One hospital's story: Ins and outs of low titer O whole blood use in trauma

Sherrie Rice

July 2022—Myriad questions had to be answered and plans made to put low titer O whole blood in the trauma bay at Thomas Jefferson University Hospital. Julie Katz Karp, MD, associate professor and director of transfusion medicine, reported why, when, and how it was done and where they stand today, in a process she describes as "a never-ending series of hoops."

"We make a lot more than we use, and it is a lot of work, but it's highly valued in our trauma service," she said in a CAP21 session on the use of low titer O whole blood in trauma care.

Thomas Jefferson University Hospital is a level one trauma center whose annual transfusion numbers are as follows: 19,000 red blood cells, 6,600 platelets, 4,400 plasma, 900 cryoprecipitate. About 2,000 trauma patients are seen each year.

The blood bank is on the eighth floor of the main hospital building, and the trauma bay is on the first floor of a building a block away. Though the buildings are connected by flyover bridges, "there's no easy way for us to get magically from the eighth floor of one building to the first floor of another," Dr. Karp said. There was no relocation plan for either area and, amid staffing shortages, limited availability of couriers to transport blood.

A new electronic medical record went live in April 2017, which added to the trauma team's difficulties of "arriving" patients. By July, there was talk of acquiring a secure access blood refrigerator for the trauma bay. "And it wasn't long after that we started to discuss what we were going to put in this mythical refrigerator," Dr. Karp said, noting that the literature about low titer O whole blood's benefits was appearing at about the same time (see story, June issue, <u>https://bit.ly/LowtiterO</u>).

"Low titer O whole blood was starting to become common," she said, "and it wasn't just one trauma program here or there." Many were adopting use of LTOWB, "so our trauma surgeons were getting excited about it."

"That's when we started asking the hard questions" about it—questions that would apply to any institution considering the same, she said—and how it would fit into practice at Thomas Jefferson. Starting with: Who is supplying the LTOWB—the hospital-based donor center or blood suppliers—and what is the cost of each option and how can the two be balanced? How reliable is the supply? "It's not always so easy. Frankly, in more recent years, red cells aren't so easy. Nothing's easy anymore," Dr. Karp said. "So if we say we need 10 units, are we getting 10 units?" And how much would be needed to support the trauma service? "We didn't know because we'd never done this before," she said, so it had to be determined as time went on or in advance, "or maybe a little of both."

Will LTOWB be available to other services beyond trauma? Though expanding it to other services was discussed, it never was.

Where will it be stored? In the blood bank, in the secure refrigerator in the trauma bay, or both?

How will its expiration be managed? "Will we spin it down to manufacture red cells at 14 days? Will we allow it to expire on the shelf at 21 or 35 days, depending on which anticoagulant preserving solution it's in?"

Is only O positive stored, or will O positive and O negative be stored? What are the logistics of replenishing it in the secure trauma refrigerator? "We don't have infinite amounts of staff to do that, so we had to discuss the expectations with our trauma surgeon colleagues," Dr. Karp said.



Dr. Karp

What happens if LTOWB is not available, either because what was stored was used amid a large event or the supplier couldn't deliver? "What is the plan because not having any blood is not an option. Presumably component therapy would be the default," she said, "but it should be discussed ahead of time."

How are the regulatory requirements related to use of LTOWB fulfilled?

Thomas Jefferson has a fixed-site, hospital-based blood donor center that collects about 10 percent of the hospital's inventory. "Small but mighty" is how Dr. Karp describes the center, which has a dedicated donor staff and donor coordinator. The blood bank manufactures the blood components, so they wondered if they could make their own LTOWB. The center collects about 100 O positive and 15 O negative whole blood donations monthly, "so we thought it would be feasible to collect our own," Dr. Karp said, noting it would come from only male donors and never pregnant females to circumvent concerns about TRALI mitigation and HLA antibody testing.

And then there is the titer.

AABB standard 5.27.1.1 says if LTOWB is used, the blood bank/transfusion service should define low titer and have policies, processes, and procedures for LTOWB use, the maximum volume/units allowed per event, and patient monitoring for adverse effects. "There's no official definition of low titer," Dr. Karp said. "You get to define it."

They defined theirs as negative at a titer of 200 for anti-A and anti-B, which was in line with practice at other institutions and suppliers (per presentations at the 2018 AABB meeting), she said, and allows for a maximum number of donors to be included in collections. They performed a validation of 24 type O donors from their center, using titers of 200 and 50. At 200, only one donor of 24 would have missed the titer; at 50, five of 24 would have missed the titer.

LTOWB would be used only in "adult" patients defined as age 14 or older, which was consistent with how the hospital defines pediatric (under age 14). A maximum of four units of LTOWB would be transfused per patient/event, primarily because of hemolysis concerns but also logistics, Dr. Karp said. "We were not planning to have that much low titer whole blood in-house or in that trauma refrigerator."

"We were looking at it as a bridge, to be used in those first 10 to 15 minutes while the blood bank is getting coolers of components ready," she said.

Unused LTOWB would be manufactured into RBC units at shelf life day 14. They discussed whether to discard the unit but decided against it because they have the capability to manufacture. Accompanying plasma would be discarded.

In early 2019 the secured refrigerator "walked in the door," Dr. Karp said—about 18 months after discussions got underway—at which point refrigerator validation and blood bank/trauma staff education began. LTOWB was built into the EMR, product codes were built, and the titer was validated. They went live on April 1 with four units of O positive LTOWB, two units of O negative LTOWB, and six units of RBCs in the new refrigerator.

"We had an intense period of on-the-spot education and debriefing after each use of low titer O whole blood early on, and then eventually it became more by the book," she said. One year later, in the middle of the pandemic's first year, they decided to stop making O negative LTOWB. "We weren't using it very much, for better or worse." Few of the trauma patients are female and even fewer are of childbearing potential. "It was decided that if a woman of childbearing potential came in, we would offer them O negative red cells." As the blood banker, Dr. Karp explained to the trauma surgeons that the risk of giving O positive low titer O whole blood to a female of childbearing potential was a reasonable risk given that the patient is very ill and thinking not about the baby she might have but about going home. "Many institutions that did make O negative low titer O whole blood had abandoned it," she said, so the plan to discontinue wasn't an uncommon one. "O negative red cells are scarce, and we want to make sure they're going exactly where they need to be and not just sitting in a refrigerator."



Fig. 1. Thomas Jefferson University Hospital LTOWB: April 2019-June 2021

Fig. 1 shows the number of units procured, spun down, transfused, and discarded for a period of just over two years. Beginning in April 2020, she said, "it almost looks like someone turned down the volume on the bars."

Overall, she said, "we spin down a lot but don't use very much." They've transfused about 31 percent of what was made available as LTOWB, and discarded two percent. Sixty-six percent of units are spun down to RBCs.

LTOWB manufacture and use will mean ongoing education of the trauma and blood bank staff, she said, whether it's new employees or those who might need a refresher. Or it could be unique events that call for taking a step back and asking, What did we do here and could we have done it better?

"We'll be continuing to talk about low titer O whole blood for a long time," she said.

Sherrie Rice is editor of CAP TODAY.