e-Network Forum
CALIFORNIA BLOOD BANK SOCIETY
"We help save lives of people who need blood"

Storage of blood for patients transported on emergency flights

A transfusion medicine colleague in New Mexico would like to know how others handle requests to transport blood products on helicopter or fixed wing aircraft for emergency management of patients. The inquiring colleague's facility has a Level 1 trauma center and both types of aircraft bring in patients for emergency treatment. Their service area includes the entire state of New Mexico and parts of others. Until a few years ago, the helicopter used to call the hospital 'home', but more recently it is maintained at the airport for fueling and maintenance during its idle times. The Life Flight staff used to pick up group O Rh negative RBCs from the hospital's blood bank to take with them on their emergency flights. Usually they would return with the patient without using the blood. Now that they do not have easy access to the hospital blood bank's supply of group O Rh negative RBCs, they want to **keep a small stock of blood at the airport**. They are considering having the local blood center contract directly with them, since the hospital is nearly out of the supply loop. How do others address the issue of flying blood products while attending to emergency patients via Life Flights? Do other Life Flight units transport blood with them? If yes, how do they store blood when it is not in transport?

The following responses were received.

ADDENDA June 10, 2003

1. **A colleague at a large transfusion medicine center situated in South Australia's major trauma-receiving hospital** reports that their approach to transporting emergency blood on these retrievals was revised about 18 months ago. Previously, helicopters took hard rigid coolers containing blood. However, for safety reasons, the hard rigid coolers were swapped out for a new kind of cooler for transporting emergency blood. With the assistance of a local company they devised a 'soft' cooler using insulated foam in a fabric cooler. This was validated for temperatures up to 40C for 12-hour periods. These soft coolers are now used for all aero-retrieval blood shipments and are highly identifiable with florescent lettering. In addition to these new coolers (which they call 'eskies') they have set up a special 'retrieval refrigerator' in the ICU department in which are kept two eskies with 6 group O Rh negative red cells each. When a retrieval team departs with blood they ring the laboratory to let them know they have taken a retrieval esky, which allows the laboratory to prepare a replacement. The ICU staff add the required numbers of coolant packs to the esky just prior to departure. On return, all unused units are brought to the transfusion laboratory for checks to determine if the units are suitable for reissue. Apart from occasional minor difficulties this system has proven extremely beneficial to the retrieval teams in terms of reducing delays in departure and has reduced the 'stress' the laboratory previously had in getting these emergency blood requests prepared. As an adjunct to this system they also have two other 'emergency boxes' [6 O POS & 6 O NEG] on hand at all times for non-retrieval emergencies that may occur elsewhere in the hospital.

2. **A colleague at a major university medical center in Ohio** published a paper on this matter in Laboratory Medicine entitled 'Emergency transfusion during medical air transport'. Lab Medicine vol 25, no 5, May 1994. The article can be found in the library, the old fashioned way!!!

3. **A retired ARC Medical Director in Palo Alto** adds the following reference by Berns KS and Zietlow SP, entitled 'Blood usage in rotor-wing transport' (Air Med J. 1998 Jul-Sep;17(3):105-8). This helicopter program in rural Southeastern Minnesota maintains a refrigerator with 4 units of **O-negative blood that is kept in the hangar and serviced by the blood bank**. Four percent of patients were transfused, all without incident.

ADDENDA July 28, 2003

4. **A Canadian anesthesiologist and flight physician** on an air ambulance service reports that they use a helicopter that travels both to scenes of accidents as well as transports patients between outlying (rural) hospitals and the major trauma center in one of the Canadian provinces. Many of the hospitals they fly to have very limited blood stores (often 1-2 units of group O Rh negative), and injured patients often have delays before they even get there. He comments that the time to

