

Davies Enterprise Award Application

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Name of Organization: University of Iowa Health Care

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Menu Item: Patient Safety Enhancements

Executive Summary

Improving patient care and outcomes, managing costs associated with blood management and administration, and conserving increasingly scarce blood products were the goals of an EHR-enabled Blood Management program implemented by the University of Iowa Hospitals and Clinics (UIHC). Using targeted blood management teams and clinical decision support in our electronic health record, this program reduced the number of blood products administered, the number of patients receiving two units of blood, the number of patient blood draws per day, and the number of incorrect medication administrations, all while saving \$9,300,000.

Background

A blood management program was developed at the University of Iowa Hospitals and Clinics (UIHC) after transfusion methods were investigated following a transfusion-related adverse event. In January, 2011, a new blood management program was endorsed by the Blood Transfusion Subcommittee at the hospital and \$375,000 was allocated to support contracting with an outside resource to help with the startup of the program.

In alignment with the Blood Management program was an initiative to ensure all blood components were scanned at the time of administration into the electronic health record (EHR). This includes type and screen collection and blood administration. The Blood Product Administration and Type & Screen initiative is important as patient misidentification is one of the leading causes of transfusion related deaths.

Local Problem and Intended Improvement

The goals of the blood management program were to improve patient care and outcomes, manage costs associated with blood management and administration, and to conserve increasingly scarce blood products.

The consultant contact focused on two key areas to be improved:

- 1) Optimizing the use of blood products
- 2) Optimizing resources involved in the transfusion process, such as:
 - healthcare dollars
 - cost of wasted blood
 - hospital beds
 - medical supplies and devices
 - laboratory tests
 - pharmaceuticals
 - technician time
 - nursing time and care

Design and Implementation

Our consultant, along with the transfusion subcommittee and representatives from UIHC's nursing staff completed an audit of the hospital's blood management and transfusion procedures in January, 2011. A summary of audit findings identified four initiatives to focus the blood management process revision upon, including:

- 1) Awareness and education
- 2) Appropriate utilization
- 3) Best practices
- 4) Interdisciplinary collaboration

Nurses from units which administer large amounts of blood were recruited to participate in the four project teams that were formed to address the identified initiatives, as they draw many of the lab workups and are often the first to recognize reactions and complications from blood they have administered.

A blood management coordinator was engaged to oversee the program and manage the four project teams. The teams worked to develop comprehensive educational programs on blood transfusion safety, blood conservation awareness, and advocacy of patients for staff involved in ordering and administering blood draws.

The Education and Communication Team was formed to tackle the awareness and education initiative. Main goals of the group were to lower avoidable errors by distributing information, increasing awareness, and explaining how key nursing performance is to the process outcomes. Education was coordinated for staff and for patients. Competency training and testing on transfusion procedures and safety was developed for registered nurses, nursing assistants, medical assistants, and nursing unit clerks. Blood management presentations were given to all departments. A monthly newsletter was created, and all staff blood management resources were placed on a hospital intranet site. For patients, home care instructions post-transfusion were updated. A blood transfusion consent form was written and approved by a Hospital Administrative Committee to include risks, benefits, and alternatives. Also, an anemia pamphlet was created.

All IT related projects are designed and implemented using multidisciplinary teams of IT and clinical resources and follow a structured roll-out plan. Members from both groups were represented on the leadership and project teams. IT and subject matter experts brought working models of the solution option back to the committee for approval before proceeding to the next phase of development. Subject matter experts participated in the design and testing of all functionality and reporting developed and super users across all roles discuss what education they recommended for end users before implementing the change. The large group collaborated on the go live dates, prepared an education and go live support plans and then actively monitored the process post go-live for additional concerns of need for enhancements.

How was Health IT Utilized

The Order Set Team was formed to ensure appropriate utilization of blood products. The goal was to align standardized blood orders with national transfusion patient safety goals of the “right indication” and the “right dose”. The standard order set available in the EHR, which included two units of blood, was altered to only include one unit. All physicians who used two units of blood rather than one were forced to indicate their reasoning within a Best Practice Alert (BPA).

