Squashing sepsis

In the “old days,” we used to refrigerate platelets, for the same reasons we refrigerate or freeze other blood products, to preserve them and their function. But we soon learned that after 24 hours in the refrigerator, platelets didn’t really do their work, and warming them back up didn’t help. Thus began the journey to room storage for three days, eventually five, with current hopes for even longer. But, given the propensity of a rich culture medium such as plasma to foster bacterial growth, due to uncommon but inevitable contamination with skin bacteria or the occasional bug circulating in a donor’s blood stream, serious septic reactions occurred. This led to the development of our current requirements for apheresis platelets and platelets pooled in groups, that a culture system with an automatic alert for bacterial growth be employed. The authors of this article (see reference), all from the American Red Cross Biomedical Services, reviewed a large collection of data and constructed a statistical model to estimate the actual contamination rate in units that may escape detection by the BacT/ALERT culture system.

Virtually all of the definite or probable septic reactions classified by the Red Cross hemovigilance program since 2004 have implicated platelet components that had a false-negative culture. Other studies have led to the surmise that the number of bacteria in a test system culture sample, taken between 24–36 hours of incubation, are present in a concentration between 1–60 CFUs per collection sample (8 ml); this is well below the sensitivity of the detection system, which is 1–10 CFU per 1 ml. The 24-hour wait time before sampling and culture inoculation hopes to capture a sample after any bacteria present might have entered the log phase of growth. Obviously some don’t do so right away, which would likely quash any hopes of extending the five day shelf life.

Between January 2007 and December 2011, all culture results and all reported septic reactions were collected. Cultures that were initially positive but not confirmed on subsequent sample re-culture were assumed to be so due to low concentration and dormant bacteria, and for this model were classified as “unconfirmed positive.” These had previously been labeled as false positive, sampling contamination. Thus, for culture results for 2,217,086 apheresis platelet collected between the above dates, there were 417 confirmed positive, 653 false positive (instrument failure), 243 unconfirmed positive, 2 discordant positive and 138 unable to determine. The authors developed a model, (please see the article) using these “unconfirmed positives” as likely causes of probable or proven septic reactions. From this they predicted that the vast majority of platelet collections (>99.5%) are functionally sterile and <0.5% may contain potentially dangerous bacteria. During this same five-year period, 38 transfusion reactions (including 4 fatalities) were reported from Red Cross-provided facilities, a post-transfusion sepsis rate of 9.4/ million. (See tables in the article for details of culture results.) This model of the residual rate of bacterial contamination in apheresis platelets describes a subset of platelets containing low concentrations of dormant bacteria, and supports a previous conclusion that doubling or tripling the bacterial culture sample volume would have no effect on using that method to improve detection. Shortening the shelf life for an already constrained product is not a popular option for additional protection for patients. Methods for pathogen inactivation or rapid and sensitive bacterial tests on the day of transfusion seem like rational alternatives, but are yet to be widely available.


In the news

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Cover photo: Granulocytic white cells (neutrophil), T-lymphocytes, and a red blood cell (erythrocyte).

This issue of PLUS was written by Dr. Robert (Bob) Westphal.
Psychologically, almost everyone understands that children, especially younger children and infants, are—physically—not simply small adults. Similarly, their physiologic makeup also differs. This includes their Hgb and Hct levels, as well as their total blood volume (TBV). Immediately at birth, levels depend somewhat on the amount of umbilical cord blood transferred to the baby’s circulation; in the next few days, this evens out to an Hct of about 47% and a total blood volume of 8.4% of body weight (in kilograms; i.e., 84 ml/kg). By the end of the first year, the Hct is decreased to ~34% and by age 4–6 the Hct is around 41% with the total blood volume diminished to about 7.7% of body weight, on its way towards an adult level of around 7%. A few years later, levels between boys and girls begin to differ.

