Developing a Practical Blood Management *Tool Kit*

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Disclosures of Potential Conflict of Interest

- Parent Institution contracted with the Strategic Healthcare Group (SHG), as Blood Management consultants (2009 – 2010)
- Accepted honorarium from LLC for Webinar Presentation (August 2011)
OBJECTIVES

- Assemble and integrate all resources associated with blood transfusion
- Evaluate and prioritize Blood Management tools described to help build a program at your hospital
  - *Institutional* modifications that help change clinical habits
  - Changes made within the Transfusion Service
  - *Patient-centered* blood management initiatives
- Generate strategies for waste reduction and conservation in transfusion therapy
Applied Blood Management

• **Goal:** To ensure that every unit of blood transfused is appropriate
  - Minimize transfusion, complications and anemia
  - Efficient use of all resources (blood, people, devices, drugs)

• **Organizational principles**
  - Education, education, education
  - Attention to detail
  - Multidisciplinary approach
  - **Utilization of evidence-based guidelines** and clinical best practices
  - Reduce risk exposure
  - Proactive patient management systems
There is no Magic
Blood Management is NOT a Turn-Key Operation

But, there are many
“Appropriate Use of Blood with the Goal of Minimizing Use

Blood Management

Lawrence T. Goodnough, MD; Aryeh Shander, MD

Context.—We provide an overview of the principles of blood management: the appropriate use of blood and blood components, with a goal of minimizing their use.

Objective.—To review the strategies that exploit combinations of surgical and medical techniques, technologic devices, and pharmaceuticals, along with an interdisciplinary team approach that combines specialists who are expert at minimizing allogeneic blood transfusion.

Blood management has been defined as “the appropriate use of blood and blood components with a goal of minimizing their use.”1 The US Food and Drug Administration and the blood industry promote the appropriate use of blood through the Circular of Information for the Use of Human Blood and Blood Products, which states that “red cell-containing components should not be used to treat anemias that can be corrected with specific medications. . . .”2 Despite these and other recommendations,3 transfusion practices are still behavior based and result in unnecessary blood product use.4

Data Sources.—A search on Medline and PubMed for the terms English and humans used in articles published within the last 20 years.

Conclusions.—Blood management is most successful when multidisciplinary, proactive programs are in place so that these strategies can be individualized to specific patients.

(Arch Pathol Lab Med. 2007;131:695-701)
Principles of Blood Management

- Grounded in scientific validation and evidence-based practice
- Uses a multidisciplinary team approach
- **Patient-Centered** = Focus on the patient’s best interest
  - Physician-driven
  - Multidisciplinary and multi-professional
  - Efficient and effective
- Achieves *change* through education & training
- Must have an institutional **commitment to excellence**
Principles of Blood Management
Operational Issues

- Planned cooperation among multiple levels of care
- Risk reduction instituted in every phase of patient-care continuum, such as
  - Use of peri-operative blood salvage
  - Restrictions appropriate for surgical procedures
  - Use of surgical devices, medications and techniques to reduce blood loss
  - Restricting certain medications or nutritional supplements
Your Blood Management Bus: Any Size, Any Color, Destination the Same

Small Hospital may need only a Mini-bus

Big Hospital Consortia, Complex Patient Mix may require a Fleet of Very Large Buses
Who Do You Want **on** Your Bus? People are Your Most Precious Resource!

Before you can affect change, **Build your Team**

- A Multidisciplinary Transfusion Committee is critical
- Inter- and Intra-Departmental engagement and collaboration is a must
  - Physicians: Multi-specialty representation
  - Nurses: Inpatient, outpatient and nurse educators
  - Medical Technologists
  - Pharmacists
  - Quality & Patient Safety
  - Risk Managers
  - Administrators: Laboratory & Hospital
Additional Resources on Your Bus

- Transfusion Committee Chair
- **Thought Leaders** and *Program Champions*: May be members of the Transfusion Committee, but additional *engaged* champions need to be in the conversation
  - Recruit the right, obsessively-motivated people
  - Physician champions, multiple disciplines
  - Identify nurse champions, every nursing unit and selected outpatient areas
  - Solicit administrative champions
  - Maintain a sense of urgency, but not crisis
When Your Blood Management Bus Rolls out of the Station...

- Know who is on the bus
- Where they are “seated”
- Who’s driving the bus (today or any time)
- Map your goals and your destinations
  - Need regular meetings with agendas
  - Require committee assignments with time lines
  - Develop a “Blood Management Steering sub-Committee” to stay on task
No “Magic Silver Bullet”, but a Series of Iterative Disciplined Steps

- Institutional modifications that help change clinical habits
  - Revised & disseminated transfusion therapy guidelines
  - Revised / re-educated on use of the MSBOS
  - Implemented new Blood Bank automation
  - Implemented LEAN modifications to the path of work flow in the Blood Bank
  - Modified EMR blood ordering pathway (“Blood Navigator”)
  - Developed nursing education tools, required E-Learning modules
  - Transfusion consent process revised (electronic)
  - Negotiate the very best prices for purchased blood
Further Disciplined Steps Taken within the Blood Bank

- Maintained reduced collection of pre-deposit autologous WB
- Maintain Quality Plan, Blood Bank Quality Unit and all QA monitoring activities
  - On-going QA assessments & measurements are vital & required
- Eliminated use of a “manual requisition” and secondary banding of transfusion recipients
  - Demonstrated decreases in unacceptable specimens and WBIT
- Implemented system-wide increased awareness and education on blood management issues
- Renovations to Blood Bank (Irradiator issues)
- Revised choices for hemostatic components
TRANSFUSION CONFUSION

2011 ASCP Annual Meeting
INFORMATION SHARING

Blood Usage Transfusion Indications

Red Blood Cells – Adult
Average hematocrit of a unit of RBCs is 55 – 65%
1. Actively Bleeding (Acute Blood Loss Anemia)
2. Consistent with Surgical Blood Usage Guidelines
3. Hgb / Hct < 10 g/dl / 30% w/ Significant Cardiac Disease
4. Hypovolemia/Anemia w/ Decreased O₂ Delivery (Decreased SV/O₂, Cardiac Output)
5. Hct <21% Signs / Symptoms of Anemia Absent Pre-existing Cardiac Disease

Red Blood Cells – Pediatrics
1. Actively Bleeding (Acute Blood Loss Anemia)
2. Consistent with Surgical Blood Usage Guidelines
3. Hgb / Hct < 13 g/dl / 40% and Mechanical Ventilation for Neonates
4. Hypovolemia for Chronic Congestive Heart Failure
5. Hypovolemia/Anemia w/ Decreased O₂ Delivery (Decreased SV/O₂, Cardiac Output)
6. Maintain Established Hematocrit in Premature Infants

Platelets
Ordered as “Adult Dose” or number of units (up to 3) for Pediatrics
Adult Dose = approximately 3 x 10^11 platelets, prepared
1. Prophylactic:
   a. ≤ 10,000 in Stable Patients
   b. ≤ 20,000 w/ Intracranial Intervention or Pathology
   c. ≤ 25,000 w/ Lumbar Puncture
   d. ≤ 30,000 in Neonates
   e. ≤ 100,000 w/ DIC or ECMO
   f. ≤ 100,000 w/ Neurosurgery or Gynecologic Surgery
   g. > 100,000 w/ Platelet Dysfunction and Invasive Procedure
   h. 20,000 to 50,000 as outlined in the 2008 Practice Parameters
2. Therapeutic:
   a. ≤ 50,000 w/ Active Bleeding, DIC, Cardiac Bypass, MTP
   b. ≤ 100,000 w/ Intracranial, Spinal or Orbital Bleeding
   c. > 100,000 w/ ECMO Patients w/ Bleeding