The best practices initiative was tackled by the Pre-Operative Anemia Management Team. They worked with surgeons to determine practices to more consistently check hemoglobin levels before surgery. A workflow was developed that, when preoperative anemia has been detected, the EHR presents a Best Practice Advisory to the provider to refer the patient to the Hematology Clinic to treat the anemia preoperatively (See Figure 1). By finding anemia preoperatively, the number of blood products given to patients' intra and post-operatively is reduced.

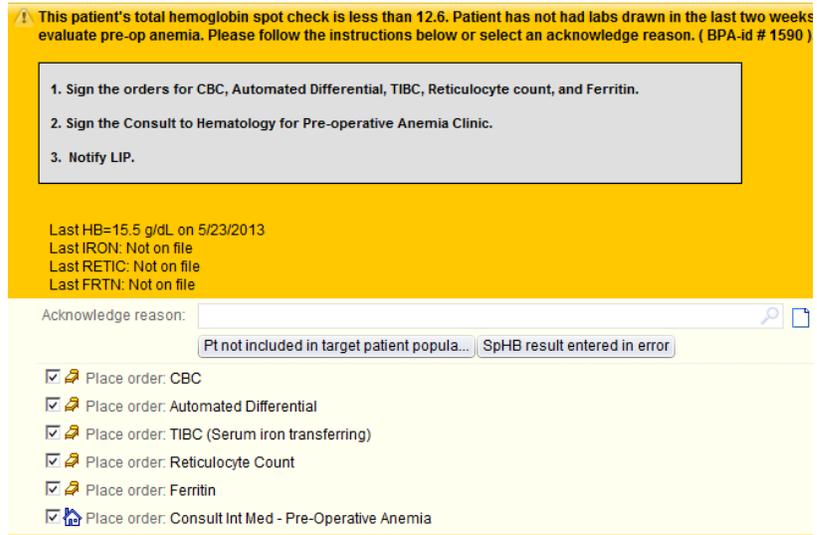


Figure 1. EHR Best Practice Alert

The Iatrogenic Blood Loss Team worked on interdisciplinary collaboration. The goal was to reduce the amount of blood loss by reducing the number of lab draws per patient per day and by reducing the amount of blood discarded when drawing labs using a central line.

The EHR was instrumental to the success of our Blood Management Program. It allowed us to standardize our blood product order sets to contain a hard stop at transfusing only one unit of blood rather than the previous norm of two units. Using an available feature of our EHR, we were able to require all physicians placing blood product orders to indicate the reason for the transfusion. Dashboard utilization reports were monitored and the data was used to round back to the ordering provider so to provide education.

The EHR is also used to scan the barcodes of both the patient and the blood products to ensure the correct blood product is being administered to the right person. Audit reports are closely monitored of every scanning event so to alert to any possible trends of process issues and identify areas for improvement. Educational efforts are targeted as data indicates. As depicted in figure 2, the EHR bar code confirmation match led to a safer and more efficient process.

