

Doing Everything to Conserve Blood

Allina Health Hits Benchmarks in a System-wide Effort; Strives for Best in Class



Minneapolis Heart Institute

AT A GLANCE

Not-for-profit Allina Health serves patients throughout Minnesota and western Wisconsin at 12 hospitals, 90 clinics and three ambulatory care centers. The system provided 105,057 inpatient hospital admissions, 1.2 million outpatient admissions and 35,373 inpatient surgical procedures last year. It consistently ranks high on U.S. News and World Report’s Best Hospitals list.

The Minneapolis Heart Institute at Allina’s flagship, Abbott Northwestern Hospital, is recognized internationally as one of the world’s leading providers of heart and vascular care. Through the institute, advanced cardiac surgery is performed at Abbott Northwestern; United Hospital in St. Paul, Minn.; and Mercy Hospital in Coon Rapids, Minn.

In 2011, senior clinical leaders at Allina, including Chief Clinical Officer Penny Wheeler, MD and Lauren Anthony, MD, medical director of Allina Medical Laboratories, began discussions on how to reduce the use of blood products across the system. According to national benchmarks, Allina had a transfusion rate that was 25 percent above average. Wheeler was intrigued after attending national health care meetings where she heard presentations on the value of blood conservation for better clinical outcomes and significant cost savings.

Dr. Anthony had prior experience with a successful blood management program and was asked to lead the project. She

knew that Pathology could not just mandate new practices through the system; she needed allies among the providers who used the most blood products. That meant gaining the support of physicians, especially cardiac surgeons, and other clinicians such as perfusionists, who operate the heart-lung machines that support the patient during open-heart surgery.

When Dirck Rilla, SpecialtyCare’s director of clinical perfusion operations, arrived at Allina, he noticed that transfusions following open-heart surgery were far too commonplace. “There was not really any effort to conserve blood. The rate of platelet transfusions was running 65 percent to 70 percent. We were using 2 to 3.25 units of red blood cells per patient. The national benchmark at that time was 0.8 or 0.9.”

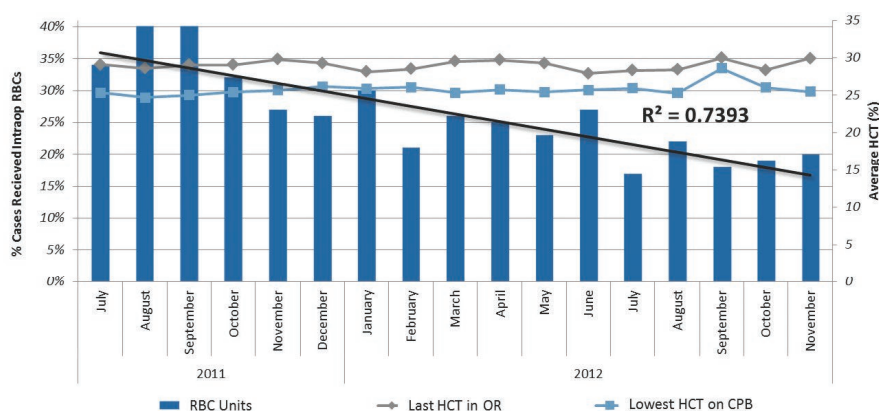
Eventually, Allina adopted an ambitious system-wide blood conservation program.

The project included:

- changing cardiac bypass protocols to reduce the use of priming volume for the heart-lung machine and use of the patient’s own blood for priming purposes;
- reducing postoperative blood loss for cardiac and orthopedic surgery by collecting blood from surgical sites, concentrating it, washing it and then reinfusing the blood to the patient (a process commonly referred to as autotransfusion);

Figure 1: Intraoperative RBC Use

Allina System Open-Heart Procedures



Note. RBC = Red Blood Cell, HCT = Hematocrit and CPB = cardiopulmonary bypass.