A group of transfusion medicine and pediatric experts in the United Kingdom (UK) invited all the hospitals in the UK in which any child under 18 received a red cell transfusion during a three-month period in 2009 to submit data (see reference). A total of 160 of 247 (65%) responded. For this report, 1,302 patients not in a neonatal unit were analyzed. Neonatal transfusions are treated separately. Evidence has previously been reported in the UK Serious Hazards of Transfusion (SHOT) study that a disproportionate number of adverse transfusion events occur in children, especially infants < 1 years old. In the study reported here, 74% of the episodes involved a single transfusion during their admission; more than half of the patients were hematologic or oncologic patients.

About 40% of the transfusions were prescribed as units, not ml. The median Hgb level triggering transfusion was 7.9 g/dl. The general pediatric ward was the site for the largest number of transfusions, at 33%. The hematology-oncology ward and day care wards accounted for almost another 1/3 of sites, with the remainder scattered across pediatric ICU, the operating room and a handful of infrequent sites. Principal reasons for the transfusion were: anemia with symptoms, 33%; anemia without symptoms, 18%; chronic transfusion program (patients with hemoglobinopathies), 17%; and bleeding, 13%.

To avoid over-transfusion of children, most experts recommend prescribing by ml/kg, rather than units, even in older children. The study found ordering peaks at 10, 15 and 20 ml/kg. For the non-bleeding patient, a dose of 10 ml/kg is commonly used as a baseline. The following equation has been used to calculate transfusion volumes: weight (kg) × increment in Hb (g/dL) × 3/ (hematocrit [Hct] level of RBCs). This predicts that with a UK standard Hct of red cells of 0.6, 10 ml/kg gives an increment of 2 g/dL. This will differ some, depending on bleeding status and the actual RBC-packed cell Hct.

The study also looked carefully at respiratory status and the main indication for transfusing noted in the chart, as well as the resulting increment of Hgb seen in these groups. The authors call for further efforts in education and in research to look at the issues of transfusion volumes, transfusion triggers and ways to decrease the occurrence of single transfusion incidents wherever possible. Many years ago, Khalil Gibran (in “The Prophet”) wrote: “Your children are not your children, but the end of life’s longing for itself.” We need to care for it carefully.


Children are different; care carefully!
HEV and Blood transfusion

Hepatitis E virus (HEV) is a single-stranded, non-enveloped, RNA virus that was identified in 1983 and found to be related to outbreaks of hepatitis in South Asia associated with monsoon, or heavy, seasonal rains. This virus was commonly found in fecally contaminated water in large refugee camps; however, affected patients are generally asymptomatic (see references). Subsequent studies have shown four genotypes: types 1 and 2 directly affecting humans and types 3 and 4 occurring mostly in animals and affecting humans only sporadically. All four genotypes are present in North America, and types 3 and 4 are found in domestic and wild swine, deer, rabbits, muskrats and shellfish. Seroprevalence studies in North America, Western Europe and Japan have reported antibody presence in 6.25% of the healthy population. Another surveillance study conducted by the CDC from 1988 to 1994 showed HEV antibody presence in 21% of the individuals.

Despite this, very few people with active hepatitis have been found to have HEV infection; the CDC did find 26 cases between 2005 and 2012, of which 15 were acquired here, while 6 occurred in U.S. travelers to endemic countries. Since most people with active HEV infection are asymptomatic, they would qualify as blood donors. However, only a few individual case reports from Europe and Japan have documented HEV transmission to recipients from an HEV-infected donor. In 2013 it was reported that of 1,939 blood donors at the National Institutes of Health, anti-HEV IgG was found in 22% in 2006 and 16% in 2012. Although eight donors had IgM anti-HEV, none were HEV-RNA positive, and no cases of seroconversion were found in 362 recipients who could be followed up.

This year, authors from the Institute of Transfusion Medicine in Lubeck, Germany, and the Paul Ehrlich Institute for Vaccines and Biomedicines in Germany, retrospectively surveyed sera for HEV infection from 1,019 whole blood donors (see references). They tested for anti-HEV IgG using an enzyme-linked immunosorbent assay and by Western blot. Of the 69 donors (6.8%) found to be positive, 7 had converted in the past 2 years and 3 of these 7 had HEV RNA detectable in their plasma, for an annual incidence rate of 0.35%. The presence of HEV RNA did not correlate with the detection of IgM anti-HEV or with an elevated ALT. The one traceable recipient of a sero-converting unit of blood with detectable HEV RNA showed no detectable anti-HEV IgG, IgM or HEV RNA 6 weeks after transfusion.

