Implementing a Blood Management Program to Improve Patient Safety

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According to the American Red Cross, someone in the United States needs blood every two seconds and more than 38,000 blood donations are needed every day.1 One out of every 10 people admitted in a hospital needs blood and the average red blood cell transfusion is approximately 3 pints.

The demand for blood transfusions is growing faster than donations. According to research,2 20 percent of blood products are consumed in the Cardiac Surgery area alone, and the supply does not equal demand. Data show that the efficacy and safety of all blood products are problematic. Complications from surgery can prolong recovery, increase hospitalization time, and can be life threatening to patients.

Healthcare professionals, those who finance healthcare, governmental organizations, and the general public are familiar with the statistics and issues surrounding blood management during surgery. Of the nearly 30 million surgeries performed each year in the United States, the post-operative complication rate is estimated to be about 5 percent.2 Complications that happen in conjunction with surgical operations are a major cause of patient injury, post-operative complications, mortality, and healthcare cost. Surgical complications can take a measurable toll on a patient’s health and safety, extending treatment and leading to longer hospital stays. Regulatory compliance mandates to improve outcomes and promote patient safety in blood product management require hospitals to respond with effective and efficient programs.

In 2008, our risk-adjusted mortality and surgical re-exploration for Coronary Artery Bypass Graph (CABG) surgery rates had dropped below our projected threshold while remaining above the Society for Thoracic Surgery (STS) best practice goal. Not reaching the best practice goal we had set was a disappointment for the Cardiac Surgery Team. We had expected to experience statistical improvement in these measures as a result of Surgical Care Improvement Project (SCIP) measures and multiple improvements implemented by the Cardiovascular Team in relation to standardizing approaches to Cardiovascular (CV) Surgery. Blood management strategies in the cardiac surgery population became of interest because of the volume of blood product usage and the evidence based data that proves complications are directly associated with an increase use of blood products. The Cardiac Surgery Team planned to focus on our blood utilization process and look at improving transfusion practices and patient clinical outcomes.

Patients who are on many pharmacological platelet inhibiting agents presented to our hospital as a risk to their clinical status during surgery. The level of patient care and services needed improvement. Hospital management was discouraged by the amount of blood utilized and the increased costs of blood products. Changes in blood management services were also needed to respond to the Centers for Medicaid and Medicare Services (CMS) and The Joint Commission’s prompting for hospitals to shift toward implementing blood product management programs to improve utilization, outcomes, and promote patient safety.

Project Planning and Design
Blood management is a multidisciplinary process designed to promote the optimal use of blood products and ensure the safe and efficient use of a precious blood product/
component for therapy. It is also an approach to evaluate mechanical, technical, and medical treatments in which to reduce or eliminate transfusions of blood products. The Blood Utilization Committee at our hospital was redesigned from a committee where data were reviewed but had little impact on process improvement. The restructuring of the blood transfusion committee began with the implementation of new blood management processes that would extend beyond just Cardiovascular Services and would be overseen by the hospital management.

This manuscript describes how we incorporated a blood management program into our organization. Patient safety has been a strategic focus of our board and senior leadership for many years and was enhanced by the introduction of a formalized Blood Management Program initiated in April 2009.

**Goals**

The goals of the blood management program is to reduce complications and infection rates, shorten length of stay, manage operative blood, decrease unnecessary blood and blood product utilization, and promote better patient outcomes.

Support for a blood management program, in conjunction with the Centers for Medicare and Medicaid Services and The Joint Commission includes The American Association of Blood Banking (AABB), College of American Pathologists (CAP), American College of Surgeons, American Hospital Association, American Society of Anesthesiologists, Association of Pre-Operative Registered Nurses, Agency for Healthcare Research and Quality, Centers for Disease Control and Prevention, Department of Veteran’s Affairs, and the Institute for Healthcare Improvement.

The blood management program is also designed to reduce the cost to the hospital, the patient, and the insurance carrier. The strategies are based on the best available evidence-based practices and technology, then refined and improved as new scientific information becomes available.