Blood Bank Phone Extension – 6-3651

Blood Usage Transfusion Indications

Plasma
Thawed Plasma with 7 Day Outdate
1. DIC or Other Consumptive Coagulopathies
2. Factor Deficiencies w/ Active Bleeding or INR > 1.7 Prior to Procedure
3. Rapid Resolution of Wartaint Effect w/ Active Bleeding or Invasive Procedure
4. Thrombotic Microangiopathies (e.g., TTP, HUS, HELLP Syndrome)
5. Massive Transfusion (MTP and Others)
6. Deficiency of Protein C, Protein S or AT
7. Documented Congenital or Acquired (Inhibitors) Factor Deficiency

Cryoprecipitate
Each adult dose of cryo-contains at least 750mg of Fibrinogen
1. Active Bleeding or Invasive Procedure w/ Fibrinogen Levels < 100 mg/dL
2. Active Bleeding or Invasive Procedure in Refractory von Willebrand Disease
3. Active Bleeding or Invasive Procedure w/ Thrombotic Bleeding Unresponsive to DDAVP
4. Suspected/Identified Hemorrhagic Stroke/Intracranial Bleed Patients Receiving TPA
5. Active Bleeding or Invasive Procedure w/ Disseminated Intravascular Coagulation (Fibrinogen WNL)
6. Active Bleeding or Invasive Procedure w/ Factor XIII Deficiency

All of the Indications for Transfusion are available in the Clinical Protocols section of the EMR Home page under Blood Bank. Parameters for Product Usage

Guidelines for Surgical Blood Usage are available in the Clinical Protocols section of the EMR Home page under Blood Usage Guidelines for Surgery. Individual service guidelines are also listed with the service section.

Blood Bank Phone Extension – 6-3651
Hey, Loyola Nurse. Thank you for the care and compassion that is provided to our Loyola Community! Continue to read notes of appreciation from leadership and other disciplines. Happy Nurse’s Week!

A Look at Health-Care Government Relations with Jim Whitehead

My name is Jim Whitehead, and I am the assistant vice president for Government Affairs for Loyola University Health System. In this role, I work with local, state and federal elected officials to monitor and influence public health policy and legislation as it relates to these levels of government.

We find ourselves in an unprecedented era of health-care policy change and development on both the federal and state level. All of this will have a significant impact on LUHS, our health-care providers, the patients we serve, the students we teach and the crucial research in which we engage. This moment in time offers a unique opportunity for Loyola to influence health policy through the engagement of our individual elected officials.

On the state level, we face true challenges as Springfield embarks on a significant reform of the entire Medicaid program while trying to balance the state budget. The General Assembly also will continue with health legislation, which annually includes bills that impact our nurses and how they care for our
RESOURCES: The Cost of Waste

• According to the 2008 UHC data, the median percentages for wasted products:
  - RBCs, 0.8%
  - Plasma, 2.28%
  - Apheresis platelets, 2.42%

• If you are a “Median” UHC member using Leukocyte Reduced RBCs and purchasing blood products at the 50th %-ile, this level of waste costs $79,443 every year.
Considerations for Cryo Dosing

- **Minimum** fibrinogen content = 150 mg / unit
- “Pool of 10” Cryo’s intended to deliver 1.5 grams of fibrinogen
- Cryo QC: fibrinogen content consistently = 350 mg to 500 mg / unit
- Pool of 5 Cryo’s consistently deliver 1.75 to 2.5 grams of fibrinogen
- Cryo purchased or pooled as a “Pool of 5”, new “Standard of Practice” and order choice
Considerations for Platelet Dosing

• Focused on Platelet **Content** in the bag
• Platelets, Pheresis = (min.) $3.0 \times 10^{11}$
• Avg. QC of Platelets, Pheresis = $3.6 \times 10^{11}$
• RD platelet (min.) = $5.5 \times 10^{10}$
• LR Random-donor platelet QC = 8.3 to $8.8 \times 10^{10}$
• Pool of 4 LR-RD platelets = 3.3 to $3.5 \times 10^{11}$
• Inaugurated the “Adult Dose” of platelets
WASTE REDUCTION STRATEGIES

• Implemented new dosing strategies:
  - “Adult dose” Platelets
    o Single donor apheresis platelet
    o Pooled random donor platelets (pool of 4)
  - “Adult dose” Cryoprecipitated AHG
    o Pre-pooled, 5-unit Cryo

• Using current evidence-based information to determine the “Adult dose” enabled Transfusion Medicine physicians and Transfusion Committee implement change
Considerations for Plasma Availability

- “Fresh Frozen” Plasma contains “all” of the plasmatic ingredients
- Once thawed, FFP has 24-hour shelf life (or requires re-labeling)
- FP24 significantly replacing FFP
- FFP, FP24 and Thawed Plasma all have decreased Factor V and Factor VIII contents, but not below hemostatic levels
WASTE REDUCTION STRATEGIES

• Conversion of FFP to 5-day *Thawed Plasma* reduced plasma waste from 5.4% to 3.6% in the first year after implementation.
• Currently, plasma waste is at 1.5%, a ~ 72% improvement.
• Associated savings > $10,000 annually
Barriers to Progress: Expect “Push Back”

• Tenacious individual professional autonomy
  - Prepare to be greeted with antipathy
  - Skepticism about new concepts
  - Entrenched hierarchical authority structure
  - Diffuse accountability

• Academic physicians: A thousand “Points of No”.
• “But this is the way we’ve always done it…”
• “When my patients bleed a lot, I just transfuse them…”
• “…but you don’t understand, I always get the sickest patients!”
• “I really don’t care about some other guy’s patients (when) mine are the most important?”

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The Only Individuals who Embrace Change are Babies with Wet Diapers
Moving Knowledge
How Well Do Facts Travel?

Perioperative Blood Transfusion and Blood Conservation in Cardiac Surgery: The Society of Thoracic Surgeons and The Society of Cardiovascular Anesthesiologists Clinical Practice Guideline*

The Society of Thoracic Surgeons Blood Conservation Guideline Task Force: Victor A. Ferraris, MD, PhD (Chair), Suellen P. Ferraris, PhD, Sibu P. Saha, MD, Eugene A. Hessel II, MD, Constance K. Haan, MD, MS, B. David Royston, MD, Charles R. Bridges, MD, ScD, Robert S. D. Higgins, MD, George Despotis, MD, and Jeremiah R. Brown, PhD

The Society of Cardiovascular Anesthesiologists Special Task Force on Blood Transfusion: Bruce D. Spiess, MD, FAHA (Chair), Linda Shore-Lesserson, MD, Mark Stafford-Smith, MD, C. David Mazer, MD, Elliott Bennett-Guerrero, MD, Steven E. Hill, MD, and Simon Body, MB, ChB

University of Kentucky Chandler Medical Center, Lexington, Kentucky (VAF, SPF, SPS, EAH), University of Florida, Jacksonville, Florida (CKH), University of Pennsylvania Health System, Philadelphia, Pennsylvania (CRB), Harefield Hospital, London, United Kingdom (BDR), Rush Presbyterian St. Luke’s Medical Center, Chicago, Illinois (RSDH), Washington University Medical Center, St. Louis, Missouri (GD), Center for the Evaluative Clinical Sciences, Dartmouth Medical School, Lebanon, New Hampshire (JRB), Virginia Commonwealth University, Richmond, Virginia (RDS), Montefiore Medical Center, Bronx, New York (LS-A), Duke University Medical Center, Durham, North Carolina (MS-S, EB-G, SEH), Keenan Research Center in the Li Ka Shing Knowledge Institute of St. Michael’s Hospital, University of Toronto, Toronto, Ontario, Canada (CDM), and Brigham and Women’s Hospital, Harvard Medical School, Boston, Massachusetts (SB)

Background. A minority of patients having cardiac surgery require transfusion. Blood transfusion is associated with a variety of morbidity and mortality. Although only a small fraction of patients require blood transfusion, lack of data on the type, volume, and timing of transfusions, and the lack of evidence available for each of the transfusions, make it difficult to evaluate the impact of transfusion on patient outcomes. The aim of this guideline is to review the evidence on transfusions and provide recommendations for optimal perioperative blood management.

