

Information About Blood Filters

Provided by LifeServe Blood Center's Medical Department:

*Dr. Bruce Kloster, Dr. Michael Kafka, Dr. Sara Shunkwiler
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Many have questions about the appropriate use of blood filters. The most common questions relate to how many units of products can be used with each filter set and how long the filter set can be employed. Unfortunately, the regulating agencies in blood banking are silent on this topic. Rather they defer to the manufacturer of these devices and the content in their package inserts. Having said this it is hard for a Blood Banker to definitively state or advise others on what is the "best practice" for a hospital to have regarding blood filter policy as there really is no "standard" in this regard. ***The information listed below reflects the advice and opinions from LifeServe Blood Center's Medical Department.***

What does AABB and other regulatory agencies have to say about blood filters?

- **Circular of Information For The Use of Human Blood And Blood Components:**
"All blood components must be transfused through a filter designed to remove clots and aggregates (generally a standard 170- to 260-micron filter). The specific product manufacturer's package insert should be reviewed for instructions pertaining to use of transfusion devices (eg, filters, blood administration sets, and blood warmers)."
- **AABB Standards, 27th ed. 5.26.8:** "Blood and blood components shall be transfused through a sterile, pyrogen-free transfusion set that has a filter designed to retain particles potentially harmful to the recipient."
- **Technical Manual, 17th ed:** "Standard blood administration tubing generally has a 170- to 260-micron filter, but this specific micron size is not mandated or required."

Why does the AABB say we shouldn't be using blood warmers with platelets, cryoprecipitate, and granulocytes? After all, we have run platelets through blood warmers before and nothing untoward seemed to happen.

- To start with, this is not an AABB-stated contraindication. A search of the Technical Manual, the Circular of information, and the AABB Standards yields no mentions of this "absolute contraindication". Practically speaking, the primary purpose for using blood warmers is to prevent hypothermia in rapid transfusion. Cryoprecipitate and platelets, being at room temperature, are much less likely than refrigerated red blood cells to cause hypothermia in a rapid transfusion scenario. Granulocytes are fairly fragile and so it would make sense not to put them through a blood warmer.

If the AABB is not the one who put out this "absolute contraindication" who did?

- A search of various manuals for blood warmers does turn up the verbiage "absolute contraindication." Given this it is reasonable to assume that the "absolute contraindication" for administering platelets, cryoprecipitate, and granulocytes through a blood warmer comes from the manufacturer of the devices rather than from the FDA or the AABB.

We have learned that microaggregate filters should be used to decrease the chance of lung injury. What patients and with which products should we use microaggregate filters?

- Much of the discussion about microaggregate filters seems to be a holdover from the days of bed-side leukoreduction. When leukoreduction was done at the bedside (instead of prestorage leukoreduction that is now done almost exclusively in the US), it was these microaggregate filters that were felt to be potentially advantageous to patients. Additionally, within the anesthesia literature in the 1970's and 1980's there was some discussion that microaggregate filters could help reduce transfusion related lung injury. An example of this sentiment can be found in this article: Dunbar RW, Price KA, Cannarella CF. "Microaggregate blood filters: effect on filtration time, plasma hemoglobin, and fresh blood platelet counts." *Anesth Analg.* 1974 Jul-Aug; 53(4):577-83. Thankfully we have had tremendous improvement in the quality of banked blood and blood processing since this time such that the issues the microaggregate filters were meant to prevent several decades ago are no longer ready concerns with today's banked blood. Within the blood bank literature, there is little to no discussion of microaggregate filters except in the historical context as discussed above. Some current red blood cell salvage devices use or recommend using microaggregate filters as salvaged blood is much more likely to have clots/debris than processed PRBC. The AABB Technical Manual, 17th ed states, "Microaggregate filters are not used for routine blood administration. These second-generation filters were originally developed to remove leukocytes and to complement or replace the clot screen in the 1970s. They have since been replaced by more efficient third generation leukocyte reduction filters. Microaggregate filters have a screen filter of 20 to 40 microns and retain fibrin strands and clumps of dead cells. Red cells, which are 8 microns in diameter, can flow through the filters. Microaggregate filters are typically used for the reinfusion of shed autologous blood collected during or after surgery." Thus, it is reasonable to assume that, except with some cell salvage devices, there is no current literature to suggest that there is a role for use of microaggregate filters today to transfuse leukocyte reduced PRBC.

How many blood products can be transfused through an infusion set before a new infusion set must be utilized?

- This is a common question and unfortunately there is not a one size fits all answer. The best reference is the package insert/manufacturer recommendations for the particular infusion set you are using. To the chagrin of some, the manufacturers are not always as specific as one may like on this topic. If this is the case with the infusion sets at your hospital, our best recommendation is to "select" a number that works well for your institution. An informal survey of hospitals across the country reveals wide variation in the number of units of blood products they have either selected/were advised on per their infusion set manufacturer and ranges from 1-6 units of blood products transfused per transfusion set. There is also some talk that the number of blood products that can be transfused through an infusion set depends on what blood products are being infused.

For example it is practice in some facilities that a new set must always be used for platelets or that after transfusing red cells in though an infusion set, only red cells can be used with that set and that if you switch blood products a new set must be used. There is no readily available published data to support this practice and in general, manufacturers of such infusion devices do not mandate this type of practice, yet it is readily accepted "dogma" at some institutions or within some departments within institutions. In general, manufacturers of infusion kits, if they comment on a maximum allowable number of blood products that can be infused through a single advice, do NOT qualify this number based on product type. Practically speaking, if the set



is not filtering well, it needs to be changed regardless of how many blood products have been transfused through it.

The blood infusion set needs to be changed every how many hours?

- Some manufacturers specifically state and it is generally accepted that the infusion set should be changed at least every 4 hours. However, there is little published data to support this recommendation. Regardless, changing the infusion set every 4 hours, even if not specifically spelled out, either: in manufacturer guidelines, by the CDC (whose 2011 recommendations say only that blood infusion devices must be changed every 24 hours <http://www.cdc.gov/hicpac/bsi/07-bsi-background-info-2011.html#les-2011.html>), the AABB or the FDA does seem to be the standard of care at the vast majority of facilities in the US.

The information reflected in this document is based upon the advice and recommendation from LifeServe Blood Center's Medical Department. If you have additional questions or concerns, please feel free to contact the department directly by calling 515.309.4840 or email physician@lifeservebloodcenter.org.