There have been previous studies looking for the presence of HEV antibodies in several countries, including Switzerland, the Netherlands, Germany, France, and especially Japan and China where HEV RNA has also been noted more frequently. As has been illustrated above, the degree of transmission of this virus to blood recipients seems to be very low.

The editorial provides several conclusions about HEV transmission by transfusion. First, it is clear that it has occurred. Second, although only a few cases have been reported it may be that others are unrecognized, since the symptoms are not severe and are self-limited. Testing is difficult and available from only a few specialized labs. Finally, many countries have demonstrated that healthy donors with a negative history of hepatitis may have antibodies, suggesting that asymptomatic infection may be common in adults. If continued studies find more evidence for transmission and better tests for markers of active infection, screening may be necessary. For now, though, there is no good test and the problem does not seem urgent.


As we continue to make measurable progress against TRALI, we are seeing something else needing attention, not just from blood suppliers but from those who actually prescribe, administer and oversee transfusions in hospitals and clinics. By now, probably most of the world knows that TACO stands for Transfusion-Associated Circulatory Overload. If memory serves properly, in the last annual report from the FDA on reportable transfusion reactions, and especially reportable deaths, TACO had risen to a close second behind TRALI, or maybe just surpassed it. It was stated, in 2012, that TACO was the cause of 20% of transfusion-related deaths. In an article by colleagues in Canada, the authors report that TACO is the leading cause of serious transfusion reactions and transfusion-related deaths in Canada. Many of the symptoms are similar, and in very sick patients it is often difficult to get at just what the underlying physiology is that is manifesting as lung injury and shortness of breath in association with transfusion. Popovsky et al, have previously reported a mortality rate of 5–12% in several series of patients. Potential risk factors include (but are not limited to) older patients, positive fluid balance, large volumes of plasma infusion, faster transfusion rates, underlying renal insufficiency and cardiac dysfunction.

This retrospective study took place in Toronto at two major tertiary medical centers, and the hospitals both use the Public Health Agency of Canada (PHAC) criteria for defining cases of TACO. These criteria are symptoms of dyspnea, cyanosis, orthopnea (inability to breathe while lying flat), hypertension (new or aggravated), or congestive heart failure (CHF) within 6 hours of transfusion. Patients diagnosed with TACO did not meet the PHAC definitions for TRALI or for TAD (transfusion-associated dyspnea). A careful review of all suspected cases was carried out by a transfusion safety nurse and a transfusion medicine physician based on a standardized form and grading scale. (See the article to review these forms.) All categories of blood products transfused to each patient were included in the analysis. A consecutive 50 cases at each hospital (100 consecutive cases total) that had been classified as TACO based on the appropriate criteria were reviewed and 98 included in this study. Very specific criteria for chest x-ray anomalies within 7 days of occurrence, and standard definitions for renal function, cardiac dysfunction and other laboratory data are included in the forms. Hypertension is defined as systolic BP > 140, or diastolic >90 mm. Hg. Very meticulous attention is paid to actual recorded volumes of intravenous fluids, including medications, and including blood products, as well as to other meds—many of which affect overall volume and/or BP status.

Additionally, a risk score was created for patients based on a literature review (again, see Table in the article). Risk scores ranged from 0–3, with one point assessed for each of the following: 1) age 70 or older; 2) CHF defined as anyone with a medical history of CHF, daily diuretic use, or cardiac ejection fraction < 60% by echocardiogram; or, 3) renal dysfunction—creatinine or GFR outside the normal range.