Ann Thoracic Surg 2007;83: S27-86
Moving Knowledge
How Well Do Facts Travel?

Variation in Use of Blood Transfusion in Coronary Artery Bypass Graft Surgery

Elliott Bennett-Guerrero, MD
Yue Zhao, PhD
Sean M. O’Brien, PhD
T. B. Ferguson Jr, MD
Eric D. Peterson, MD, MPH
James S. Gammie, MD
Howard K. Song, MD, PhD

Patients who undergo cardiac surgery receive a significant proportion of the 14 million units of allogeneic red blood cells (RBCs) transfused annually in the United States.1 Numerous observational studies in patients who underwent cardiac surgery have shown an association between RBC transfusion and adverse outcome, including morbidity, mortality, resource utilization, and quality of life.29 To date, no large randomized trials of transfusion thresholds have been conducted in cardiac surgery to our knowledge to address this issue.

Almost 20 years ago, the study by

Context Perioperative blood transfusions are costly and have safety concerns. As a result, there have been multiple initiatives to reduce transfusion use. However, the degree to which perioperative transfusion rates vary among hospitals is unknown.

Objective To assess hospital-level variation in use of allogeneic red blood cell (RBC), fresh-frozen plasma, and platelet transfusions in patients undergoing coronary artery bypass graft (CABG) surgery.

Design, Setting, and Patients An observational cohort of 102,470 patients undergoing primary isolated CABG surgery with cardiopulmonary bypass during calendar year 2008 at 798 sites in the United States, contributing data to the Society of Thoracic Surgeons Adult Cardiac Surgery Database.

Main Outcome Measures Perioperative (intraoperative and postoperative) transfusion of RBCs, fresh-frozen plasma, and platelets.

Results At hospitals performing at least 100 on-pump CABG operations (82,446 cases at 408 sites), the rates of blood transfusion ranged from 7.8% to 92.8% for RBCs, 0% to 97.5% for fresh-frozen plasma, and 0% to 90.4% for platelets. Multivariable analysis including data from all 798 sites (102,470 cases) revealed that after adjustment for patient-level risk factors, hospital transfusion rates varied by geographic location (P = .007), academic status (P = .03), and hospital volume (P < .001). However, these 3 hospital characteristics combined only explained 11.1% of the variation in hospital risk-adjusted RBC usage. Case mix explained 20.1% of the variation between hospitals in RBC usage.

Conclusion Wide variability occurred in the rates of transfusion of RBCs and other blood products, independent of case mix, among patients undergoing CABG surgery with cardiopulmonary bypass in US hospitals in an adult cardiac surgical database.

JAMA. 2010;304(14):1568-1575

www.jama.com
### Are There Barriers to Progress?
Component Usage, CAGB Surgery

<table>
<thead>
<tr>
<th>Component</th>
<th>1991 Study</th>
<th>2008 Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC’s</td>
<td>17% to 100%</td>
<td>7.8% to 92.8%</td>
</tr>
<tr>
<td>Plasma</td>
<td>0% to 90%</td>
<td>0% to 97.5%</td>
</tr>
<tr>
<td>Platelets</td>
<td>0% to 80%</td>
<td>0.4% to 90.4%</td>
</tr>
</tbody>
</table>

JAMA 1991;265(1): 86-90
JAMA 2010;304(14): 1568-75
Moving Knowledge:
Disparate Transfusion Practices Remain - No Improvement

• Transfusion Decisions depend (11%)
  ➢ Transfusion policies
  ➢ Ordering procedures
  ➢ Conservation strategies

• Patient characteristics (20%)

• Patient blood management needs to be a quality indicator

Blood Transfusion as a Quality Indicator in Cardiac Surgery

Aryeh S. Shander, MD
Lawrence T. Goodnough, MD

In 2007, the Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists issued clinical practice guidelines on perioperative blood transfusion and blood conservation in cardiac surgery. In a 2009 follow-up survey of clinicians considered the primary target group of these guidelines, more than two-thirds of respondents indicated some degree of familiarity with the guidelines. However, reported changes in practice resulting from the guidelines were limited, and about half of the respondents indicated that they did not adhere to the recommended reduced hemoglobin cutoff points as transfusion triggers.

Guidelines for blood transfusion have been proposed that attest to the inadequacy of discrete hemoglobin levels as triggers.

In the other study, Bennett-Guerrero et al analyzed data from more than 100,000 patients undergoing coronary artery bypass graft surgery with cardiopulmonary bypass in 2008 at 798 centers across the United States and observed substantial variation in rates of RBC (7.8%-92.8%), plasma (0%-97.3%), and platelet (0.4%-90.4%) transfusions (range of rates from 408 larger-volume hospitals provided). The variability in transfusion rates persisted after adjusting for a number of patient- and hospital-related factors.

The study by Hajjar et al is a notable addition to the existing body of evidence on the narrow benefits of RBC transfusion and its effect on outcomes in patients without hemorrhage. These studies have suggested that reduction or avoidance of transfusion in cardiac patients is associated with improved outcomes. Given the ethical complexities and methodological challenges, to date no RCT has been conducted comparing a transfused group with a nontransfused group.

Transfusion RCTs instead have focused on comparing vari-
Moving Knowledge: Optimal Patient Care Requires Multidisciplinary Team Effort

- Delay surgery, optimize patient medically
- Optimizing perfusion CPB circuit volumes
- Hct on CPB of 22% is safe & effective
- Judicious micro-sampling
- Meticulously avoid loosing blood

State-of-the-Art Blood Management in Cardiac Surgery

Keith A. Samolyk, CCP, LCP

Blood has been described as the most precious and personal substance in the world. Current directions in cardiac surgery are moving away from transfusing donor "Allogeneic" blood products, and towards improving methods of saving and preserving the patient's own "autologous" blood. Nothing else comes close to the natural healing abilities and homeostasis that one's own whole blood offers. No substitute, whether it is human or artificial, will ever work as well with fluid shifts, hemostasis and homeostasis. News reports today commonly feature severe blood shortages and research documenting recognized transfusion risks such as how older stored blood can put heart surgery patients at increased risk and others that point to the morbidity and mortality associated with its use. Therefore the medical community is moving towards more effective blood utilization by minimizing the exposure to donated blood. Current techniques are saving as much as possible of the patient's own blood that might otherwise be mismanaged or lost during surgery. Techniques, such as Ultrafiltration, that quickly concentrate and reinfuse whole blood back to the patient are the best choice. Admission to discharge hemovigilance requires a concerted multidisciplinary team effort with multimodal tools available in the coagulation armamentarium to effectively avoid this form of organ transplant. Improving outcomes and reducing morbidity and mortality in cardiac surgery takes place at the microcirculatory capillary level and with control of Hemostasis. Cardiac teams need to effectively communicate and minimize blood loss and hemodilution and reverse it, for state of the art blood management in Cardiac surgery.