- adding a device to invasive monitoring lines to reduce the amount of blood lost from multiple draws for laboratory tests;
- reducing the default transfusion order across the system from two units of red blood cells to one; and
- basing transfusion decisions not just on lab results for hemoglobin but also on an in-person evaluation of the patient’s overall condition.

The results have been strong:

- The frequency of intraoperative RBC units decreased from 32 percent to 22 percent from 2011

to 2012, while the last hematocrit in the OR and the lowest hematocrit on CPB remained stable.

- Red blood cells, which account for 70 percent of all transfusions, fell from 300 units per 1,000 admissions to 200 units at a savings of \$1 million annually. But that is based on the blood center's acquisition cost alone. Published studies have shown that when adding in costs of lab compatibility tests, maintaining blood inventory and nursing time to administer, the total cost is closer to four times the acquisition cost; and, hence, the savings would likely be four times higher. (see Figure 1)
- Overall blood utilization is down 25 to 30 percent across the system.
- Net prime volume of cardiopulmonary bypass circuit is down nearly fourfold to about 800 milliliters per case. (see Figure 2)
- In a pilot test, use of a device to reclaim blood from chest tubes postoperatively reduced transfusions from 69 percent of patients to 36 percent.

How Allina achieved those results is the real story, one that involved overcoming ingrained habits in daily practice as well as debunking the folklore surrounding the use of blood and blood products.

THE BACK STORY

Early on, Allina brought in two experts to provide perspective to physicians and other clinicians on blood management and best practices. "They brought the message that proper blood conservation is good medicine, that blood is not a benign substance, that you should only give it when it's needed and that you can cause a lot of harm when it's not," Dr. Anthony says. "Doctors don't get much education on this in the field because it's kind of its own subject area. You learn about it in the lab but not so much in areas like OB-GYN or general surgery, where they aren't so focused on transfusions."

While blood transfusions can be lifesaving, they are not risk-free. Furthermore, recent research shows that allogeneic blood transfusions (donor blood) are far from benign. Large, multicenter studies have found significantly higher rates of death, kidney failure, heart attacks, surgical site infections, postoperative bleeding and other complications among transfused patients compared with those who didn't need blood.

The program was rolled out system-wide because Allina has had complete electronic medical records since 2003, so it can't make a change to order sets for transfusions without having all of its hospitals involved. Also, advocates said it would work against the goal of clinical integration

if done hospital by hospital.

Dr. Anthony believes Allina is the largest health system to have adopted a comprehensive blood conservation program.

To make the program succeed, the Allina Transfusion Care Council was created with Dr. Anthony as its chair and members from all specialties and hospitals. Smaller work groups were formed around clinical areas with representatives from each hospital and staff, such as perfusionists, nurses and medical technicians, included. There were also hospital specific groups that mirrored the system efforts.

KEY CHAMPIONS

Among others, Dr. Anthony credits John Grehan, MD, attending cardiothoracic surgeon at United Hospital, for being a force for clinical integration on blood management. "A lot of doctors don't care about other hospitals, other specialties, but as system chair of the Cardiovascular Workgroup and chair of United Hospital's Transfusion Care Council, he has really worked across the system to implement clinical practice guidelines," she says.

She also credits an anesthesiologist at Mercy Hospital, Joshua Martini, MD, as a key champion. Blood management, as a movement, started with anesthesiologists, who provided transfusions during and after complex surgeries.

Also, Dr. Anthony credits Rilla as being one of the first people to volunteer as a champion for blood management. "I knew Dirck and SpecialtyCare had already done programs like ours, and he had made presentations at national SpecialtyCare meetings on this topic, so he gave us some really good insight as to what was going on in other hospitals, what resources they were using, and helped us build an approach to what we needed to do to get our program launched," Dr. Anthony says.