To reach these goals, we first identified the evidence-based interventions which would guide us in the transition. We also needed to describe the process of guideline development which would provide us with a balance between efficacy, safety, and regulatory constraints.

The primary goal for the new blood utilization/blood management program would be to ensure patient transfusion safety and help focus on reducing unnecessary blood demand while making efforts to increase blood availability when needed. The true key for an optimal blood product management plan would be to assure that we transfuse the right patient, the right product at the right dose (blood product amount) for the right clinical reason to achieve the right clinical outcome.

**Implementation Process**

A new perfusion service was put in place during the second quarter of 2009. This dynamic team designed a comprehensive blood management plan for our hospital. The concept of implementing medical treatments to manage a patient’s
own blood during surgery was new to this hospital. It took time to introduce and convince practitioners of the value of this new patient safety process. The perfusion service spent most of the third quarter of 2009 learning hospital practices, setting up equipment, and developing processes to improve the blood management system in the operating room.

In order to advance the knowledge of the hospital clinicians, the team needed to educate practitioners on the science and practice of blood management. This involved educating physicians about alternatives to using donated blood products vs. the benefits of using the patients’ own blood (autologous donor) through the coordination of clinical and scientific mechanisms. The formalization of education in methodology and techniques of blood product management would advance knowledge leading to improved outcomes. In order to promote the blood management plan, the lead perfusionist sought help of a multidisciplinary team to provide support and additional resources to fully implement the new blood management plan.

Hospital leadership endorsed the redesign of the Transfusion Committee during the fourth quarter of 2009. One of our cardiovascular surgeons agreed to be the new committee chair for the team and the lead perfusionist served as facilitator. Other team members consisted of anesthetists, intensivist, pharmacist, the senior vice president of patient care, blood bank technical specialist, pathologists, advanced practice registered nurse, other perfusionists, medical technologist, operating room nurse, quality improvement, emergency medicine, orthopedist, senior vice president medical affairs, critical care nurse, and anesthesia physician assistant.

The purpose of Transfusion Committee (TC) was to encourage the use of the “Precautionary Principle” in regards to transfusion therapy, thereby respecting the adage, “First do no harm.” In addition, the mission statement of the committee was to comply with all of the regulatory and accreditation requirements and be successful in implementing safe transfusion practices. The committee was responsible for reducing transfusion errors and improving blood utilization. The committee focused on transfusion practices to include transfusion therapies, new technologies, and a blood utilization review program.

The goal of the Transfusion Committee was to promote the safe and effective use of blood and its components. This included:

1. **Transfusion policies and procedures and assuring compliance.** The team functions to collaborate with other clinical disciplines to assure that all policies and procedures related to transfusion therapy conform to the applicable regulations. The committee also evaluated and implemented, when appropriate, blood management techniques and alternatives to transfusion.

2. **Staff training and education.** This involved overseeing the creation of transfusion educational modules and implementing them across the institution, promoting a program for continuing education of nurses, physicians, and blood bank staff in transfusion safety; and, developing systems that are easily accessible to staff for rapid and timely dissemination of transfusion, safety-related information.

3. **Blood-usage review and peer-review programs.** This required developing a uniform approach to monitoring blood use and providing oversight for a hospital-wide, peer-review program for blood use. The program involved establishing systems to generate physician-specific, blood-utilization peer-review reports needed for the approval or renewal of hospital privileges for medical staff.

4. **Performance improvement/data collection and analysis.** The PI activities require a reactive approach to include participation in root-cause analysis (RCA) of transfusion-related adverse events and ensure RCA recommendations are disseminated, implemented, and evaluated for effectiveness. Activities also included proactive assessments that would enhance patient safety through the implementation of ongoing assessment and performance improvement in blood product ordering, blood sample collection, issuing blood products, pre-transfusion bedside clerical checking, and suspected transfusion reaction reporting practices. Activities also included reviewing and analyzing blood bank reports regarding blood usage, blood loss, adverse reactions, and transfusion errors and accidents.
5. **Communication.** The team must provide feedback that is meaningful and relevant to clinical departments. This included providing comprehensive blood utilization reports to executive leadership and recommend corrective actions when required. In addition, blood-utilization reports would be provided to the accreditation and regulatory agencies, as well as the governing body as needed.