Keywords: Blood Management; Ultrafiltration; Hemostasis; Fluid shifts; Clotting Factors; Cardiac Surgery

2011 Updated Clinical Practice Guidelines

- In cardiothoracic surgery, 3 important preoperative risk factors are linked to bleeding & blood transfusions
  - Advanced age (> 70 years)
  - Low RBC volume, such as preoperative anemia or small body size (or both)
  - Urgent or complex operations, usually associated with prolonged CPB & non-CABG procedures
- Major guideline revisions since 2007
  - Pre-operative interventions
  - Manage antiplatelet therapy before the operation
  - Use drugs that limit blood loss

**Patient-Centered Blood Management Initiatives: Individualized Care**

- Pre-surgical anemia screening & diagnosis, known as *preoperative optimization*
- Practice *concurrent* blood order review
- Optimize use of peri-operative blood salvage
- Select and use POCT, where applicable
- Adjunctive pharmacological therapies
- Minimize blood test ordering and phlebotomy
- ICU Directors need to exercise control
Eliminate “Rainbow Draws”
VAMP – Venous Arterial Blood Management Protection Systems

- Edwards LifeSciences’ VAMP System™
- Abbott SafeSet™, Blood-conserving Arterial Line System
- Via Medical Blood Gas & Chemistry Monitoring System
Intraoperative Blood Salvage
Cell Salvage in Cardiothoracic and Other Surgeries

Operating Room
- Cell Saver System collects, washes, and reinfuses blood intraoperatively

Patient Transfers to Cardiac Care Unit

Cardiac Care Unit
- cardioPAT System collects, washes, and reinfuses blood postoperatively
Perioperative Cell Salvage in CT Surgery

<table>
<thead>
<tr>
<th></th>
<th>Allogeneic Blood Transfusion</th>
<th>Intraoperative Cell Saver® System</th>
<th>Postoperative cardioPAT® System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoidance of unnecessary allogeneic transfusion</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Types of procedures used</td>
<td>Intra- and postoperative cardiovascular surgery</td>
<td>Cardiovascular surgeries and other high blood loss procedures</td>
<td>Cardiovascular postop: CCU, ICU</td>
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<tr>
<td>Hematocrit</td>
<td>50–60%</td>
<td>50–60%</td>
<td>70–80%</td>
</tr>
<tr>
<td>Red blood cell recovery</td>
<td>N/A</td>
<td>95.8%</td>
<td>76.5–92.2%</td>
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<tr>
<td>Albumin</td>
<td>Present</td>
<td>97.3% removal³</td>
<td>97.1–99.9% removal³</td>
</tr>
<tr>
<td>Free hemoglobin</td>
<td>Present</td>
<td>95.7–99.8% removal¹</td>
<td>93.4–99.5% removal¹</td>
</tr>
<tr>
<td>Heparin</td>
<td>N/A</td>
<td>97.8% removal⁴</td>
<td>96.0–100% removal⁴</td>
</tr>
</tbody>
</table>
| Increase risk of severe infection in cardiac surgery | Infection rate¹  
1 unit — >3%  
2 units — 4%  
3 units — 6%  
4 units — 16%  | Eliminates risk of infection and complications associated with allogeneic blood | Potential cost savings by eliminating unnecessary allogeneic transfusions and the associated risks of infection and immunosuppression |
| Cost                               | $1,400 per unit fully burdened⁶ |                                |                               |
Post-Operative Cell Salvage in Orthopedic Surgery

<table>
<thead>
<tr>
<th>Unwashed</th>
<th>Stored Blood</th>
<th>OrthoPAT Blood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unwashed</td>
<td>Allogeneic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced with storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced with storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 unit = 1.1x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 units = 1.7x</td>
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<tr>
<td>Hematocrit</td>
<td>Low percentage of RBCs</td>
<td>50–60%</td>
</tr>
<tr>
<td>2,3 DPG</td>
<td>Reinfused within 4 hours</td>
<td></td>
</tr>
<tr>
<td>Nitric Oxide</td>
<td>Reinfused within 4 hours</td>
<td></td>
</tr>
<tr>
<td>Increase risk of serious infection</td>
<td>Potential complications due to biologic response modifiers</td>
<td></td>
</tr>
<tr>
<td>Cost of blood</td>
<td>Up to $250 per procedure</td>
<td>$1,400 per unit fully burdened</td>
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<tr>
<td>Washout</td>
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<td></td>
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<tr>
<td>Albumin</td>
<td>0%</td>
<td>N/A</td>
</tr>
<tr>
<td>Free hemoglobin</td>
<td>0%</td>
<td>N/A</td>
</tr>
<tr>
<td>Heparin</td>
<td>0%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*OrthoPAT Blood

The OrthoPAT System returns the patient’s own high-quality blood without the risks of complications and infection that are associated with stored and unwashed blood.
Intraoperative Blood Salvage Activity
Point-of-Care Testing: *Actionable Intelligence* Required

- Measures of Platelet function
  - Plateletworks® assay
  - VerifyNow® assay
- Viscoelastic Whole Blood Assays
  - Thromboelastography (TEG®)
  - ROTEM
  - Sonoclot® analyzer
- Fibrinogen levels at POC
RESOURCES: Direct Costs of Blood

• For most institutions, blood component purchases are likely the largest line item in a multi-million dollar laboratory budget

• The 2008 UHC Efficient Blood Management project put the median cost for blood at $6.4 million annually, (slightly less for organizations with blood collection programs)
Our RESULTS: Blood Usage, Adjusted for Census
RBC Usage per Discharge FY09 - FY11

**Individuals**

Set 1: UCL=0.99, Mean=0.74, LCL=0.86 (1-12) (mR=2)
Set 2: UCL=0.36, Mean=1.07, LCL=0.48 (13-36) (mR=2)
Set 3: UCL=0.77, Mean=1.66, LCL=0.56 (25-36) (mR=2)

**Blood Management Implementation Workshop 2/13/2009**

2011 ASCP Annual Meeting
Platelet Transfusion Episodes per Discharge FY09 - FY11

Blood Management Implementation Workshop 2/13/2009

Mean = 0.24
Mean = 0.23
Mean = 0.22

UCL = 0.32
CL = 0.15

July 2008 - August 2008
September 2008 - November 2008
December 2008 - January 2009
February 2009 - April 2009
May 2009 - June 2009
July 2009 - August 2009
September 2009 - October 2009
November 2009 - December 2009
January 2010 - February 2010
March 2010 - April 2010
May 2010 - June 2010
July 2010 - August 2010
September 2010 - October 2010
November 2010 - December 2010
January 2011 - February 2011
March 2011 - April 2011
May 2011 - June 2011
July 2011 - August 2011
Plasma Usage per Discharge FY09 - FY11

Blood Management Implementation Workshop 2/13/2009

UCL = 0.34
Mean = 0.26
LCL = 0.07

Mean = 0.23
LCL = 0.07

Mean = 0.19
LCL = 0.05

July 2008
August 2008
September 2008
October 2008
November 2008
December 2008
January 2009
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October 2009
November 2009
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January 2011
February 2011
March 2011
April 2011
May 2011
June 2011
July 2011
August 2011

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Plasma Use per Discharge Corrected for TPE

