



e-Network Forum

CALIFORNIA BLOOD BANK SOCIETY

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Acceptable containers for temporary storage of blood in the operating room and ICU

A blood banker in a sunbelt state has concerns about the use of transport boxes for the temporary storage of blood in the operating room suite. She is of the opinion that validated transport boxes are ideal for transport of blood from one facility to another and even for use in a hospital in emergency/trauma situations. However, she laments that in her hospital, cardiac surgeons request blood transport boxes to be sent to have blood products in the 'heart room' during surgery, only to have the box moved to the cardiac intensive care unit to be kept at the bedside while the patient's chest is still open, or until the patient is stable. In the opinion of the inquiring blood banker, in the above situation **she feels that the transport box is really a blood storage container**. If we agree that the transport box is a blood storage container, what should be the rules for the temperature in these boxes? The inquiring blood banker says that she believes that transport boxes (such as those used by her area Red Cross, were originally designed for transport of blood to facilities and that the temperature within the box should be maintained at 1-10C and that the maximum transit time for blood in such a box should be no more than 24 hours. So, for an example, if blood is kept in this "transport box" for 12 hours and the temperature of the box is 8 C when it is returned to the blood bank, would others in the e-network allow this blood to be acceptable for placement back into inventory and eventual re-issue? What if the blood is kept in this box for 24 hours at a temperature less than 10 degrees C, would most places accept it back into inventory, place it in controlled refrigerators at 1-6 C for use at a later time? Please share your policies regarding the use of 'transport boxes' and the blood put into them. For a related discussions please see:

For related discussions in this forum see these links:

- [Transporting platelets](#)
- [Transporting plasma](#)

The following responses were submitted:

1. **A transfusion medicine physician in Northern California** reports that her university hospital uses such boxes for temporary storage in the O.R., and they accept units back as long as they meet the 1-10 degree requirement. [The responding blood banker did NOT indicate if they would take a box back after a defined MAXIMUM number of hours, should that occur. At her institution they do not remove the box from the O.R.; units are supposed to be sent back to the Transfusion Service at the end of surgery. They have a pneumatic tube system that permits rapid delivery of units to the ICU, so they don't need to store units in the ICU. Occasionally they have had requests to keep an igloo in the ICU, but then someone has to accept responsibility for making sure there is fresh coolant in the container. For units that are supposed to be kept in coolers, they place individual temperature devices on the units that will indicate if the unit goes above acceptable temperature (10 degrees C).

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2. **A blood banker in Virginia** reports that they use **Cell-Safe™ coolers** for unstable patients in the OR/ICU. The coolers can maintain a 1-6 C environment for up to 5 hours and a 1-10 C environment for 24hrs if packed correctly (based on our annual testing). However, they only allow them to be out for 4 hours at a time. For long cases, the OR brings them back for "fresh" coolers every 4 hours. Whenever there is doubt about the temperature of a unit, it is measured directly before being accepted into inventory. Units above 10 C are not accepted back into inventory. Of course, one of the big questions for any remote transport/storage system is, "Was the unit actually in the cooler/refrigerator?" The responding blood banker thinks most OR teams are more likely to leave units in a cooler that can be kept in the room with them than they are to leave units in a centralized OR refrigerator. The Virginia blood banker adds that **AABB Standard Source III**; 3.4 says, "When units are placed in coolers for transport to the Operating Room (OR), they are considered to be in transport." However, it goes on to say that they are considered to be in storage when they are placed in a refrigerator for surgery ...

3. **An East Coast blood banker** reports that they use temperature monitors in these boxes and change the coolants at the bedside every 24 hours. From time to time blood is maintained in these boxes for greater than 24 hours. When this blood banker was asked under what circumstances they might actually keep blood for 24 hours at a bedside, he responded that for patients with ongoing severe hemorrhage post-operatively it would be rare and usually not for 24 hours, but more commonly this might occur for patients with ongoing transfusion needs/emergency use, as with ECMO or ventricular assist devices. The problem with the ECMO patients is that every now and again they have catastrophic bleeding when they have their lines changed. The clinicians taking care of these patients feel they need to have some blood immediately available for such emergencies (these are mostly infants and small children). So, his transfusion service monitors the coolers and changes the coolants. It's usually only one patient at a time and perhaps a few days out of the month. And it's preferable in their view to having an OR or ICU blood refrigerator, which was the alternative. He adds that if blood comes back and is 10 degrees C or less, they place it in inventory and are willing to reissue it later. These coolers are monitored with temperature-sensitive devices that show whether the temperature has exceeded 10 degrees C. Also, they measure the temperature when the cooler is returned, which from a regulatory standpoint is a key issue. He believes that the temperature rules are almost completely arbitrary and have little or no scientific basis in fact, as far as he knows, so focusing on a few degrees one way or the other makes no sense to him. In any case, he argues that slightly warmed red cells may well be safer for the patient (hypothermia, is, in general, bad for hemostasis and host defenses against infection based upon randomized trials) and warmer red cells may have more normal oxygen delivery properties than red cells transfused at 1-10 degrees. Finally, he added that as far as he knew, storing blood at 10 degrees C would not be expected to materially affect the likelihood of bacterial sepsis due to red cell transfusion. Bacterial contamination of red cells is quite rare, for one thing - yes or no? He wondered whether anyone had evidence that bacteria proliferate better at 10 degrees than 3 degrees C. He admits to not being a microbiologist but he is inclined to doubt any clinically significant difference.
4. **A blood banker in Los Angeles** reports that from the data collected during validation studies at a transfusion service where he used to work, a time limit of 8 hours was set for blood stored in coolers. This time limit was actually conservative, since when they loaded the coolers with 10 units of RBCs or FFP, and kept the lid closed, the cooler held a compliant temperature for 24 hours. To be on the safe side, they used the 1-10 degree C standard for units returned, plus a temperature indicator that was affixed to the unit (Safe-T-Vue®; distributed by William Laboratories, manufactured by Newton Industries) and changed irreversibly from green to red when the temperature exceeded 10 degrees C. Their initial validations showed that the color indicator began to change color at about 9 degrees C. Any units returned with the "temp dot" showing a color other than green was directly measured for temperature and discarded if this exceeded 10 degrees.

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5. **Another blood banker states:** "In our hospital this problem was solved by providing **portable blood refrigerators** to all cases that require 'large' (interpretation is necessary here) volumes of blood and/or plasma. These refrigerators are monitored in the same way as any other blood refrigerator, and can be moved to the next patient care area if appropriate. All refrigerators have continuous temperature monitoring with appropriate alarms. These units are accepted back into inventory. Occasionally when blood is transported from one of our institution hospitals to the other its is done in transport boxes with tamper-evident tape. If the seal is broken, blood/plasma is not accepted back into inventory."

Please submit comments to the [e-Network Forum](#).



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Addenda: June 28 & July 2, 2002