That approach included adopting all recommended practices in the 2011 Society of Thoracic Surgeons' Blood Conservation Guidelines. The first project was to revamp the cardiopulmonary bypass circuit to reduce priming volume. "So we shortened up the lines; we made things a lot smaller, a lot tighter," Rilla says. Exposing blood to the surfaces within the heart-lung machine provokes an inflammatory response that can cause the patient to dilate and lose fluid from blood vessels to the tissues. To reduce intravascular depletion, the patient often receives crystalloid volume administration, which carries the risk of hemodilution and subsequent blood transfusion.

The shorter circuit enabled the other big change—the switch to retrograde autologous priming technique (RAP). Prior to that point, the heart-lung pump was primed only with an isotonic crystalloid solution. Essentially, this solution

maintains sufficient blood volume between the machine and the patient for survival during surgery. The downside is that this fluid also dilutes the patient’s blood, often to the point where needed blood components, including clot forming proteins, are ineffective, resulting in excessive bleeding and acute anemia.

The RAP procedure allows for the patient’s own blood to be brought into the circuit to displace a significant amount of the IV fluid. “Essentially, the patient’s own blood primes the circuit, and once on bypass, we don’t see a huge drop in hemoglobin and hematocrit like we used to, so we are not diluting them out significantly,” Rilla says. “When we are done with surgery, we have a lot of that blood left in the circuit, which we can then chase back up to the patient.”

United Hospital has made those pump practices standard, and Dr. Grehan says perfusionists played a big role in taking the data on improved outcomes to the other two hospitals that perform cardiac surgery. “Perfusionists have a home base, but they travel to other hospitals and can bring it to the attention of younger doctors who might be amenable to it. In turn, we hope they can build a critical mass so that more senior surgeons will take a look at this data, which is pretty compelling. But after 30 years of doing a pretty complex surgery and doing it well, many are still not ready for it.”

911: A CALL TO THE BLOOD POLICE

Allina has tried a novel approach to spread the word about blood conservation. Dr. Anthony wrote and Rilla and Dr. Martini starred in a 12-minute “Law and Order”-style video called “The Blood Police: The Case of Too Much Blood.”

In it, a surgeon played by Dr. Martini is called by a nurse about a joint replacement patient whose blood work result suggests anemia, with a hemoglobin level of 8.0 grams per deciliter (g/dL). The doctor orders two units of blood, adding,

“She is due to start rehab, so we will need to tank her up.”

The video includes “evidence,” such as a screenshot of the transfusion guidelines from the American Association of Blood Banks, which recommends:

- making transfusion decisions for all patients based on symptoms as well as hemoglobin levels and
- using a hemoglobin level of 7 g/dL to 8 g/dL as a threshold for hospitalized patients who are stable.

“When I made up the dialogue, I used all the objections I have heard in all the meetings and presentations on the blood program,” Dr. Anthony says. “I had heard the phrase ‘the blood police’ so many times, I thought we should use it to our advantage.”

“Administrators who would be totally bored with blood management watch this video and they get it,” she adds. “It has enabled us to get more buy-in from leadership.”