tertiary care is critical in the outcomes for some of these patients, particularly those involving trauma. Their round trip flying times vary from 45 minutes to 2 1/2 hours. At present, when blood is needed the helicopter diverts to one of the hospitals in town before flying out, which can mean additional delays of 20 minutes. He is impressed that the hospital labs have been wonderful in their cooperation, but he can envision arriving to pick up blood when there is a major disaster tying up the blood bank, or late at night, and they are overworked already. The question he has is what are other places with similar situations (ie flying to rural areas, not short transports) doing with regard to **blood supply** in these circumstances? They do not base the helicopter at a hospital, but, but rather **at the airport**. The base is staffed 24/7 by a nurse/paramedic and often a physician. There would be someone there properly trained to monitor and record blood units stored in a refrigerator. He knows we had a discussion regarding blood refrigerators in operating rooms, but he thinks this is different as they will only have group O Rh negative units. Also, once units are taken to a scene or other hospital, **what disposition do the units undergo if not transfused**? Their plan would be to take them out of the gel pack coolers and deposit them back in the refrigerator at the helicopter base. Should they be given to the blood bank in the receiving hospital and new, fresh units issued? If not, how many times would you accept that this could be done safely if they are returned to the base refrigerators? Better still, what **cumulative time out of a monitored refrigerator** is acceptable when this is done repeatedly?

ADDENDA July 29, 2003

5. **A colleague in Albuquerque** reports that a local trauma hospital's blood bank is in the process of setting up a system that will allow a flight crew to have immediate access to **two group O Rh negative RBCs that will be stored at a local airport**, where the flight crew is stationed. Once implemented, the flight crew will be able to dispatch the two units of RBCs with the aircraft when they need to provide emergency care to a bleeding patient who is in a remote location. The local hospital blood bank staff is preparing **SOPs for training the flight crew** on QC and refrigerator alarm checks for the safe storage of blood at the airport. When the flight crew takes the two group O Rh negative RBCs, the units will be **transported in a cooler that has been validated to maintain an appropriate temperature** for a specified period of time. Thus, when the two units of group O Rh negative RBCs are out on a flight, the blood storage refrigerator at the airport is empty. The trauma hospital **blood bank (which supplies blood to the flight crew) informs the flight crew when the group O Rh negative units are about to expire** (about 1 week prior to expiration). The flight crew **returns** the unused group O Rh negative units to the blood bank and the blood bank issues fresher units. Since the units are being stored in a remote refrigerator (at the airport), the blood bank will not put back into the inventory the group O Rh negative units just returned from the airport until the temperature records (QC) of the remote (airport) refrigerator are **verified for proper temperature control**. If the temperatures were maintained within acceptable limits, the returned RBCs may be placed back into the general inventory in the blood bank, so that they may be used for another patient within the hospital.

ADDENDA Aug. 1, 2003

6. **A New Jersey colleague** reports that although their 'remote' blood transfusion protocol is not aircraft-related, the principles they wish to share are relevant. Several years ago, they opened an **Oncology Center across the street** from their main facility. They were faced with the problem of transporting and storing blood products for transfusion.

   An insulated bag was decided on to bring the units to the Center. The responding colleague wanted to be sure that if not used, the blood could potentially be returned to stock. They decided to use a **"temperature dot"**, which is commercially available from several manufacturers. The one they chose was a plastic encased white porous sponge. It is activated and attached (by an adhesive back) to the unit. Once the unit reaches a temperature of 10 degrees C, the dot turns red. They chose the current company because they appear to have a good QA system and because the dot's reaction is not reversible. (At least one alternative "dot" will revert once the units are returned to the refrigerator.) Once they had the equipment, they **validated** its ability to maintain the temperature of the blood in the bag between 1 and 10 degrees C for 8 hours (the longest time they felt the unused blood would sit around before being returned). **A standard freezer pack was used to keep the units cold**, along with a separator to protect the units from contact with the pack. They repeated the test with 1,2,3 and 4 units of blood to make sure the number of units did not influence the temperature.

   When the blood leaves the blood bank, the transfusionist is **instructed not to transfuse if the dot has turned red**. They have had only a few instances where the dot turned red erroneously. For example, if the dot is held in one's hand, even for a few seconds, the warmth of a person's hand may be enough to turn the dot red. Depending on the size of the unit, it usually takes 30-45 minutes for the dot to change from white to red as the unit sits on a counter. With this system, if the blood is returned to the blood bank, they are able to place it back into stock with confidence. The dot can stay on the unit until it is finally transfused. (**Editor's note**: Visit a related earlier discussion on this subject.)

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Please submit comments to the e-Network Forum.

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