The overall incidence of TACO at the two hospitals was 0.5 event per 1,000 RBC, platelet or plasma transfusions. Exactly 2/3 of the patients were transfused on the hematology or medical service (including some outpatients), 16% on the surgical wards, 10% oncology and 6% trauma. Nearly half, 44%, had abnormal renal function (using the definition above) at admission, hypertension was noted in 65% and 28% had ischemic heart disease. Very critically, signs of fluid overload were noted on pre-transfusion CXRs in 73% of the patients prior to transfusion who subsequently had an incidence of TACO. Forty-four of the patients had an echocardiogram prior to transfusion, and low ejection fractions and/or diastolic dysfunction were found in 30% and 55%, respectively.

Before ordering a transfusion, only 31% of the physicians documented the patient’s fluid status; more than half the doctors documented fluid intake and output. There were also signs of physical examination of edema, elevated venous pressure and crackling noises in the chest. Many orders were given over the phone. The patient’s weight was rarely recorded before or after transfusion. Of the 98 evaluated patients with TACO, 81 received RBCS, and of these, 46% received 1 unit and 51% 2 units. Platelet and plasma transfusions were not
After widespread provision of platelet concentrates in the 1960s, it became clear that refrigerated storage of whole blood-derived platelet concentrates strongly reduced their post-transfusion survival, and thus utility. Additive solutions for whole blood collection were primarily geared to preservation of red cell function and survival; in order to allow platelet concentrates to be stored at room temperature, different additives and a gas permeable container had to be supplied. Allergic transfusion reactions (ATRs) were also common, including anaphylactic ones, since the recipient of platelet concentrates was infused with potentially allergenic substances from several donors at once. In addition, actively metabolizing platelets (and some leukocytes) in storage also generate other cell mediators that cause recipient reactions. Thus was born the concept, and equipment, to provide single donor platelets by apheresis of a single, suitable donor. Earlier products had been stored only for up to 3 days, limiting supply and availability; the use of apheresis equipment meant platelets could be isolated in their own medium, their own container, and be stored for up to 5 days, after which function and efficacy decreased and the risks of bacterial growth at room temperature storage increased. The history of modern developments in platelet transfusions is nicely summarized by Dr. Heaton in his editorial (see reference).

Since the first platelet additive solution (PAS) was introduced in Sweden, in 1991, successive investigators have been delineating the pathophysiology of stored platelets and the efficacy of various additives in reducing harmful effects. Use of PAS has been demonstrated to significantly decrease ATRs, and various solutions have been marketed. These, of course, are not without significant costs. Many ATRs can be prevented, or mitigated, with medication(s), which also have a cost, plus the problems of patients with reactions may keep them in hospital longer, also a cost. And still another alternative, prevention by platelet washing and concentrating, also has costs and significantly reduces the number of available, viable platelets.

Using some key assumptions about platelet transfusion and reaction rates, obtained from real data, Kacker and colleagues (see references) constructed a fairly complicated model to evaluate the cost effectiveness of PAS solutions in four different scenarios with several points each on the decision tree, depending on when one resorts to all PAS-stored apheresis products. These included leukoreduction, concentration of platelets, washing of platelets, using PAS initially and using PAS with no preventive pre-medication. They concluded that using PAS for all apheresis platelet

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**PAS for ATRs?**

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transfusions may be both financially and clinically beneficial, both of which are important considerations.

Of equal importance is the relatively short storage time permitted for platelets, currently 5 days at room temperature. The FDA has fairly strict criteria for allowable storage time that yields viable platelets: platelets are to be collected and re-infused into the same subject; the lower post-storage 95% confidence limits for platelet recovery are 66% or greater, and for the survival (of radiolabeled platelets) it is 58% or greater. Some studies have already shown that some platelet preparations (apheresis) fulfill these criteria at 7 days. Slichter and her co-workers (see references) evaluated the post-storage viability for products stored for up to 18 days in 80% additive solution and 20% plasma. They used the Haemonetics MCS+, COBE Spectra or Trima Accel collection systems and compared control and test samples from the same individual, of which there were 117. They demonstrated that Haemonetics platelets had good viability for almost 13 days, probably related to the reduced level of collection injury to platelets in that system. Obviously further studies in these areas need to be done, but it certainly seems that PAS collected/stored platelets will become the improved standard in the future.