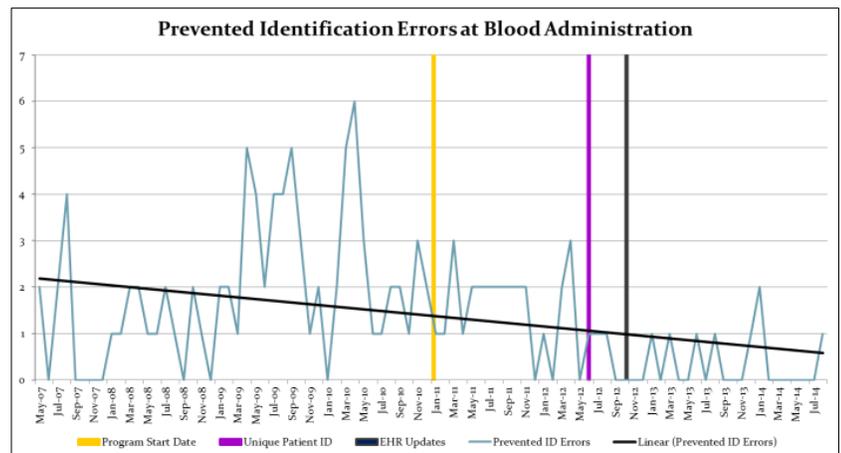


Figure 2. Reduced number of Patient Errors

Value/Derived Outcomes

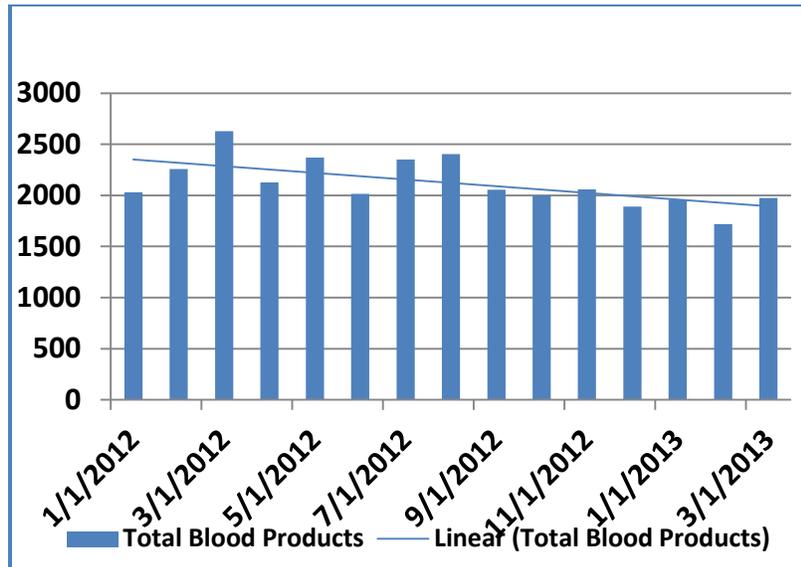


Figure 3. Total blood products

The work of the four project teams contributed to efficiencies in blood products administered at UIHC (*Figure 3*):

- The number of blood products, which was 2,031 in January of 2012, was reduced to 1,717 in February, 2013.
- Between January 2012 and March 2013 there was a 15.71% reduction in the number of patients receiving two units of blood.
- Patient safety has thus increased, as patients are at risk whenever they receive unnecessary blood products. Another benefit of reducing the number of blood products administered is that nurses have more time for other tasks.
- The support of the Iatrogenic Blood Loss team resulted in a reduced number of patient blood draws per day. With the highest acuity patients, the adult ICUs and the PICU historically had the greatest number of blood draws – often as many as five per day. The majority of these draws were done through central lines with a significant amount of blood loss.

Before the blood management program, in calendar year 2010 nurses were drawing an average of 3.92 draws per patient per day and 59% of all ICU patients were averaging more than two draws a day for successive days. As of February 2013, UIHC reduced the average number of blood draws per day down to 2.09, and only 24% of ICU patients had more than two draws a day for successive days. Most inpatient units reduced their average draws per patient per day and the number of blood draws on successive days. The medical/surgical oncology unit, for example, has reduced the average draws per patient per day from 1.78 in July 2011 to 1.4 in February, 2012. (*Figure 4*)