UCL = 0.28

Mean = 0.19

Mean = 0.16

UCL = 0.09

2011 ASCP Annual Meeting
Some Examples of What We Did with our “Gain Share”?

- Justified and hired a *Transfusion Safety Officer*
- **Eliminated** bedside leukocyte-reduction filtration of blood
- Provide 100% of platelets as leukocyte-reduced
- Implemented Verax bacteriological testing of all transfused platelets
Next Steps: A “To Do” Wish List for My Institution

- Improve preoperative patient blood management
- Optimize the use of cell salvage in the OR
- Enhancements to physician & nursing practice
  - Recognition and reporting of transfusion reactions
  - Reduce iatrogenic blood loss in critical care areas
- Improve Blood Usage in Cardiac Surgery
- Market and apply a “Bloodless Surgery” program
- Improve tracking & use of platelets
- Execute Point-of-Care initiatives
  - TEG and platelet function assays
  - Re-visit / pilot use of VAMP devices
- Put the *Electronic Crossmatch* into practice
- Capital renovations to the floor plan
- Programmatic enhancements to donor program
Develop Your Own “To Do” List

- Maintain Blood Management an institutional priority
- Identify changes that make the process of blood transfusion safer
  - Leadership
  - Resources
  - A belief in a solution
  - Measurement (assessment / auditing)
- Understand Blood Management in terms of evolving innovations
  - Translate ideas into your setting
  - Regularly assess progress using data
Develop Your Own “Don’t Do” List

- Avoid pre-deposit autologous blood donation
- Prophylactic plasma transfusion for minor procedures in non-bleeding patients (e.g., INR’s ≤ 1.9)
- Double transfusions when a single unit will do (re-assess your patient)
- Tolerate practice variability
- Order or waste more product than you need.
- Miss recognizing and reporting adverse events
Future of Blood Management

- Society for the Advancement of Blood Management (founded in 2001)
  - Blood Management should become THE standard of care
  - Blood transfusion should be viewed as an alternative
  - Creating sources of knowledge for all types of blood management strategies
  - Developing evidence-based guidelines – Best Practices - to limit exposure to allogeneic blood
“Knowledge exists in two forms – Lifeless, stored in books, and Alive in the consciousness of men”

Albert Einstein
Basics of Blood Management

Petra Seeber and Aryeh Shander
PERIOPERATIVE BLOOD MANAGEMENT
A Physician’s Handbook
1st Edition

2011 ASCP Annual Meeting
Selected Bibliography


Selected Bibliography


INTRODUCTION TO BLOOD MANAGEMENT

Carolyn Burns, M.D.
Medical Director, Transfusion Services
Strategic Healthcare Group LLC
Stewardship:
“The careful and responsible management of something entrusted to one’s care.”

“Patient’s should get all the care they need and none they don’t; safely, efficiently and at low cost.”
-Donald Berwick, MD
Centers for Medicare and Medicaid Services
Blood Transfusions More Than Double Since 1997
AHRQ News & Numbers, September 24, 2009

- The National Blood Collection and Utilization Survey reported a 34% increase in transfusions between 1997 and 2008\(^1\)
- The number of hospital stays for patients who received blood transfusions increased by 140 percent (from 1.1 million to nearly 2.7 million) between 1997 and 2007
- This represents the largest increase in procedures not involving pregnancy or childbirth over the 11-year period

\(^1\) Benjamin, Transfusion 2011;54:670-73
What is Blood Management?¹

- Blood management is an evidence based, multidisciplinary process that is designed to promote the **optimal** use of blood products throughout the hospital.

- The goal of blood management is ensure the safe and **efficient** use of the many resources involved in the complex process of blood component therapy.

¹ Boucher, Hannon, Pharmacotherapy 2007;27(10)
Is Blood Utilization Optimal?

Variation in transfusion practice - cardiac surgery

- Review of transfusion practices for primary CABG patients at 24 U.S. institutions
- Transfusion rates:
  - RBC 27% - 92%
  - Platelets 0% - 36%
  - FFP 0% - 36%
  - Cryo 0% - 17%
- Intra-hospital variation was also demonstrated among surgeons at the same hospital
- 12 fold difference in cardiac surgery RBC transfusion practices are noted from country to country
- Recent review of U.S. cardiac surgery practices shows that variation continues to increase

1 Stover, Anesthesiology 1998;88
2 Snyder-Ramos, Transfusion 2008;48
3 Bennett-Guerrero, JAMA 2010;304
Is Blood Utilization Optimal?

*Blood utilization trends- U.S. vs. international*

- Universal blood use trends are shifting from surgical to medical patients\(^1\)
  - Better surgical blood conservation
  - Aging medical and oncology population
- During the period 1999- 2004\(^1,2\):
  - Blood use in the US increased by 16%
  - Blood use in the UK declined by 8%
- Current per capita blood use in the U.S. is\(^3\):
  - 15% higher than in Europe
  - 44% higher than in Canada
- Do we really have older, sicker patients in the United States than in the rest of the world?

\(^1\) Wallis et al, Trans Med 2006;16
\(^2\) Yazer, Transfusion 2007;47
\(^3\) McPherson, Transfusion 2007;47S
\(^4\) Snyder-Ramos, Transfusion 2008;48
Is Blood Utilization Optimal?

*Inappropriate transfusion rates*

- Audit of routine transfusion orders at Brigham and Women’s Hospital, Boston\(^1\)
  - ER, OR, PACU and emergent transfusions were excluded; relatively liberal criteria used
- Percentage of inappropriate orders was **73%** for all medical staff and **72%** for junior house staff at baseline
  - Declined to 60% inappropriate orders with education and computerized decision support
- Chart audits at two New York City hospitals showed **62%** of transfusion orders were inappropriate and **49%** were judged to be inadequately documented\(^2\)

---

1. Rothschild et al, Transfusion 2007;47
2. Friedman et al, ArchPatholLabMed 2006;130
"Every system is perfectly designed to get the results it consistently achieves."

-Donald Berwick, MD
Root Causes of Transfusion Practice Variation

- Physician practice variation
  - Physicians make highly individualized trade-off decisions between the risks of anemia vs. risks and benefits of transfusion which are more aligned with the physician’s bias rather than the physiologic status of the patient\(^1,2\)
  - This decision is often based more upon custom and habit rather than formal training and current evidence based principles\(^3\)
  - Nurses also have similar gaps in knowledge and competency for transfusion administration

- Institutional practice variation
  - Presence or absence of education, oversight and monitoring of blood utilization and blood management best practices

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\(^1\) Corwin, Chest 1995;108
\(^2\) Corwin, CritCareMed 2004;32(1)
\(^3\) Dzik, Transfusion 2003;43
\(^4\) Stover, Anesthesiology 1998;88

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KEY ISSUES IN BLOOD MANAGEMENT
KEY ISSUES IN BLOOD MANAGEMENT

The “Transfusion Trigger” Controversy

Transfusion trigger: “a particular hemoglobin level of discomfort in the prescribing physician, not defined by clear physiologic parameters”

1 Spiess, Ann Thorac Surg 2002;74
Quality Issues: Failure to Adopt Evidence-based Transfusion Guidelines

“A restrictive strategy of red cell transfusions is at least as effective as and possibly superior to a liberal strategy in critically ill patients, with the possible exception of patients with acute myocardial infarction or unstable angina.”

Ranked as the #1 landmark study that has changed the practice of transfusion medicine but how many physicians are familiar with it?

