The Trauma Professional's Blog

Trauma MedEd

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Jehovah's Witnesses And Blood Transfusion - Demystified

Injury can be a bloody business, and trauma professionals take replacement of blood products for granted. Some patients object to this practice on religious grounds, and their health care providers often have a hard time understanding this. So why would someone refuse blood when the trauma team is convinced that it is the only thing that may save their life?

Jehovah's Witnesses are the most common group encounted in the US that refuse transfusion. There are more than 20 million Witnesses worldwide, with over 7 million actively preaching. It is a Christian denomination that originated in Pennsylvania during the 1870s.

Witnesses beleive that the bible prohibits taking any blood products, including red cells, white cells, platelets or plasma. It also includes the use of any dialysis or pump equipment that must be primed with blood. This is based on the belief that life is a gift from God and that it should not be sustained by receiving blood products. The status of certain prepared fractions such as albumin, factor concentrates, blood substitutes derived from hemoglobin, and albumin is not clear, and the majority of Witnesses will accept these products.

Inside This Issue

1 **Jehovah's Witnesses and Blood Transfusion**

2 **What's The INR Of FFP?**

2 **Blood Transfusion With Component Therapy**

3 **How To Predict The Need For Massive Transfusion**

3 **Does Initial Hematocrit Predict Shock?**

4 **Evolution Of The Use Of rFVIIa**

Trauma Calendar of Events

Trauma Center Association of America
Trauma Medical Director Course
Location: Peppermill Resort, Casino & Spa, Reno, NV
Date: November 5-8, 2013

Eastern Association For The Surgery Of Trauma
Location: Waldorf Astoria Naples, Naples, FL
Date: January 14-18, 2014

Cell saver techniques may be acceptable if the shed blood is not stored but is immediately reinfused.

Why are Witnesses so adamant about refusing blood products? If a transfusion is accepted, that person has abandoned the basic doctrines of the religion, and essentially separates themselves from it. They may then be shunned by other believers.

So what can trauma professionals do to provide best care while abiding by our patient's religious belief? In trauma care it gets tricky, because time is not on our side and non-blood products are not necessarily effective or available. Here are some tips:

- **Your first duty is to your patient.** Provide the best, state of the art care you can until it is absolutely confirmed that they do not wish to receive blood products. In they are comatose, you must use blood if indicated until the patient has been definitively identified by a relative who can confirm their wishes with regard to blood. Mistaken identity does occur on occasion when there are multiple casualties, and withholding blood by mistake is a catastrophe.
- **Talk with the patient or their family.** Find out exactly what they believe and what they will allow. And stick to it.
- **Aggressively reduce blood loss in the ED.**

We are not always as fastidious as we should be because of the universal availabilty of blood products. Use direct pressure or direct suture ligation for external bleeding. Splint to reduce fracture bleeding.

- **Aggressively use damage control surgery.** Don't go for a definitive laparotomy which may take hours. Pack well, close and re-establish normal physiology before doing all the final repairs.
- **Always watch the temperature.** Pull out all the stops in terms of warming equipment. Keep the OR hot. Cover every bit of the patient possible with warming blankets. All fluids should be hot. Even the ventilator gases can be heated.
- **Think about inorganic and recombinant products** such as Factor VIIa, tranexamic acid and Vitamin K. These are generally acceptable.
- **Consider angiography if appropriate**, and call them early so their are no delays between ED and angio suite or OR and angio suite.

Bottom line: Do what is right for your patient. Once you are aware of their beliefs, avoid the use of any prohibited products. Speak with them and their family to clarify exactly what you can and cannot do. This is essentially an informed consent discussion, so make sure they understand the consequences. Follow their wishes to the letter, and don't let your own beliefs interfere with what they want.

What's The INR Of FFP?

So what's the INR of FFP? Or stated another way, what's the lowest you can correct a patient's INR using infusions of fresh frozen plasma?

One of the mainstays of correcting coagulopathy, either from hemorrhage or due to medication like warfarin, is transfusion of FFP. Frequently, clinicians will write orders to administer FFP until a certain INR is achieved. What is a reaonable INR?

A "normal" INR is 1.0, plus or minus about 0.2, depending on your laboratory. However, two separate studies have shown that transfusion of FFP will not reliably decrease the INR below about 1.7.

Bottom line: The answer to the question is about 1.6. If any clinician orders FFP transfusions with a goal INR below this, it probably won't happen. And since transfusions of any product have risks, my "juice to squeeze" ratio of risk vs benefit begins to fail at an INR of 1.6. Below that point, the patient needs a normal temperature and good perfusion to drop their INR further.