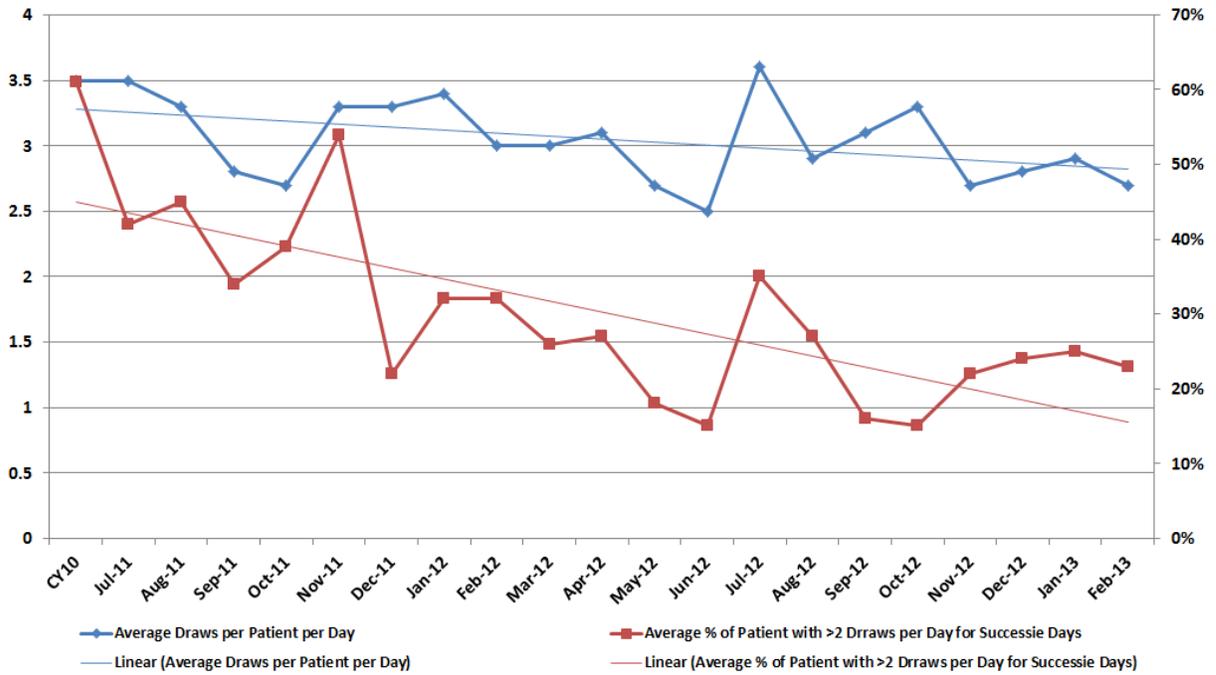


Figure 4. Blood management: Iatrogenic Blood Loss project team metrics

As result of the program, the total number of monthly blood draws was reduced by 30% even though patient OR cases continued to increase over the same time span. (Figure 5)

Total Blood Product Administrations Compared With Total Surgical Cases

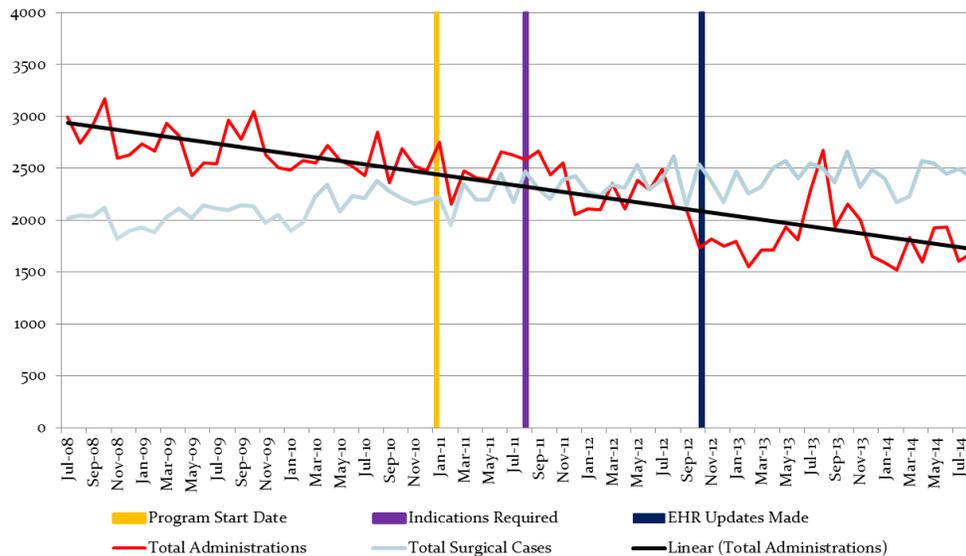


Figure 5. Total blood administration as compared to surgical cases with noted implementation dates

