epoch. In conjunction, this resulted in a reduction of the RBC transfusion rate from 39.3% to 20.8% (p < 0.001). Similar reductions were observed for the transfusion of fresh-frozen plasma (FFP; from 18.3% to 6.5%, p < 0.001) and platelets (PLTs; from 17.8% to 9.8%, p < 0.001). Hospital mortality and cerebral vascular accident incidence remained unchanged in the PBM epoch. However, the incidence of postoperative kidney injury decreased in the PBM epoch (from 7.6% to 5.0%, p = 0.039), length of hospital stay decreased from 12.2 ± 9.6 days (median, 10 days) to 10.4 ± 8.0 days (median, 8 days; p < 0.001), and total adjusted direct costs were reduced from $48,375 ± $28,053 (median, $39,709) to $44,300 ± $25,915 (median, $36,906; p < 0.001).

CONCLUSIONS:
Implementing meticulous surgical technique, a goal-directed coagulation algorithm, and a more restrictive transfusion threshold in combination resulted in a substantial decrease in RBC, FFP, and PLT transfusions; less kidney injury; a shorter length of hospital stay; and lower total direct costs.


The next chapter in patient blood management: real-time clinical decision support.

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²From the Departments of Pathology and.

Abstract

OBJECTIVES:

Blood transfusion was identified by the American Medical Association as one of the top five most frequently overused therapies. Utilization review has been required by accreditation agencies, but retrospective review has been ineffective due to labor-intensive resources applied to only a sampling of transfusion events. Electronic medical records have allowed clinical decision support (CDS) to occur via a best practices alert at the critical decision point concurrently with physician order entry.

METHODS:

We review emerging strategies for improving blood utilization.

RESULTS:

Implementation of CDS at our institution decreased the percentage of transfusions in patients with a hemoglobin level of more than 8 g/dL from 60% to less than 30%. Annual RBC transfusions were reduced by 24%, despite concurrent increases in patient discharge volumes and case mix complexity. This resulted in acquisition costs savings (direct blood product purchase costs) of $6.4 million over 4 years.

CONCLUSIONS:

We have been able to significantly reduce inappropriate blood transfusions and related costs through an educational initiative coupled with real-time CDS. In deriving increased value out of health care, CDS can be applied to a number of overuse measures in laboratory testing, radiology, and therapy such as antibiotics, as outlined by the American Board of Internal Medicine's Choosing Wisely campaign.


Patient blood management to reduce transfusion need.

Lynn S¹.

Author information
Abstract

Patient blood management is a multidisciplinary, patient-centered approach aimed at improving patient outcomes, preserving the blood supply, and reducing costs. By identifying patients at risk for transfusion and taking steps to maintain hemoglobin concentration, manage anemia, optimize hemostasis, and minimize blood loss, clinicians can improve patient outcomes.

A single-center strategy to minimize blood transfusion in neonates and children undergoing cardiac surgery.

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Author information

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Abstract

BACKGROUND:

The transfusion of blood products in the setting of uncontrolled bleeding is unquestionably lifesaving. However, in many instances, the decision to transfuse is based on physician gestalt rather than medical evidence. When indications for transfusion are unclear, the benefits of blood products must be balanced against their significant risks and associated costs. As our institution is a referral center for patients of Jehovah's Witness faith, this population has pushed our development of techniques to achieve the goal of bloodless surgery. Our practices in caring for this population have become our standard practice for managing all patients undergoing congenital cardiac surgery.

OBJECTIVES:

To evaluate our success in minimizing the use of blood products during pediatric cardiac surgery.

METHODS:

After IRB approval, we retrospectively reviewed all patients who underwent cardiac surgery utilizing cardiopulmonary bypass (CPB), for biventricular repair procedures. The study was conducted at a single institution (Nationwide Children's Hospital (NCH)) during the period: January 1, 2013 and December 31, 2013.

RESULTS:

A total of 209 patients were included. Overall, 81 patients (38.8%) and 81 of 136 (59.6%) weighing more than 6 kg received no blood products (bloodless) during their entire hospital stay. Bloodless surgery was
most successful in patients weighing more than 18 kg, followed by patients weighing 6-18 kg. All 73 patients who weighed <6 kg received blood transfusion during their hospitalization.

CONCLUSION:

The techniques that we have developed to initially care for our Jehovah's Witness families may be applied to other pediatric and adult surgical procedures.


Risk for Cerebral Palsy in Infants With Total Serum Bilirubin Levels at or Above the Exchange Transfusion Threshold: A Population-Based Study.

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Abstract

Importance:

Exchange transfusion is recommended for newborns with total serum bilirubin (TSB) levels thought to place them at risk for cerebral palsy (CP). However, the excess risk for CP among these infants is unknown.