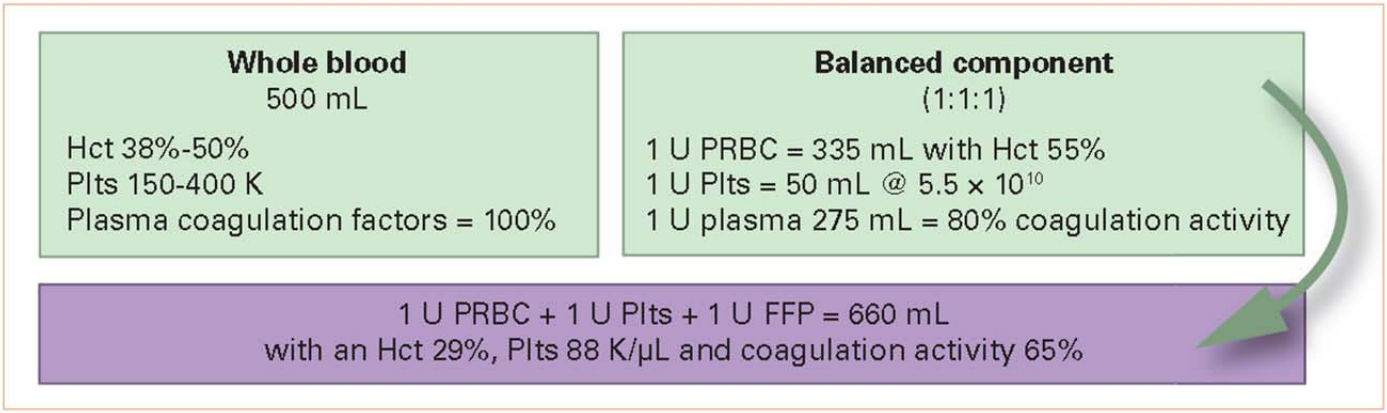
References:

- *Toward rational fresh frozen plasma transfusion: the effect of plasma transfusion on coagulation test results. Am J Clin Pathol 126(1):133-139, 2006.*
- *Effect of fresh frozen plasma transfusion on prothrombin time and bleeding in patients with mild coagulation abnormalities. Transfusion 46(8):1279-1285, 2006.*

Blood Transfusion With Component Therapy

About 40 years ago, blood banks started moving away from keeping whole blood and began separating it into components (packed cells, platelets, plasma, etc.) for more targeted use. For most uses, this is just fine. But what about trauma?

Trauma patients bleed whole blood. Doesn't it make sense to give whole blood back? Much of our experience with massive transfusion is derived from our colleagues in the military. Two decades ago, the norm was to give 4 units of packed red cells or so, then give two units of plasma, and every once in a while slip in a bag of platelets. Our military experience seems to



indicate that this 4:2:1 ratio is not optimal, and that something like 1:1:1 is better.

If you think about it, whole blood is already 1:1:1. Splitting it into components and then giving them back seems to be a lot of extra work (and expense) to accomplish the same thing as just giving a unit of whole blood. Plus it triples the exposure to infectious agents and antigens, since the components will usually come from three separate donors. **Note that the data in the table above is true for fresh whole blood** (not practical in civilian life); banked whole blood will lose some coagulation activity.

Bottom line: Is it time to think about supplying whole blood to trauma centers? And actually looking at whether the outcomes are better or not?

How To Predict The Need For Massive Transfusion

Massive transfusion is needed in about 3-5% of trauma patients. **All Level I and II trauma centers are required to have a massive transfusion protocol. However, the protocol must be triggered in a timely manner to best benefit the major trauma patient.**

Trauma surgeons at Vanderbilt validated a simple scoring system that allows accurate prediction of the need for massive transfusion in patients as they arrived in the ED. The system was called the ABC score (Assessment of Blood Consumption). It consists of the following 4 yes/no parameters:

- Penetrating mechanism (0=no, 1=yes)
- ED SBP <= 90 (0=no, 1=yes)
- ED heart rate >= 120 (0=no, 1=yes)
- Positive FAST (0=no, 1=yes)

The results of ABC when applied to trauma patients in the ED was as follows:

ABC Score	% requiring massive transfusion
0	1%
1	10%
2	41%
3	48%
4	100%

This scoring system is simple, easy to use and easy to remember. No laboratory tests are needed, and the information needed can be gathered quickly.

Bottom Line: This is a simple and accurate prediction system for determining the need for massive transfusion in trauma patients. Recommended!