Lyme disease from transfusion? Why not?

Those of us in the northeastern and northern midwestern areas of the U.S. are visited frequently from early spring to late autumn and sometimes beyond by deer ticks. These ticks announce their presence by an itchy bite that may well develop into Lyme disease if the tick is not immediately removed. Many of us are even prescribed a preventive single dose of doxycycline if the tick is present for more than 20–24 hours. Lyme disease is the most commonly reported vector-borne disease in the U.S. Undetected, a tick bite often develops into a rash known as erythema migrans that spreads from a classic bulls-eye lesion to a generalized rash. At this point, just as with syphilis, spirochetemia can be documented. Babesiosis, transmitted by the same tick, is much less common but has been transmitted by transfusion more than 160 documented times.

Many pathogens can be transmitted by transfusion, and the authors describe and evaluate four common elements for these infectious processes in order to explain the lack of transmission. Most Lyme disease patients with spirochetemia are symptomatic, and therefore do not offer themselves up for donation. In addition, virtually all collection centers defer potential donors who do not feel well, and many defer those with a history of a recent tick bite. The spirochetemia is relatively short lived and thought to last less than 2 months. The number of spirochetes present may be as low as 1 in 10 ml, not much of an inoculum. Finally, the organism changes phenotypically in different environments; ticks handle it differently from mammals, and although it can be found in stored blood products, it has adapted to the mammalian host and may not be very infectious.

Certainly syphilis, another spirochete with protean manifestations (primary lesion, spirochetemia, eventually targeting joint, neurological and cardiac tissues), has been transmitted by transfusion. Last reports of this were in the 1960s, and probably related to the use of “fresh blood.” For whatever reason, I’m sure we’re all grateful to know Lyme disease has not been transmitted by transfusion so far but “Eternal vigilance is the price of freedom,” as the famous quote goes. Stay tuned!

The principle of Yin and Yang is a fundamental concept in Chinese philosophy and culture in general, dating from at least the third century BCE. This principle is that all things exist as inseparable yet contradictory opposites, for example, female-male, dark-light and old-young. The two opposites attract and complement each other. You may be familiar with the common illustration of the idea, the symbol for yin and yang; if not, the idea is probably clear. When the ordinary equilibrium of blood that is liquid and flowing through our vessels is insulted, as with a damaged vessel, our blood clots to plug the breach(es). But without restraint on the coagulation forces, our entire circulation would seize up and coagulate. And without coagulation, we’d just leak into the outside world with the first traumatic insult. Yin and Yang. Hemostatic homeostasis. Maintaining this balance is thus a critical biological function, especially in the face of major traumatic insults.

In keeping with what some think of as a new philosophical idea, “Less is better,” an editorial and two articles in the January 2014 edition of Transfusion (see references) look again at the use of tranexamic acid (TXA) to reduce blood loss and subsequent blood transfusion in some orthopedic surgical procedures: total hip arthroplasty (THR) and total knee arthroplasty (TKA). Less use of blood transfusion is not a new idea, but it is gaining more ground in circles other than that of traditional blood bankers. Since blood bankers don’t really use any blood, this is a good thing! There are some of us who even argued against the use of autologous transfusion in elective surgery, pointing out that the best place to store blood is in the human body, that of the patient involved.

TXA is a lysine analog that inhibits fibrinolysis, the breaking down enzymatically of the fibrin clot, and has been the subject of increasing interest among the surgical and blood transfusion communities. One way to think about fibrinolysis is to consider it the Yang to coagulation’s Yin, as noted above. Elements of the fibrinolytic system are intended to limit clotting to the area of injury, prevent total occlusion of the vessel when required, and help dissolve and reshape the final clot. As well, there are circulating inhibitors and stimulators to help regulate both coagulation and fibrinolysis.