1 Hébert et al- NEJM 1999;340(6)  
2 Blajchman- Transfusion 2005:45
WHY DON’T TRANSFUSIONS SEEM TO IMPROVE OUTCOMES IN ANEMIC PATIENTS?
Blood Product Issues: Storage Defects and Microvascular Perfusion

- Build-up of cytokines, free Hgb, K+, cellular debris (BRMs) \(^1,2\)
- Decreased 2,3- DP, ADP, ATP, NO
- Poor deformability leading to decreased oxygen exchange\(^3\)

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\(^1\) Kristiansson- ActaAnesthScand 1996;40
\(^2\) Fransen- Chest 1999;116
\(^3\) Hovav- Transfusion 1999; 39
Safety Issues: Adverse Effects of Allogeneic Transplantation

Infectious Complications
- Viral, bacterial contamination of platelets* (1:3000), other (nvCJD, West Nile, Chagas)

Febrile and allergic reactions
Hemolytic transfusion reactions* (clerical error)
- Mistransfusion incidence 1:16,000

Other
- TA- Microchimerism (50% of trauma pts @ discharge/30% @ 1 year), TA- graft vs. host disease
- SIRS, TRIO, TRAGI, TACO(1:350), TRALI*
- Transfusion related immunomodulation (TRIM)

1 Goodnough- CritCare Med 2003;31(12S)
2 Utter- Transfusion 2006;46
3 Rana- Transfusion 2006;46
KEY ISSUES IN BLOOD MANAGEMENT

Safety Issues: Transfusion and Adverse Outcomes

Intraoperative Blood Transfusion and NSQIP Surgical Outcomes in 941,496 Patients

1 Bernard et al, JAmCollSurg 2009;208
2 Ferraris et al, ATS 2011
3 Napolitano et al, CritCareMed 2009;37(12)

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“Intraoperative transfusion of PRBCs increases risk for mortality and several morbidities in general surgery patients. These risks, substantial for even 1U, remain after adjustment for transfusion propensity and numerous risk factors available in the ACS National Surgical Quality Improvement Program. Transfusion for mildly hypovolemic or anemic patients should be discouraged in light of these risks.”

1 Bernard et al, JAmCollSurg 2009;208
Risk Management Issues: Patient Safety, Regulatory Compliance and Medical-Legal Liability

- TJC National Patient Safety Goal #1 is to eliminate medication and transfusion errors
- TJC, state, federal (CMS), AABB, CAP regulations cover blood utilization
  - Informed consent process and documentation
  - Physician transfusion appropriateness and documentation
  - Nursing compliance and documentation of transfusion administration
  - Hospital blood utilization oversight systems and effectiveness

Proposed Performance Measures

Transfusion Consent
RBC Transfusion Indication
Plasma Transfusion Indication
Platelet/ Prophylactic Transfusion Indication
Blood Administration Documentation
Preoperative Anemia Screening
Preoperative Blood Type Screening
KEY ISSUES IN BLOOD MANAGEMENT

Blood Costs

Transfusion Costs

$ 220

Labor

$ 660

Overhead

$ 1220

Adverse Effects

$ 2100*

*2010$ costs


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### Economic Issues: Transfusion-Related Costs

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Facilities</th>
<th>Study Technique</th>
<th>Acquisition Cost %</th>
<th>Patient Sample</th>
<th>Cost/ Unit (2010$)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forbes, 1991</td>
<td>19 Teaching Hospitals with Level I or II Trauma</td>
<td>Survey of blood related charges</td>
<td>37%</td>
<td>Mixed Population</td>
<td>$506</td>
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<tr>
<td>Mohandas, 1995</td>
<td>Outpatient Cancer Center</td>
<td>Review of blood related charges for 219 patients</td>
<td>26%</td>
<td>Solid Tumors</td>
<td>$827</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Hematologic Tumors</td>
<td>$892</td>
</tr>
<tr>
<td>Cantor, 1998</td>
<td>Outpatient Cancer Center</td>
<td>Survey of blood related cost activities</td>
<td>15%</td>
<td>Solid Tumors</td>
<td>$641</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hematologic Tumors</td>
<td>$657</td>
</tr>
<tr>
<td>Crémieux, 2000</td>
<td>Outpatient Cancer Center</td>
<td>Cost activities recorded for 517 patients</td>
<td>19%</td>
<td>Solid Tumors</td>
<td>$850</td>
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<td></td>
<td></td>
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<td></td>
<td>Hematologic Tumors</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complex Patients</td>
<td>$944</td>
</tr>
</tbody>
</table>

*2010 Medical Services CPI, base acquisition cost $220

---

Economic Issues: Adverse Event Costs

Shapiro et al, J Trauma 2003;55
BLOOD UTILIZATION & BLOOD MANAGEMENT FOR THE 21ST CENTURY
FROM BLOOD SAFETY TO TRANSFUSION SAFETY

Shifting the Focus From Blood Center to Hospital: A Vein-to-Vein Transfusion Safety Chain

“Unsafe at Any Speed: Dangerous Focal Points in the Transfusion Process”

Safe transfusion therapy depends upon an interconnected series of processes that begin with the donor and ends with the patient.¹

¹ Dzik, Transfusion 2003;43
Blood management is a multidisciplinary, multimodality patient safety initiative designed to improve blood utilization & to reduce preventable errors.

*The Joint Commission Patient Blood Management Measure

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Questions?
Carolyn Burns, M.D.
CBurnsMD@BloodManagement.com
Opportunities for Improved Blood Management

Jennifer Rhamy MBA, MA, MT(ASCP)SBB, HP Executive Director, Laboratory Accreditation Program, The Joint Commission
Disclosures

None
Objectives

1. Outline the 7 Patient Blood Management Performance Measures and their current status
2. Name the most common transfusion-related survey findings for hospitals
3. Name the most common transfusion-related survey findings for labs
4. Identify where the laboratory and hospital opportunities align
Our mission

The Joint Commission mission:
To continuously improve health care for the public, in collaboration with other stakeholders, by evaluating health care organizations and inspiring them to excel in providing safe and effective care of the highest quality and value.
Vision Statement:

All people always experience the safest, highest quality, best-value health care across all settings.
Being an Effective Evaluator: What Does this Really Mean?

- Process is thorough, fair and objective
- Process identifies most critical safety and quality issues
- Process focuses on what is important (vs. everything)
- Process is inclusive of mandatory (regulatory) and collaborative (inspirational) modes
- Process is continuous, not event-driven
- Process is guided by surveyor experience and expertise, informed by data
The Joint Commission Lab Survey Philosophy

- Focus on an educational and evaluative process
- All surveyors are employees with clinical/laboratory management experience
  - Anatomical pathologist surveyors available upon request in addition
- Standards are written to review outcomes rather than multiple specific tasks unless required by regulation or best practice guidelines
The Joint Commission Enterprise

The Joint Commission
- Accreditation and Certification
  - Survey and Intracycle monitoring
  - Quality Measurement and Health Care Research
  - Standards and Performance Measures

Center for Transforming Healthcare
- Peer-developed solutions based on DMAIC/Lean principles
- Solutions available on web site

Joint Commission Resources
- Consulting
- International Accreditation
- Publications
Accreditation Programs

- Hospital
- Home Care
- Behavioral Health
- Laboratory
- Ambulatory
- Long Term Care
- Critical Access Hospitals
- Certification

Note: For today’s discussion, the clinical survey process will be generalized to the hospital survey, but many other programs have analogous standards for blood transfusion
Three Survey Evaluation Tools

Hospital Tracer
- Performed by hospital survey team
- Every three years

Laboratory Tracer
- Dedicated laboratory survey team
- Every two years
- Links the laboratory to patient care delivery

National Patient Safety Goals (NPSG)
- Address specific patient safety concerns
- Many eventually become part of standards
- Bring attention to specific issues
- Broad across programs
Tracer Survey Process

The cornerstone of The Joint Commission survey, tracer methodology uses actual patients as the framework for assessing standards compliance.