Objective:

To quantify the risks for CP and CP consistent with kernicterus that are associated with high TSB levels based on the 2004 American Academy of Pediatrics exchange transfusion threshold (ETT) guidelines.

Design, Setting, and Participants:

We enrolled 2 cohorts from a population of 525,409 infants in the Late Impact of Getting Hyperbilirubinemia or Phototherapy (LIGHT) birth cohort. Eligible infants were born at a gestational age of at least 35 weeks at 15 hospitals within the Kaiser Permanente Northern California integrated medical care delivery system from January 1, 1995, through December 31, 2011.

Exposures:
The exposed cohort included all 1833 infants with at least 1 TSB measurement at or above the ETT based on age at testing, gestational age, and results of direct antiglobulin testing. The unexposed cohort was a 20% random sample of 104 716 infants with TSB levels below the ETT.

**Main Outcomes and Measures:**

A pediatric neurologist blinded to the TSB levels reviewed medical records to determine the presence of CP, defined as a nonprogressive congenital motor dysfunction with hypertonia or dyskinesia. Cerebral palsy was judged to be consistent with kernicterus if magnetic resonance imaging of the brain revealed bilateral globus pallidus injury in the setting of dyskinetic CP.

**Results:**

We identified CP in 7 of 1833 exposed (0.4%) vs 86 of 104 716 unexposed (0.1%) infants (relative risk, 4.7 [95% CI, 2.2-10.0]). Absolute risk differences were 0.2% (95% CI, 0%-0.5%) for a TSB level 0 to 4.9 mg/dL above the ETT (n = 1705), 0.9% (95% CI, 0.1%-5.3%) for a TSB level 5.0 to 9.9 mg/dL above the ETT (n = 102), and 7.6% (95% CI, 2.1%-24.1%) for a TSB level 10 mg/dL or more above the ETT (n = 26). Cerebral palsy consistent with kernicterus occurred in 3 infants (incidence, 0.57 per 100 000 births); all 3 had TSB levels of more than 5.0 mg/dL above the ETT and at least 2 risk factors for neurotoxicity, such as prematurity, glucose-6-phosphate dehydrogenase deficiency, or hypoxia-ischemia.

**Conclusions and Relevance:**

Cerebral palsy consistent with kernicterus occurred only in infants with 2 or more risk factors for neurotoxicity and TSB levels of more than 5 mg/dL above the ETT. Among infants with lower degrees of TSB level elevation, the excess risk for CP is minimal.

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### SURGICAL TECHNIQUES


**Reduced operating time but not blood loss with cruciate retaining total knee arthroplasty.**

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**Abstract**
BACKGROUND:

There is no consensus regarding the use of retaining or replacing cruciate implants for patients with limited deformity who undergo a total knee replacement. Scope of this paper is to evaluate whether a cruciate sparing total knee replacement could have a reduced operating time compared to a posterior stabilized implant.

METHODS:

For this purpose, we performed a randomized study on 50 subjects. All procedures were performed by a single surgeon in the same conditions to minimize bias and only knees with a less than 20° varus deviation and/or maximum 15° fixed flexion contracture were included.

RESULTS:

Surgery time was significantly shorter with the cruciate retaining implant (P = 0.0037). The mean duration for the Vanguard implant was 68.9 (14.7) and for the NexGen II Legacy was 80.2 (11.3). A higher range of motion, but no significant Knee Society Scores at 6 months follow-up, was used as controls.

CONCLUSIONS:

In conclusion, both implants had the potential to assure great outcomes. However, if a decision has to be made, choosing a cruciate retaining procedure could significantly reduce the surgical time. When performed under tourniquet, this gain does not lead to reduced blood loss.


The Relationship Between Total Arterial Revascularization and Blood Transfusion Following Coronary Artery Bypass Grafting.

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Author information

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Abstract

BACKGROUND:

Blood transfusion adversely affects the outcome of coronary artery bypass grafting (CABG), yet blood transfusion after CABG is still common. Total arterial revascularisation (TAR) is increasingly used in current practice but its impact on postoperative blood transfusion is not known.

METHODS:

We reviewed the cardiothoracic and blood bank databases and collected data for isolated primary CABG patients from July 2007 to June 2012, excluding patients who had a single graft (n = 148). Perioperative variables of TAR patients (n = 745) were compared with patients who had one or more venous grafts (SVG, n = 1,761) for first-time isolated CABG. The conduits used in TAR patients were predominantly left
internal thoracic and radial arteries. Matched group comparison of TAR and SVG patients was performed. The association of TAR with blood transfusion was investigated using multivariate and matched analysis.