6. **Community involvement.** The team must maintain a cooperative relationship with the regional blood center. This includes involving the blood center in staff education, disease surveillance, and follow-up of suspected cases of transfusion-related acute lung injury (TRALI).

**Measurement of Progress and Quality Improvement Results**

**Committee Team Meetings:** We held monthly team meetings developed action plans (see Figure 2). Data were reviewed to provide the team with progress made and to identify opportunities for improvement. Members were given assignments and input gathered. Part of the committee’s greatest responsibility was to promote the safe and effective use of blood and components. The committee also performed all of the duties that were outlined in the hospital’s bylaws, as well as any other duties required to maintain institutional compliance with regulatory, accrediting, and licensing agencies.

**Multi-disciplinary:** If input was required from additional members of the medical or nursing staff, reports were brought back to the team and shared at meetings. An example of how well the multidisciplinary approach has worked was evident in the changes made to our informed consent process.

- Nurses reported that the consent process for blood products was confusing for them and for the patients.
- Outdated forms were being often used.
• Nurses had to look in multiple places for the correct forms and procedure used to complete the form.
• One form referenced a patient video describing the blood collection process that was no longer available.

Team members revised the process, policies, and forms to assure that patients understand the risks and benefits involved with receiving transfused blood. Team members also made sure that the blood consent form met regulatory compliance.

The education plan was sent to nurse educators, nurse leaders, and to the Nurse Practice Council. After reviewing the revised form and process, the Nurse Practice Council responded by making recommendations to change the process to make compliance easier for the nurses and ensure
that the patients receive appropriate information about the process prior to signing the blood consent form.

This collaboration allowed for a more efficient and patient-friendly process that enabled the team to combine several documents into one, while assuring we met The Joint Commission standards of compliance for blood banks and transfusion services.

Results

According to data (see Figures 3 and 4) from the Society of Thoracic Surgeons (STS) National Registry for 2009 and year-to-date 2010, our risk-adjusted mortality rate is at best practice level. Surgical re-exploration CABG only dropped in 2009 and is at the best practice rate (0 percent) for 2010. The number of intra-operative blood products has decreased. These improvements in patient safety are due in part to the progressive efforts put forth to standardize the medical approach in the operating room specifically by identifying ways to reduce post-op blood utilization on cardiovascular cases. Improvements have also been realized as a result of the nursing ancillary approach to blood management, the standardization of perfusion protocols, and improvement in communication and coordination of care between anesthesia and perfusion. Having the right equipment in the right place at the right time has been invaluable to our team – this was experienced when we purchased the new Cardiopulmonary Bypass Machines, converted to the autotransfusion system with blood management capabilities, and added post-op cardioPAT system.

Since implementation of the blood management program, Redesigned Blood Utilization Committee, and the use of Laboratory TEG (thromboelastograph) testing, we have seen a dramatic 31 percent decrease in our blood product utilization and expenses decreased by $510,000. See Blood Bank Data: Figures 5 and 6.

Education on blood management is continuously provided for surgeons, physicians, anesthesia, nurses, laboratory, and critical care personnel. A better educated heart team has resulted in ultimate benefits to our patients in improved patient safety and decreased cost.

Our proactive approach in tracking the transfusion, SCIP and CV Surgery measures and sharing our trends through a collaborative approach to our Performance Improvement Board, celebrating our victories and discussing our challenges with surgeons, nursing staff, and ancillary departments, has improved quality.