- Individual tracers follow the experience of care for individuals through the entire health care process in the organization.
- System tracers evaluate the integration of related processes
  - Coordination and communication among disciplines and departments
  - In-depth discussion and education regarding the use of data in performance improvement
  - Incorporate pre-analytic, analytic and post-analytic into a systemic review
Tracer Methodology

- **Laboratory Tracer**
  - Select four dates covering the two year period since last assessment
  - At least one patient with a transfusion will be selected for Tracer

- Tracers follow the patient documentation from the doctor’s order into the lab and back out to the patient chart

- Assesses the entire patient care continuum, not just individual tasks

- Directed towards systems and outcomes
Reviewed in a Lab Tracer

- Doctor’s order
- Pre-analytic process
- Analytic Process
- Post-analytic process in lab
- Report on patient’s chart (not just LIS)
  - Critical value notification
  - Results of transfusion reaction work-up with lab director’s interpretation
- Personnel records and competency
- Quality system documents
  - Validations, correlations, maintenance, quality control, proficiency testing
Hospital Tracer

- Hospital surveys are every three years while lab surveys are every two years, so most likely occur at different times.
- Target the Priority Focus Areas plus Conditions of Participation (blood administration process is a CoP)
- Will always include one patient receiving a transfusion
- Will follow the trail from the chart into the laboratory and back to the patient’s chart
- Includes PI activities
- Will include blood administration lab records as well as specimen collection activities (NPSG 01.01.01)
National Patient Safety Goals

Apply to blood transfusion:
- NPSG 01.01.01
- Use at least two patient identifiers when providing care, treatment and services.
- NPSG 01.03.01.
  Eliminate transfusion errors related to patient misidentification.
- UP 01.01.01
  Conduct a pre-procedure verification process
NPSG 01.01.01 Use at least two patient identifiers when providing care, treatment and services.

EP 1. Use at least two patient identifiers when administering medications, blood, or blood components; when collecting blood samples and other specimens for clinical testing; and when providing treatments or procedures. The patient's room number or physical location is not used as an identifier.

EP 2. Label containers used for blood and other specimens in the presence of the patient.
NPSG 01.03.01 Eliminate transfusion errors related to patient misidentification.

EP 1. Before initiating a blood or blood component transfusion:
- Match the blood or blood component to the order.
- Match the patient to the blood or blood component.
- Use a two-person verification process or a one-person verification process accompanied by automated identification technology, such as bar coding.
- (See also NPSG.01.01.01, EPs 1 and 2)

EP2. When using a two-person verification process, one individual conducting the identification verification is the qualified transfusionist who will administer the blood or blood component to the patient.

EP3. When using a two-person verification process, the second individual conducting the identification verification is qualified to participate in the process, as determined by the hospital.
UP 01.01.01 Conduct a pre-procedure verification process

Identify the items that must be available for the procedure and use a standardized list to verify their availability. At a minimum, these items include the following:

- Relevant documentation (for example, history and physical, signed procedure consent form, nursing assessment, and pre-anesthesia assessment)
- Labeled diagnostic and radiology test results (for example, radiology images and scans, or pathology and biopsy reports) that are properly displayed
- Any required blood products, implants, devices, and/or special equipment for the procedure
Hospital standards related to blood administration

- EC.02.05.03 Emergency power for blood storage systems
- HR.01.02.01 Special training provided for transfusion administration
- MS.05.01.01 Medical staff involved in PI activities for blood & blood use
- PC.02.01.01 Transfusions administered per law & medical staff policy
- PC.03.01.01 Transfusion administration equipment is available for operative and other high-risk procedures
- PI.01.01.01 Organization collects data on blood and blood use, and all reported and confirmed transfusion reactions
- RI.01.03.01 Informed consent process
- NPSG.01.01.01 Two identifiers used to ID patient for transfusion
- NPSG.01.03.01 Two persons verify patient ID and product for transfusion
- UP.01.01.01 Standardized pre-op verification list, including blood product availability (and other laboratory reports)
Informed consent obtained according to P/P and, except in emergencies, before surgery. Informed consent process includes a discussion about reasonable alternatives including risks, benefits, and side effects.

<table>
<thead>
<tr>
<th>Element</th>
<th>Code</th>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI.01.03.01</td>
<td>9,11</td>
<td></td>
<td>The hospital's written policy describes how informed consent is documented.</td>
</tr>
<tr>
<td>RI.01.03.01</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR.01.02.01</td>
<td>1</td>
<td></td>
<td>The hospital defines staff qualifications specific to their job responsibilities.</td>
</tr>
<tr>
<td>NPSG.01.01.01</td>
<td>1</td>
<td>Use at least two patient identifiers when administering blood or collecting samples for testing.</td>
<td></td>
</tr>
<tr>
<td>NPSG.01.01.01</td>
<td>2</td>
<td></td>
<td>Label containers for blood and other specimens in presence of patient.</td>
</tr>
<tr>
<td>PC.02.01.01</td>
<td>15</td>
<td></td>
<td>Blood transfusions are administered according to law and regulation and approved medical staff P/P.</td>
</tr>
<tr>
<td>NPSG.01.03.01</td>
<td>1</td>
<td>Blood administration process</td>
<td></td>
</tr>
<tr>
<td>UP.01.01.01</td>
<td>2</td>
<td></td>
<td>Standardized pre-op verification list, including blood product availability (and other laboratory reports)</td>
</tr>
<tr>
<td>EC.02.05.03</td>
<td>5</td>
<td></td>
<td>Emergency power provided for blood and tissue storage systems</td>
</tr>
<tr>
<td>RI.01.03.01</td>
<td>5</td>
<td></td>
<td>The hospital's written policy describes how informed consent is documented.</td>
</tr>
<tr>
<td>PI.01.01.01</td>
<td>7</td>
<td></td>
<td>The hospital collects data on the following the use of blood and blood components. No RFIs for this element or on medical staff involvement in review</td>
</tr>
<tr>
<td>QSA.05.13.01</td>
<td>7</td>
<td>The organization follows its policies and procedures that guide the monitoring of the patient and the reporting of suspected transfusion-related adverse events during blood and blood component administration.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.15.01</td>
<td>2</td>
<td>The interpretation of the transfusion reaction workup provided by the transfusion service director is documented in the patient’s clinical record.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.01.01</td>
<td>4</td>
<td>The blood transfusion service director or an individual qualified as a technical supervisor in immunohematology conducts an annual review of the policies and procedures of the blood transfusion service. The annual review is documented.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.01.01</td>
<td>1</td>
<td>The laboratory has written policies and procedures for the blood transfusion service that are consistent with AABB standards.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.08.01</td>
<td>3</td>
<td>The laboratory follows its policies and procedures for transfusion-related activities.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.22.01</td>
<td>2</td>
<td>The laboratory confirms the reactivity of reagents.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.01.01</td>
<td>5</td>
<td>The policies and procedures for the blood transfusion service are available to staff involved in transfusion services.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.13.01</td>
<td>2</td>
<td>Policies and procedures for monitoring of patient and reporting of suspected transfusion-related adverse events during blood and blood component administration address monitoring of patients during blood and blood component administration, criteria for recognizing a suspected transfusion-related adverse event, protocol to follow if a suspected transfusion-related adverse event occurs, suspected transfusion-related adverse events reported immediately to the physician responsible for the patient and requirement that suspected transfusion-related adverse events are reported immediately to the laboratory, whether or not the physician responsible for the patient deems it necessary to report the event.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.26.01</td>
<td>1</td>
<td>The laboratory retains an audit trail detailing the receipt and disposition of all blood and blood components for 10 years.</td>
<td></td>
</tr>
<tr>
<td>QSA.05.16.01</td>
<td>4</td>
<td>The laboratory has procedures on temperature ranges for blood and blood components</td>
<td></td>
</tr>
</tbody>
</table>
Where Are the Biggest Opportunities for both Clinical and Lab Staff?