- The average number of patients with greater than two blood draws on successive days was reduced from 20% down to only 1%. One of the main advantages to the patient of having less blood drawn is that for every 50 ml of blood drawn, the risk of moderate to severe hospital acquired anemia increases by 18% and decreases hemoglobin by 0.5 grams. Having less blood drawn also increases patient satisfaction.
- Patient identification and blood scanning in our electronic medical record has resulted in a decreased number of incorrect blood administrations. After being in place for more than six months, the EHR barcode scanning for Blood Product Administration and Type & Screen specimen collection reflected that over 10,000 blood components were scanned into our electronic medical record. During this time two alerts of potential incorrect blood component transfusions were fired in the EHR. Percent of blood component administrations not performed by protocol has dropped from .9% to .45%. In the OR specifically it dropped .7%. The EHR system captures every partial miss-scan event (patient or product information). Anytime the reports reflect that a nurse is struggling with the scanning process, resources are dispatched to provide education.

Lessons Learned

- Bringing a blood management coordinator on board was key to keeping the project moving forward and on track.
- Providers have come to realize the added patient safety benefits of ordering one unit of blood per transfusion rather than automatically ordering two.
- Involving front line staff in the project workflow design and testing lab are crucial to identifying current challenges, developing sustainable workflows, long-term optimization solutions and achieving staff buy-in.
- Education throughout the process is essential; at the beginning to explain the goal of the initiative; during patient care, to provide elbow-to-elbow super user support, and post event monitoring of the data to target those in need of additional education.
- Patient satisfaction improved through reduced patient blood draws.

Financial Considerations

UIHC resources were strategically allocated for the Blood Management Program. The Blood Management Coordinator, who was hired to oversee the program and coordinate the activities of the four project teams, was funded by the hospital's Clinical, Quality, Safety and Performance Improvement department. The coordinator was hired from one of our own inpatient units.

The expense of the \$375,000 contract with Strategic Health Management™ has already been recovered. Using the computer as our 'second person check' for blood administrations as well as having less blood administrations, frees up nurses for other patient care duties. By reducing the amount of blood products we have administered between April 2011 and March 2013 we have an estimated purchase cost savings of nearly \$900,000, transfusion

cost savings of over \$2,000,000, and adverse events related to blood transfusion costs savings of over \$6,000,000, equaling \$9,300,000 in savings for that time period alone. (Table 1).

	Baseline Period Apr 10 - Mar 11	Period to Date Apr 11 - Mar 13		Unit Savings	Purchase Cost Savings	Transfusion Cost Savings	Adverse Events Cost Savings	Total Estimated Savings
	Avg # of Units per 1000 Cases	Avg # of Units per 1000 Cases	% Saved					
Red Blood Cells	544.39	465.99	14%	5217	\$1,033,175	\$2,410,132	\$6,364,419	\$9,807,726
Platelets	123.59	127.77	-3%	(278)	(\$134,019)	(\$128,509)	(\$339,353)	(\$601,881)
Plasma	158.2	147.77	7%	694	\$11,984	\$105,472	\$169,310	\$286,766
Cryoprecipitate	13.7	18.38	-34%	(311)	(\$35,574)	(\$28,633)	(\$37,970)	(\$102,177)
TOTALS				5231	\$875,565	\$2,358,462	\$6,156,406	\$9,390,434

Table 1. Estimated inpatient and outpatient savings

Source: Strategic Healthcare Group LLC

Transfusion cost per unit in 2010 \$ (source: Cremieux et. al. JClinOncol 2000; 18:2755-61)

Adverse events cost per unit, including LOS and infections in 2010 \$ (source: Blumberg et. al. AmJSurg 1996; 171: 324-30)