In the first and second quarters of 2010, we realized a 98 percent improvement when the NHSN risk 1 category rate dropped to zero for CABG surgery as compared to the 1.8 rate during same period of 2009. This correlates to improved blood utilization and improved utilization of SCIP Measures. While our biggest success was with CABG patients, we also worked collaboratively with our other surgeons to improve the surgical care for all patient populations where blood utilization was involved. These relatively minor adjustments, coupled with timely communication and follow-up, had a significant impact as well as a result of:

- Enrolling influential support from administration, surgery, and anesthesia;
- Maintaining the focus of the project on improving patient care;
- Developing an understanding of the current process and where the current system may be failing;
- Targeting small but significant improvements that work within the current system;
- Engaging the use of automation to make improvements;
- Accepting small increments of improvement and repeating them often; and
- Communicating frequently and timely with the leaders and the practitioners.

Communication and Collaboration Crucial Roles

Because this initiative was geared primarily toward surgeons, we learned early on that communication is vital to the success of the project. We initiated several ways to communicate to the surgeons, i.e., by letter, one-on-one surgeon meetings, and meetings with the entire department of surgery. Communication with our surgical staff was accomplished in department meetings. In addition, we were supported by Administration and our Performance Improvement Steering Committee. We learned this is truly a collaborative effort involving surgeons, quality assurance managers, nurses, nurse practitioners, anesthesiologists, pharmacy, critical care nursing, and hospital administration. The team network enabled the system to function at a higher level because of the shared experience. When meeting as a team, the support generated for one another was great.

As part of peer review and education, we communicated with the perfusionist, pathologist, anesthetist, and surgeons on a monthly basis regarding opportunities for improvement with the blood management process.

Conclusion

We know that blood products remain a precious, scarce, expensive, and potentially hazardous resource. Although anemia carries risks in the cardiac patient population, there is very little to no evidence demonstrating improved outcomes with transfusion. For years, the medical field has over-estimated the benefits and underestimated the risk of
transfusion. All clinicians must take an active role in supporting multidisciplinary blood management programs.

At St. Francis, surgeons, perfusionists and pathologists have taken the leadership in creating blood management safety. Our blood management program structure has been set up in a way that is centered on teamwork and communication. This has helped maintain consistent standardized practices in blood transfusion therapy, improved patient safety, and allowed departments to learn from each other’s successes and mistakes. This has taken out the “silo-effect” and has forced us to proactively implement improvements in a consistent manner across the organization.

The blood management program is a strong force in our hospital that positively impacts the care of our surgical patients. Our successes and challenges are reviewed at all levels of our organization, including the Transfusion

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**Figure 5:** Blood and Blood Product Utilization Results: PRC per IP Admission decreased by 23 percent, FFP decreased by 28 percent, and Platelet Pheresis units decreased by 36 percent.

**Figure 6:** St. Francis’ blood bank expenses for all blood products decreased by $510,000 in the first year after implementing the blood management program.
Committee, the CV Surgery Team, and our Department of Surgery and Performance Improvement Committee of the Board.

The most positive and unexpected benefits of implementing this process was the teamwork that developed among the departments and with surgeons, a partnership that assures the best outcomes for their patients. A cost effective, blood management program to improve patient safety would be successful in any hospital that focuses on teamwork by crossing departmental boundaries and gaining great support from hospital leadership.

References

Kenneth M. Cole, MS, MT(ASCP), is the former Administrative Director of Laboratory Services at St. Francis Hospital in Columbus, Ga., for 17 years. Having an interest in transforming healthcare, he was a poster presenter at CLMA ThinkLab 2011 and also presented on Premier Healthcare Alliance’s first “Labinar” in August of 2011.

Ty Walker, PBMT, CCP, has been a pioneer and vocal advocate for blood management for the last 20 years. Walker is currently the blood management director for Perfusion.com, Inc. He also works closely with St. Francis Hospital, Columbus, Ga., which recently received a PHA Quality and Patient Safety Award and the ITC Award for Patient Safety & Quality, directly as a result of Walker’s involvement is spearheading a blood management program.

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