- Informed consent
- Blood administration procedures
- Document control
- Adverse event management
- Storage temp monitoring
How do the hospital and laboratory standards synergize?

1. Lab frequently cited for a non-compliant activity at the bedside. Need shared accountability recognition from the organization.
2. Blood utilization/ transfusion committee meetings with shared PI agenda
3. Collaborative laboratory training of clinical staff on blood administration
4. Laboratory/ medical staff joint review of facility policies for compliance
5. Audit of transfusions by lab staff to monitor process drift
6. Robust process for adverse event management, including education
Enterprise Collaboration

- Floor reporting of adverse reactions
- Development of quality metrics
- Development of blood management program including quality indicators
  - Utilization review
  - Utilization criteria
  - Transfusion documentation
  - Laboratory data pre and post-transfusion
  - Pre-operative testing
Comment on a Standard

The Joint Commission web site now includes a new online form to allow interested parties to comment on the standards. Please visit www.jointcommission.org and select the menu option shown below.
Blood administration compliance with accreditation transcends just laboratory or bedside regulatory spheres.

Performance improvement efforts must include both the laboratory and the patient care teams.

It’s more than who gets cited, it’s about the patient getting the right care as a joint effort.

Accreditation processes can help to bridge the inter-departmental lines of communication.
Performance Measures Project Timeline 2007 - 2011

Feb. 2007 Stakeholder Meeting
April 2008 TAP Meeting
Dec. 2008 TAP CC
Dec. 2008 TAP CC
Dec. 2009 TAP CC
Feb. 2010 Web-ex Training
Nov. 2010 TAP Meeting

Jan. 2008 Call for Technical Advisory Panel (TAP) Members & Measures
July – Aug. 2008 Public Comments
Sept. 2009 Alpha Testing
Dec. 2009 Recruit Hospitals for Pilot Testing
Feb. – Aug. 2010 Pilot Test
Dec. 2010 Submitted to NQF

June 2011 Measures Posted to Measure Reserve Library
Measure Development

- Over 68 candidate measures considered by technical advisory panel (TAP)
- 19 measures selected for public comment
- 10 measures underwent alpha testing
- 7 measures selected for pilot testing
Patient Blood Management Measures

- PBM-01 Transfusion Consent
- PBM-02 RBC Transfusion Indication
- PBM-03 Plasma Transfusion Indication
- PBM-04 Platelet Transfusion Indication
- PBM-05 Blood Administration Documentation
- PBM-06 Preoperative Anemia Screening
- PBM-07 Preoperative Blood Type Screening and Antibody Testing
Transfusion Consent Feedback

- Hospitals support this measure because information about transfusion is not consistently given to patients.
- Information is provided by a variety of staff.
- Staff need education about the risks, benefits and alternatives.
- Informed consent for blood transfusions is not required by all states.
- The consent process varies between hospitals.

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Transfusion Measures Feedback

- Hospitals have different acceptable pre-transfusion lab values
- Difficult to identify transfusions during surgery
- Point of care testing is not used in all ORs
- Difficult to determine if documentation of clinical indication was sufficient
- No standardized definition used for “bleeding
- Lack of national guidelines
RBC Pilot Test Feedback

- Many orders are written to “transfuse 2 units”
- Should focus on oncology patients due to high blood utilization
- Need to exclude some patients like trauma
Plasma Pilot Test Feedback

- The reasons for giving plasma are unclear and conflicting at times
- An INR > 2 and “bleeding” should be the only clinical indication
Platelet Pilot Test Feedback

- Hospitals are unclear about:
  - Whether platelets are indicated when patients on plavix
  - The definition of ‘thrombocytopenia’
- There is concern that establishing a critical value would trigger increased platelet use
Administration Feedback

- Some data elements are difficult to collect when blood products are transfused during surgery.
- The data element criteria are standards of care and already being collected.
- “Transfusion orders” are usually not required or documented during surgery.
- The “order to transfuse” is sometimes confused with the order to type and cross match.
Anemia Screening Feedback

- Information is not done or not available
- One of the barriers is determining who will manage care prior to surgery
- Information about when the patient was scheduled for surgery was scarce
- Most LIS do not manage outside lab results for either technical or regulatory reasons so hard to retrieve
Anemia Screening Issues

- Should anemic patients have surgery if not emergent?
- Consider adding another measure to evaluate if anemia screening was effective.
- It is difficult to determine if the lab result was ordered for an office visit or pre-operative testing.
- Cardiac patients were removed from the population because most patients have surgery within 14 days.
Blood Availability Testing Feedback

- This is a patient safety issue
- Hospitals should document whether blood is available on pre-procedure checklist
- Some hospitals would like to see this measure be required and completed sooner than anesthesia start time
- Type and screening NOT completed prior to surgery happens frequently
Type & Screen Testing Issues

- There is very little data on how often testing is not completed before surgery starts.
- There is no requirement that surgery cannot begin until the pre-procedure list is complete.
- If this measure was collected, outcome related data could be correlated.
- The intent is not to promote more testing & would only apply if T&S/T&C is ordered.
Lessons learned

- These are general measures that collect data on all patients that can be further analyzed by diagnoses and/or procedure code, age group or appropriateness as studies become available.

- There is a lack of literature regarding “gaps in care” that these measures address.

- The lack of national guidelines for blood – impacts the ability to standardize clinical indications and measure patient outcomes versus processes.
Lessons learned…

- The manual abstraction burden for these measures is labor-intensive and captures only a percentage of the transfusions.
- Complete data on all transfusions could be collected by eMeasures with minimal effort and provide comprehensive data on product usage and benchmarking.
Final Lessons Learned…

- Use of these measures could be used in conjunction with the hemovigilance measures on transfusion related events.
- If the rate of blood transfusions in hospitals is unknown, how will outcomes be monitored?
  - All the variability shows "there is both excessive and inappropriate use of blood transfusions in the U.S.," advisers to Health and Human Services Secretary Kathleen Sebelius concluded earlier this month. "Improvements in rational use of blood have lagged."
Next Steps

- Encourage use of the PBM measures at the local level
  - www.jointcommission.org/library_of_other_measures/
- Funding pending for retooling the specifications for retrieval in electronic medical record
- HHS is organizing further data collection efforts
Conclusion

Safe, appropriate transfusions is a Joint Commission priority, supported by the Blood Performance Management Metrics and the accreditation programs for hospital and laboratory.

Perfect opportunity for lab and clinical staff to collaborate

System reviews are needed to solve problems
Questions?

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Web site:
  www.jointcommission.org/accreditation/laboratory.aspx

Standards Questions
  www.jointcommission.org/standards_information/standards_online_question_form.aspx

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