Reference: Cotton et al. J Trauma 66(2) 346-352, 2009.

Does Initial Hematocrit Predict Shock?

Everything you know is WRONG!

The classic textbook teaching is that **trauma patients bleed whole blood**. And that if you measure the hematocrit (or hemoglobin) on arrival, it will approximate their baseline value because not enough time has passed for equilibration and hemodilution. As I've said before, **you've got to be willing to question dogma!**

The trauma group at Ryder in Miami took a good look at this assumption. They drew initial labs on all patients requiring emergency surgery within 4 hours of presentation to the trauma center. They also estimated blood loss in the resuscitation room and OR and

compared it to the initial hematocrit. They also compared the hematocrit to the amount of crystalloid and blood transfused in those areas.

Patients with lower initial hematocrits had significantly higher blood loss and fluid and blood replacement during the initial treatment period. Some of this effect may be due to the fact that blood loss was underestimated, or that prehospital IV fluids diluted the patient's blood counts. However, this study appears sound and should prompt us to question the "facts" we hear every day.

Bottom line: Starling was right! Fluid shifts occur rapidly, and initial hematocrit or hemoglobin may very well reflect the volume status of patients who are bleeding rapidly. If the blood counts you obtain in the resuscitation room come back low, believe it! You must presume your patient is bleeding to death until proven otherwise.

Reference: Initial hematocrit in trauma: A paradigm shift? J Trauma 72(1):54-60, 2012.

Evolution Of The Use Of Recombinant Factor VIIa

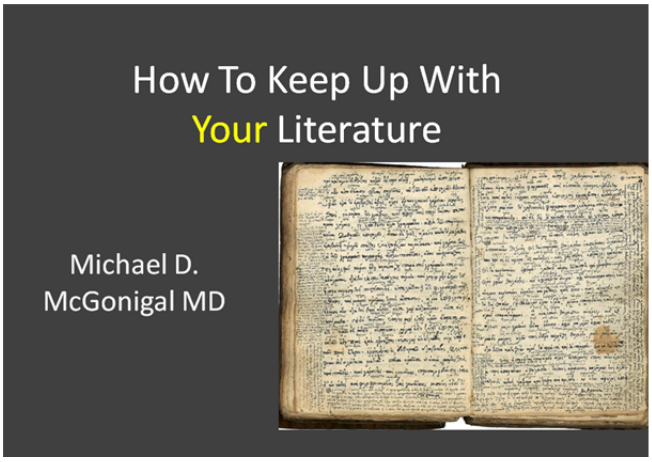
Recombinant Factor VIIa was initially approved for bleeding in hemophiliac patients back in 1999. Over the years, there has been a big move toward off-label use. There appeared to be obvious utility in using it as an emergency hemostatic agent in trauma patients. But as with many new drugs and devices, early enthusiasm slowly gave way to more balanced judgment. Reviews during the past few years are less glowing than they were early on. **So what's really been happening over the past decade?**

Researchers at Stanford tapped into a large database of patient level records from 600 hospitals around the US. They identified over 18,000 uses of Factor VIIa during a 9 year time period. By the end of the study period (2008), **97% of use was off-label!** Approved use (hemophilia) increased 4-fold, while off-label use increased by 140-fold. Cardiovascular surgery and trauma tied in their amount of off-label use (both about 29% of the sample).

Does it do any good? This paper can't directly address that question, since it does not have a good comparison group. However, looking at in-hospital mortality is revealing. Use for hemophilia (FDA approved) results in a 4% mortality rate. For trauma, the in-house mortality is 33%. The worst outcomes were with patients with an aortic aneurysm (55% mortality).

Bottom line: This review details the administration of about $175 million worth of recombinant Factor VIIa over 9 years. Off-label use has skyrocketed despite a dearth of good reports that it actually saves lives. The Number Needed to Treat to prevent one additional bad outcome keeps getting larger with every study published. With a price tag of nearly $10,000 per dose, it's getting harder to justify using it. I think this drug is now well past its prime, and we are seeing the end of life (at least in trauma) for this powerful drug.

Reference: Off-label use of recombinant Factor VIIa in US hospitals: analysis of hospital records. Annals of Int Med 154(8):516-522, 2011.



Check out this 14 minute video on how to keep current in your field of interest. Enter this link into your browser exactly (case is important):
http://bit.ly/HkOkTx (third letter is the letter oh)

Get the reference guide for the presentation, which includes specific products and tips at:
http://bit.ly/1d25i63 (first letter is the number one)