In the News

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Automation Sidebar 1

Preventing transfusion errors

Probably the most likely source of fatality in blood transfusion today is giving a patient the wrong unit of blood. It is a low risk but higher than the risk of HIV infection. "As awful as [HIV infection] is," says Cherie Evans, MD, medical director of the Blood Bank of Alameda-Contra Costa Counties, Oakland, Calif., "the real risk that the transfusion will do you irreparable harm is that you get the wrong unit of blood because we have not completely automated the process of handoffs from the donor to the blood going into the patient's arm."

James AuBuchon, MD, professor of pathology and medicine and medical director of the blood bank and transfusion service at Dartmouth-Hitchcock Medical Center, agrees that the single largest problem is a unit of blood intended for one patient being transfused into the wrong patient. A smaller but still significant problem relates to proper identification of the patient when the pre-transfusion sample is being collected. "Both of these problems relate to patient identification," Dr. AuBuchon notes.

Drs. AuBuchon and Evans cite a study in New York that found about one in 12,000 transfusions went to the wrong person. Given the distribution of blood types, the authors calculated that one in 600 000 transfusions would be expected to be fatal. Dr. Evans calls that "a pretty frightening number." With 14 million transfusions in the United States annually, that implies about two dozen fatalities each year due to mistaken identity. This has been the main reason for immediate transfusion fatality for decades, not because people are not trying hard or are not qualifed, but because of the nature of human performance. "Even the best worker may transpose a number or mix up similar names," Dr. Evans says.

"I find it interesting that we spend many dollars per unit of blood to expand the list of infectious disease tests that are applied in the name of transfusion safety," Dr. AuBuchon says. "The public seems to demand that. And it is a good thing that we are doing it. But the public seems to be unaware and one would assume uninterested in this continuing phenomenon of mistransfusion, even though deaths due to transfusion errors far outnumber the number of cases of transfusion-associated HIV.

"I agree with Drs. [Kathleen] Sazama and [Jeanne] Linden that a systems approach needs to be instituted to eliminate these errors," Dr. AuBuchon says. In addition, he notes, "Some type of mechanical or electronic aide at several key junctures along the way can be helpful as well."

Speaking of electronic tracking, preferably by bar codes, Dr. Evans says, "I think that is where blood banking and transfusion have to go." Such mechanisms are already in place at large blood collection centers. "But," Dr. Evans says, "we still need something to link the big machines in blood centers to smaller instruments in hospitals." Electronic tracking is easier for blood centers than for hospitals, which operate on a much smaller scale. "A $150,000 machine, if you are doing 15 crossmatches per day, makes no sense," Dr. Evans says.

She outlines the process to prevent transfusion error. At the blood collection center, a pilot tube is made. A single bar code is applied to the bag of blood and the pilot tube, which goes into an automated instrument for infectious disease testing, blood type determination, and antibody screening. The instrument tracks the sample by bar code, then downloads results of testing, along with the identifying bar code, into an integrally linked computer, which can print a report. "Or," Dr. Evans says, "in many large centers like ours, it is connected to the main information system. We now know that all those results-blood type, infectious disease testing, etc.-have been linked with the right donor."

At this point the pilot tube goes with the unit to a hospital carrying the bar code. "Now if the hospital had the same kind of automation on a smaller scale," Dr. Evans continues, "they would be able to use the same bar-code mechanism." Instead, tracking in most hospitals means looking at an eye-readable number on the side of the tube, which a technologist writes on a requisition slip and then, using that number, crossmatches to find a compatible unit. A bag of blood is carried to the patient and a human visually compares a series of handwritten indicators on a tag-patient name, identification number, and eye-readable number of the unit of blood-to the patient's wristband.

But less expensive mechanisms are becoming available. "What I am most excited about," Dr. Evans says, "is a handheld device called I-TRAC," made by Immucor. When a patient comes into the hospital, a band with a bar code is placed on the patient's wrist. When a unit of blood is ordered, the patient's bar code is read with the I-TRAC device, which generates a label for the patient's sample tube. For crossmatching, the instrument is used to capture the bar code on the patient's wrist. The portable printer then prints out bar-code labels that go on requisition slips to the blood bank and are put on tubes of blood from the patient. Before a unit is given, the scanner must be passed over the bar code on the patient's wristband to ensure that the unit of blood and the bar code on the unit match. Otherwise the device will not allow the unit to be given.

Dr. AuBuchon accomplishes the same objective with a mechanical barrier system called Bloodloc (Novatek; Greenwich, Conn.). "We have been using this at our institution for six years to prevent mistransfusion," he says. "We have found it to be very helpful." Bloodloc is a plastic lock that prevents access to a unit of red cells until it is opened using the code found on an adhesive label that has been attached to the patient's wristband.

This code is transferred from the wristband to the tube used for pre-transfusion testing at the time of phlebotomy. The code is then used to "lock up" the unit of red cells before it leaves the laboratory. "The only way to gain access to the bag of blood is for the transfusionist to take it to the arm of the same person who gave the pre-transfusion specimen," Dr. AuBuchon says. If there is an urgent need for the blood, such as during surgery, and the lock doesn't open, the response usually involves

"What I have tried to impress on transfusionists," Dr. AuBuchon says, "is that when the lock doesn't open there may be a good reason for it. The sample may have been collected from the wrong patient.

"We had not had in our institutional memory an acute hemolytic reaction," Dr. AuBuchon continues. "We adopted this system not because there was a problem, but because we wanted to prevent a problem."

His laboratory handles approximately 1,500 type-and-screen requests each month. "Over six years the Bloodloc system has been responsible for detecting 32 samples that came from someone other than the person whose name was on the tube," Dr. AuBuchon says. "In addition, the Bloodloc system has been responsible for preventing two transfusions that otherwise might have gone to the wrong patient. And that is in a hospital that has a very good recordkeeping system and a very good patient tracking system."

Dr. Evans notes that a hospital in Milan instituted Bloodloc and investigated all subsequent mismatches. After a year "near-misses" rarely happened anymore, because they were able to identify steps where errors occurred and adopt measures to reduce the risk of mistakes.

William Check, PhD

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