RESULTS:

Of 2,506 patients, the 745 (29.7 %) that had TAR were generally younger, with less complex coronary artery disease and less often diabetic. After correcting for these by 1:1 matching, the mean chest tube drainage and rates of blood transfusion remained significantly lower (p < .0001) in TAR patients. Indeed, red cells, platelets and fresh frozen plasma were significantly less frequently transfused in TAR patients. By multivariate analysis, TAR had an independent effect on reducing blood transfusion after CABG [odds ratio (OR) 0.67, 95 % confidence interval (CI) 0.47-0.97, p = .03].

CONCLUSIONS:

TAR achieved predominantly with left internal thoracic and radial arteries substantially reduced blood transfusion rates after primary CABG. Further studies are warranted.

TRANSFUSION HAZARDS


Platelet transfusions in platelet consumptive disorders are associated with arterial thrombosis and in-hospital mortality.

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Abstract

While platelets are primary mediators of hemostasis, there is emerging evidence to show that they may also mediate pathologic thrombogenesis. Little data are available on risks and benefits associated with platelet transfusions in thrombotic thrombocytopenic purpura (TTP), heparin induced thrombocytopenia (HIT) and immune thrombocytopenic purpura (ITP). This study utilized the Nationwide Inpatient Sample to evaluate the current in-hospital platelet transfusion practices and their association with arterial/venous thrombosis, acute myocardial infarction (AMI), stroke, and in-hospital mortality over 5 years (2007-2011). Age and gender-adjusted odds ratios (AdjOR) associated with platelet transfusions were calculated. There were 10,624 hospitalizations with TTP; 6,332 with HIT and 79,980 with ITP. Platelet transfusions were reported in 10.1% TTP, 7.1% HIT and 25.8% ITP admissions. Platelet transfusions in TTP were associated with higher odds of arterial thrombosis (adjOR=5.8, 95%CI=1.3-26.6), AMI (adjOR=2.0, 95%CI=1.2-3.3) and mortality (adjOR=2.0,95%CI=1.3-3.0), but not venous thrombosis. Platelet transfusions in HIT were associated with higher odds of arterial thrombosis (adjOR=3.4, 95%CI=1.2-9.5) and mortality (adjOR=5.2, 95%CI=2.6-10.5) but not venous thrombosis. Except for AMI, all relationships remained significant after adjusting for clinical severity and acuity. No associations were significant for ITP. These data suggest that platelet transfusions are associated with higher odds of arterial thrombosis and mortality among TTP and HIT patients.
Effect of Perioperative Blood Transfusion on Mortality for Major Urologic Malignancies.

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Abstract

INTRODUCTION:

Patients who undergo surgical treatment for malignancy often receive perioperative blood transfusion (PBT). We examined the association between PBT and mortality in patients who received surgical treatment of prostate, bladder, and kidney cancer.

MATERIALS AND METHODS:

Using the Surveillance, Epidemiology, and End Results-Medicare data set from 1992-2009, we identified 28,854 men with prostate cancer, 5462 patients with bladder cancer, and 14,379 patients with renal cell carcinoma who underwent radical prostatectomy (RP), radical cystectomy (RC), or radical (RN) or partial nephrectomy (PN) as primary therapy. Univariate and multivariate models were used to evaluate the association of PBT with cancer-specific mortality (CSM) and all-cause mortality (ACM).

RESULTS:

The rate of PBT in bladder and kidney cancer have been increasing over time, and PBT in prostate cancer steadily increased and peaked in 2002 and declined afterward. The median follow-up for the RP, RC, and RN/PN cohorts were 70 months, 21 months, and 39 months, respectively. In the RP cohort, PBT was associated with greater CSM (hazard ratio [HR], 1.609; 95% confidence interval [CI], 1.235-2.097; P = .0004) and ACM (HR, 1.121; 95% CI, 1.006-1.251; P = .0394). In the RC cohort, PBT was not associated with greater CSM (HR, 1.047; 95% CI, 0.917-1.195; P = .4962) or ACM (HR, 1.095; 95% CI, 0.998-1.200; P = .0547). In the nephrectomy cohort, PBT was associated with greater CSM (HR, 1.365; 95% CI, 1.167-1.597; P = .0001) and ACM (HR, 1.402; 1.273-1.544; P < .0001).

CONCLUSION:

PBT was associated with increased CSM and ACM for prostate and kidney cancer in a multivariate model. Although these data do not identify a causative relationship between PBT and mortality, efforts made to limit PBT in patients who undergo urologic cancer surgery can yield long-term survival benefits.
Adherence to transfusion guidelines: are we prepared for the Smarter Medicine or Choosing Wisely® initiative?

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Abstract

OBJECTIVE:

To determine, whether a restrictive transfusion strategy is followed in our hospital and to identify differences in activities within departments and patient groups.