In the first paper, a retrospective case-control study, the authors compared the effect of TXA in 51 patients undergoing staged bilateral TKA, with 70 controls having the same surgery. The surgery was staged three days apart for two knees on the same individual. The groups were similar in terms of age, sex, body mass index and preoperative hemoglobin (Hgb) levels. In the study group of 50 patients, 1 gm of TXA was administered through IV 15 minutes before the first incision and another 1 gm dose given through IV at the time of tourniquet release. Both surgical trauma and the use of a major limb tourniquet are known to activate fibrinolysis. The controls received no TXA. For statistical analysis, significance was set at 0.05. Participants included orthopedic departments from hospitals in Ohio, Arizona and Maryland. All of the surgeries were performed by the senior author; all were for osteoarthritis. Operative technique and medicaments were similar for all patients.

Allogeneic blood transfusion was required for 50 of the 70 controls and 22 of the 51 subjects (p=0.003) through the operative cycle. Mean total drain output, in ml, was 872 in the controls and 374 in the subjects (p<0.001). The study group, fewer of whom needed transfusion, received an average of 0.6 units, while the controls received 1.5 (p<0.001). Rates of infection, venous thromboembolism, re-operation and hematoma were low in both groups and statistically equal. All these data include both procedures of the staged bilateral TKA. The transfusion trigger was 9g/dl for the first surgery and 8g/dl for the second.

The second article was the report of a double-blinded, randomized, placebo-controlled study from a Croatian special hospital for orthopedics, in which the authors compared the use of TXA with placebo in order to evaluate the efficacy of TXA in reducing autologous transfusion of shed blood in TKA or THA. TXA or placebo was given 15 minutes prior to incision for THA patients and 15 minutes before tourniquet release for TKA patients. After 3 hours, a second dose of TXA or placebo was given. A transfusion trigger of 8 g/dl or 8–10g/dl with
For over a decade now, in Australia, donors who are men who have had sex with men are deferred for 12 months since their last male-male sexual contact (MSM). In the United States, and much of the rest of the world, it is a permanent deferral, with some special allowances made for sexual assault, child abuse, etc., but even those exceptions often seem very harsh, in practice. Canadian blood centers have been looking at the issue, as have some other countries in Europe. The original rationale for the lifelong deferral was that then-current tests for sexually transmitted and transfusion-transmissible diseases (such as HIV, HBV) had a significant window period, the time between infection and test-positivity. Today’s tests still have a lag time of a few days to 2–3 weeks, or even longer. However, some of the questions directed at high risk sexual and personal behavior lead to screening out many risky donors who are then never tested, at least on that donation. Initially, non-compliance rates of MSM in Australia (2000–2006) were high at 27%. A United Kingdom report of 2011, looking at a few year’s previous data, found non-compliance with that question among men at risk was 25%. In 2011, the UK non-compliance rate of actually seropositive (at donation) at-risk men was reported at 11%, and that of a similar study in Australia of 12.9%.

However, no significant increase was found in the numbers of donors with HIV or with the proportion of donors reporting MSM in the 5-year interval before the 12 month rule versus afterward. The finding from that study was that all five HIV+ donors identified in the 5 years after implementation of the
Just how old is old, anyway? Of course, the context is important—year/century, human/animal, man/woman, and of course, point of view. Many of us who are getting along in years used to think that 60–70 was pretty old. When one starts arriving there, it doesn’t seem so. Old, in terms of red cells for transfusion, also seems to vary between those who use it in hospitals and those responsible for collection, testing, storage and distribution. And there are additional subgroups here, neonatologists versus those responsible for occasional transfusions of red cells in older people, cardiac surgeons, and so on. Much has been written—and refuted—in support of any number of views, varying somewhat on geographic location, historical practice, prior training, blood availability and more.

In a recent article in Transfusion (see references), a very distinguished group of transfusion medicine specialists from 11 hospitals and three blood centers in five nations evaluated factors that affect RBC storage at the time of transfusion. The group developed spreadsheets that were used for collating information from each participating institution (See tables in paper for details.) As expected, the age distribution of RBCs is older in the hospital inventories than in that of blood centers. Also not unexpectedly, hospitals with a higher daily rate

results were excluded from the study.) Part of the study was to identify factors that were significantly associated with non-compliance. These included multiple sexual partners, history of injectable drug use, perception of a lack of privacy during the donation interview process, and a preference for a computer-based questionnaire. Given the large number of respondents, the authors feel that concerns about under-representation of first time male donors in responding to the questions—which has been seen in other studies of a variety of donor investigations—was not important in the study, since all interviews were anonymously conducted online.

