Print page

# A vital supply chain

## Keeping blood in supply is a constant calculation for San Diego Blood Bank

By Paul Sisson11:49 a.m.June 7, 2014

Blood in various stages of filtration is held in cold storage at San Diego Blood Bank. — *Eduardo Contreras*

The nonprofit San Diego Blood Bank lives on the red edge of supply and demand, a fact made visible by a recent shortage of saline solution.

Saline is a critical component that allows some donors to contribute two pints of blood per visit instead of the standard one. When a national shortage started this winter because of a surge in demand for flu patients who need hydration, the local blood bank, like many across the nation, suddenly found that it had a hole in its supply chain.

By asking the public repeatedly for extra donations, the bank eventually stabilized the community's blood supply.

But stability is a bit of a loaded word for this essential enterprise, which is built on a commodity with a short life span.

Doug Morton, the bank's chief operating officer, explained that having full coolers never brings total confidence.

"If we're sitting here with an eight-day supply of (type) O (negative) in the coolers, all it takes is one or two surgeries to go bad and suddenly you're down to a three-day supply," Morton said. The bank, he said, typically keeps between a five- and seven-day supply on hand.

Anna Nagurney, a professor of operations management at the University of Massachusetts, has studied the blood supply chain extensively and said the unpredictability of supply and demand in the supply chain has had tangible consequences. She cited a survey of 1,700 hospitals in 2007 that found blood shortages canceled or delayed 492 elective surgeries nationwide.

"Balancing supply and demand is a matter of life and death in this supply chain," Nagurney said.

The San Diego Blood Bank, which was established in 1950 and now is the county's main blood supplier, has turned to technology for help.

Today, a computerized inventory system keeps track of demand in real time, polling automated inventory systems every five minutes at each of the 35 hospitals the organization serves.

So when a patient arrives at a local trauma center in critical condition and a nurse pulls a double handful of blood units from the cooler, that action is registered back at the blood bank in five minutes or less. (A unit is roughly equivalent to a pint.)

Within 15 minutes, Morton explained, the system acts to increase supply.

"We will change our message on the fly. An email will go out and say, 'We have a critical need, we need you to donate,' " he said.

**Perishable product**

Like meat or produce, blood has a shelf life.

After collection, donated whole blood is separated into component parts at the blood bank's headquarters in San Diego.

There, a centrifuge is used to separate blood plasma from red blood cells and platelets.

Plasma, whose uses include treating severe burns and immune system disorders, can be kept frozen for one year.

Red blood cells, most commonly used in transfusions when heavy blood loss occurs, can remain useful under refrigeration — but not frozen — for up to 42 days.

Platelets, tiny bits of cells that help blood clot, have the shortest shelf life. Separated from whole blood in a centrifuge, platelets cannot be refrigerated and are viable for a

maximum of five days. To prevent them from clotting, they must be agitated continually at room temperature using special shelves that sway back and forth.

Nagurney, the supply chain researcher, said the perishability of blood products makes maintaining stable supply a unique challenge.

“There are immense time pressures on this product. At the same time, blood must undergo numerous steps of testing, processing, storage and distribution,” she said.

The San Diego Blood Bank sends a small sample from each unit it collects to a lab in Phoenix. Morton, the operations manager, noted that accurate tracking of each and every unit is essential.

“If there is a problem discovered in testing, the product has to be immediately quarantined,” he said.

**Waste and opportunity**

Some collected blood units never make it into a patient. Nagurney said in 2006, a study estimated that 1.2 million out of 15.6 million units collected went past their expiration dates — a rate of 7.7 percent overall.

Each year, the San Diego Blood Bank obtains about 85,000 units of whole blood, spending approximately $300 to collect and process each unit.

The San Diego Blood Bank’s waste rates, Morton said, are between 1 percent and 1.5 percent for red blood cells and 8 percent to 10 percent for platelets.

He said there will always be some waste, because it is necessary to over-collect from donors to make sure that enough supply is on the shelves when demand spikes unexpectedly.

We’re always going to err on that side because what we’re shooting for is a 100 percent fill rate for our customers,” Morton said.

But David Wellis, the blood bank’s new president, has plans to find new uses for expired units.

Before coming to the blood bank, Wellis had a 25-year career in the local biotechnology industry, experience that pushes him to think beyond the borders of collection and delivery.

“We’re now beginning, for example, to sell expired platelets to local biotech labs as a stem-cell growth medium,” Wellis said. “I think there is a lot of potential for that kind of thing, especially here in San Diego.

Another effort is under way, he said, to work with UC San Diego translational medicine researchers who need blood samples from “normal” people to serve as a control population in research.

The blood bank, he noted, retains the small portion of each unit collected that is used for testing but disposes of it after a few weeks.

“Each one of our donors is asked, when they register with us, if they consent for research. If the retention sample is properly consented, we’re saying let’s just save it for science,” Wellis said.

At its core, a blood bank relies on the trust of its donors and on pure human kindness. Donors give of themselves out of altruism, and that willingness to give is predicated on trust that the blood bank will do its best to make sure that patients benefit.

Wellis said he considers that social contract sacred.

“If we know we’re going to use your blood for research, we’re very transparent, and if you don’t want it use for that, that’s OK,” he said.

The trust of the community, he said, has also been a bit of a revelation since starting his new job in mid-2013.

“It opens doors like I hadn’t expected. I’ve been doing business a long time in biotech and pharma, and the level of trust is not there,” Wellis said. “You can’t have a discussion without a confidentiality agreement in place. Coming from the blood bank, I’m right away trusted and so those discussions move along so much more quickly. I was not expecting that.”



Print page