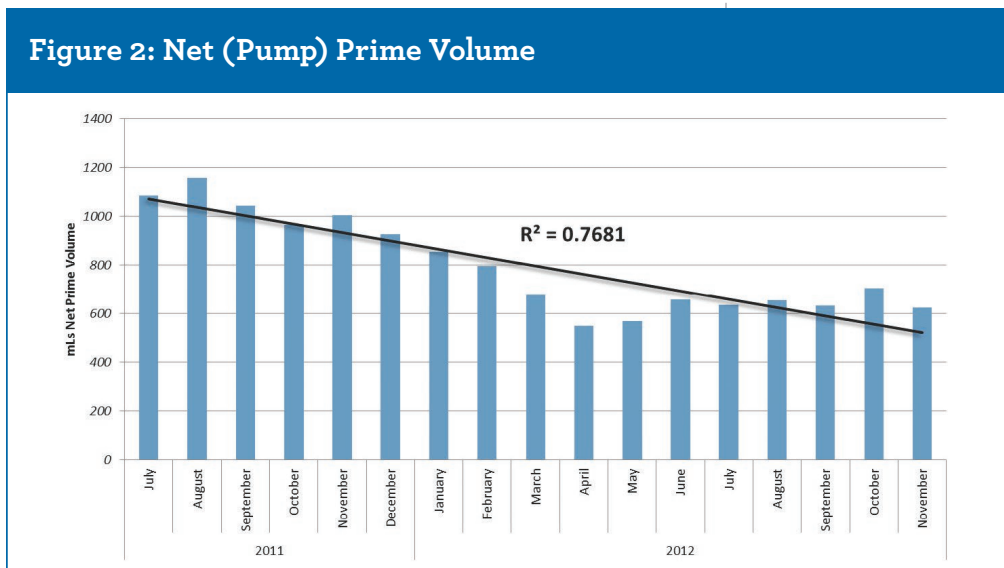
The logo for the Allina program is a red blood drop with the word “THINK” in it. “Our message is not ‘Don’t transfuse’; it is ‘Think,’” Dr. Anthony says. “There is a lot of folklore around blood, and people who would otherwise order the minimum effective dose of any medication automatically order two units of blood. We are asking them to stop and think first.”

SALVAGING BLOOD POST-OP

Another major area of blood conservation involves anesthesia technician services. Bruce Bjelland, vice president of SpecialtyCare’s Autotransfusion Clinical Services, worked with the Iatrogenic Blood Loss Committee to implement a venous arterial blood management protection (VAMP) system, which encompasses a closed blood sampling system. The VAMP system is designed to reduce blood waste associated with blood sampling. Patients with a conventional (nonVAMP)

arterial line can often lose up to a unit of blood in the days following a procedure from blood sampling procedures.

The SpecialtyCare autotransfusion team also took the lead in postoperative blood salvage in joint replacement and cardiac surgery cases. These involved the OrthoPAT and CardioPAT devices, specialized autotransfusion devices for orthopedic and cardiovascular surgeries. These highly mobile devices follow patients through the recovery process, such as the cardiac care unit, and significantly reduce red blood cell transfusions.



THE FUTURE

Allina has met its first goal of reaching the benchmark average of the national database for blood transfusion. Now the task becomes more targeted, unmasking variation in use by hospital, department and provider. “So if we look at knee replacement, we’ll want to know why at one hospital you may virtually be guaranteed to get a transfusion, yet at another, virtually nobody gets one,” Dr. Anthony says. “Is it differences in patient population or just physician practice?”

Dr. Grehan wants to develop new protocols around the use of anti-clotting medication. Patients who present to the ER with suspected myocardial infarction are often given Clopidogrel even before knowing the underlying cause of symptoms. “Also, cardiologists are of the mindset that if they can’t stent a patient, even though he’s loaded with [antiplatelet

medications], they need surgery right away, which causes us to use a lot of blood products,” he says. The Society of Thoracic Surgeons’ guidelines recommend that stable patients wait three or four days to allow the drug to dissipate and platelet function to recover prior to surgery.

The cardiovascular team is working on new dashboards that join data on blood use with outcomes and performance data. “Now we want to move beyond benchmarks to adopting all best practices,” Dr. Grehan says.

Allina is not done with educating physicians. “We are doing transfusion medicine grand rounds, focusing on topics the doctors want to hear about,” Dr. Anthony says. “We are using videoconferencing, so the speaker can reach all 12 hospitals. We are trying different modalities, really every means we can find to spread this message of using less blood.”



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through its 90+ clinics, 12 hospitals, 15 pharmacies, specialty care centers and specialty medical services that provide home care, senior transitions, home oxygen and medical equipment, and emergency medical transportation services. Learn more at allinahealth.org.



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Our client hospitals benefit from exceptional resources and our annual caseload experience of more than 350,000 surgical procedures. SpecialtyCare provides perfusion services in more than 50,000 open-heart surgeries each year. One in every nine open-heart surgeries performed in the US this year uses SpecialtyCare for perfusion services.