Most U.S. and Canadian blood collectors feel they can support a 12-month deferral rate for MSM, and the topic is one for study and discussion at federal regulatory levels.


Age is in the eye of the observer

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that the limitations of comparative studies were so severe that they cannot support firm conclusions. Another meta-analysis emphatically found that older blood was associated with a significant risk of death. Apparently, there are studies currently in progress utilizing double-blind, prospective, randomized trials in several subsets of patients. Some preliminary evidence suggests that outcomes in the neonatal ICU were not affected by blood age. Similarly, for critically ill and cardiac surgery patients, “insufficient evidence” was found to encourage the use of younger RBCs. However, a number of studies need to be done on an increasing number of special-transfused populations, these are difficult and expensive. If it turns out that there are some categories or subsets of patients for whom “fresh blood” is proven to be important, Dr. Sayers points out that blood bank managers at hospitals and centers will need to reconsider their standard practices.

The editorial closes with important thoughts to consider, which should be the point of an editorial, after all. The article by Dzik et al. identifies the factors affecting the age of RBC inventories, and since neither users nor providers can control them, a close collaboration is imperative. This would promote efficiency, increase safety, reduce outdates, improve availability of blood and allow and facilitate benchmarking and useful comparisons among hospitals. Clearly one model would not fit all, but a similar approach using the analytic frame provided by Dzik and the other members of the Biomedical Excellence for Safer Transfusion Collaborative,* would clearly be a help.

* bestcollaborative.org


Sayers MH. Fresh blood or old? How shall we manage the inventories? (Editorial) Transfusion 2014; 53:3032–3035.
TRALI mitigation and the supply of AB plasma

The implementation of AABB TRALI mitigation Standard 5.4.1.2 on April 1, 2014 has significantly impacted the Group AB plasma supply.

The American Red Cross has historically provided disproportionately more of the nation’s group AB plasma (56% in 2011\(^1\)) compared to red blood cells (42% of the supply). We have seen a significant impact on inventory levels since April 1 when the Standard went into effect. The Red Cross has undertaken several measures to increase the availability of Group AB plasma:

- Increasing concurrent collection of AB plasma during plateletpheresis procedures
- Initiating a national plasmapheresis program that will recruit TRALI low-risk AB plasma donors
- Encouraging rational use of this relatively scarce resource

We encourage our hospital customers to take immediate action, as follows:
- Audit all AB plasma patient orders to ensure the product is used only when absolutely necessary for acceptable medical indications\(^2\)
- Issue Group A plasma for emergent use in trauma cases instead of Group AB plasma when the patient’s blood group is unknown and perform ABO typing as soon as possible to enable the use of type-specific plasma
- For group AB patients with thrombotic thrombocytopenic purpura (TTP), consider the use of Octaplas\(^{TM}\) solvent/detergent-treated plasma. Ensure that this product is available in your hospital formulary and procedures are in place for use. Octaplas is not distributed by the Red Cross. The distributor of Octaplas, National Hospital Services, can be reached at 800-344-6087.
- Use 4-factor Prothrombin Complex Concentrates for the urgent reversal of Coumadin (Warfarin) in bleeding patients instead of plasma\(^3\)
- Prevent the use of plasma for the reversal of prolonged INR/PT in non-bleeding patients, where timely oral or intravenous vitamin K may be indicated\(^4\)

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\(^1\) National Blood Collection and Utilization Survey, 2011
\(^2\) Tavares et al. Transfusion 2011;51:754
\(^3\) Guyatt et al. Chest 2012;141(2 Suppl):7S–47S
\(^4\) Meehan et al. Transfusion 2013;53:491–498

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- Immunohematology Journal
  redcross.org/immunohematology
- Reimbursement
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- SUCCESS
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