METHOD:

Over a period of 15 months, RBC transfusions were prospectively recorded including the haemoglobin level prior to transfusion and were grouped in the different departments of our hospital (internal medicine ward, department of surgery, emergency room, intensive care unit, gynaecology ward, medical outpatient clinic and oncology outpatient clinic). Indications and co-morbidities were assessed retrospectively by reviewing the patient's charts.

RESULTS:

There were 1,832 RBC products transfused in total. The overall mean level of haemoglobin before transfusion was 7.61 g/dl (±1.1). These haemoglobin levels differed significantly between the departments (p <0.001), with the lowest threshold in the internal medicine ward (7.30 g/dl ± 1.0) compared to the surgery ward (7.73 g/dl ± 1.0) and to the intensive care unit (7.82 g/dl ± 0.9). In general, mean pre-transfusion haemoglobin levels did not differ significantly between patients with coronary artery disease (CAD) and patients without (7.64 g/dl ± 1.0 vs 7.59 g/dl ± 1.1, p = 0.48). In transfusions for patients with acute coronary syndrome a tendency to a higher transfusion threshold than in patients with stable CAD could be found (7.84 g/dl ± 0.7 vs 7.58 g/dl ± 1.0, p = 0.05). Patients with haematological disorders were transfused at a higher threshold when compared to patients without (7.77 g/dl vs 7.56 g/dl, p = 0.006).

CONCLUSION:

All wards in our analysis are following the current guidelines based on restrictive transfusion strategies. At the same time, we were able to detect significant differences between different departments and patient characteristics


Changes of Hemoglobin and Hematocrit in Elderly Patients Receiving Lower Joint Arthroplasty without Allogeneic Blood Transfusion.

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Abstract

BACKGROUND:

It has rarely been reported about the changes of hemoglobin (Hb) and hematocrit (Hct) in elderly patients receiving total knee arthroplasty (TKA) or total hip arthroplasty (THA). This study aimed to evaluate the changes of Hb and Hct after TKA or THA in elderly patients, and analyze its relationship with sex and type of arthroplasty.

METHODS:

This is a prospective cohort study, including 107 patients receiving TKA or THA without allogeneic blood transfusion. There were 54 males and 53 females, with a mean age of 69.42 years. Levels of Hb and Hct were examined preoperatively and during the 6 months follow-up after operation.

RESULTS:

Levels of Hb and Hct decreased postoperatively and reached their minimum points on postoperative day 4. Thereafter, Hb and Hct recovered to their preoperative levels within 6-12 weeks. No significant differences in the levels of Hb and Hct were noticed between different sexes. THA patients showed significantly greater drop in Hb and Hct than TKA patients in the first 4 days postoperatively (P < 0.05).

CONCLUSIONS:

Levels of Hb and Hct decreased during the first 4 days after arthroplasty and gradually returned to their normal levels within 6-12 weeks postoperatively. THA may be associated with higher postoperative blood loss than TKA.


Red cell transfusion and the immune system.

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Abstract

Understanding the complex immunological consequences of red cell transfusion is essential if we are to use this valuable resource wisely and safely. The decision to transfuse red cells should be made after serious considerations of the associated risks and benefits. Immunological risks of transfusion include major incompatibility reactions and transfusion-related acute lung injury, while other immunological insults such as transfusion-related immunomodulation are relatively underappreciated. Red cell transfusions should be acknowledged as immunological exposures, with consequences weighed against expected benefits. This article reviews immunological consequences and the emerging evidence that may inform risk-benefit considerations in clinical practice.
The Many Faces of Survivor Bias in Observational Studies on Trauma Resuscitation Requiring Massive Transfusion.

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Teaching transfusion medicine: current situation and proposals for proper medical training.

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Abstract

The current curricula in medical schools and hospital residence worldwide lack exposure to blood transfusion medicine, and require the reformulation of academic programs. In many countries, training in blood transfusion is not currently offered to medical students or during residency. Clinical evidence indicates that blood transfusions occur more frequently than recommended, contributing to increased risk due to this procedure. Therefore, the rational use of blood and its components is essential, due to the frequent undesirable reactions, to the increasing demand of blood products and the cost of the process. Significant improvements in knowledge of and skills in transfusion medicine are needed by both students and residents. Improvements are needed in both background knowledge and the practical application of this knowledge to improve safety. Studies prove that hemovigilance has an impact on transfusion safety and helps to prevent the occurrence of transfusion-related adverse effects. To ensure that all these aspects of blood transfusion are being properly addressed, many countries have instituted hospital transfusion committees. From this perspective, the interventions performed during the formation of medical students and residents, even the simplest, have proven effective in the acquisition of knowledge and medical training, thereby leading to a reduction in inappropriate use of blood. Therefore, we would like to emphasize the importance of the exposure of medical students and residents to blood services and transfusion medicine in order for them to acquire adequate medical training, as well as to discuss some changes in the current medical curricula regarding transfusion medicine that we judge critical.