Driving Success in Blood Utilization: Unlock the Power of Data

Jo Ann Hegarty, Director Blood Bank
MedAssets Advisory Solutions
What is Blood Management?

- An evidence based, multi-disciplinary process designed to:
  - Promote optimal use of blood products
  - Ensure the safe and efficient use of all the resources involved in blood component therapy
Why a Blood Management Program?

• Economic
  – Supports business environment of health care reform policies, current and projected healthcare economics, and stewardship of scarce resources

• Clinical
  – Addresses risk/safety of transfusion practices
    • Iron overload
    • Infectious diseases
    • Immunosuppression
    • Questionable clinical outcomes, e.g. TRALI, TACO, TX reactions
    • Increased LOS

• Regulatory/Standards
  – TJC requirements
  – CAP, AABB, SABM guidelines
Blood Management: A Collaborative Effort

- Physician Practice
  - Anemia reduction strategies and programs
  - Pre-intra-post operative strategies
  - Targeted use of blood and blood products
  - Blood conservation programs

- Nursing Care
  - Product issue and administration
  - Nursing management and oversight

- Laboratory Processes
  - Blood product ordering practices
  - Inventory management
  - Patient testing and donor testing

- Quality Programs
  - Transfusion committee utilization and review processes
  - Quality program and metrics tracking
Blood Management is a Critical Need

Blood Costs

Transfusion Costs

Labor

Overhead

Adverse Effects

$220

$660

$1220

$2100*

*2010$ costs

A Reminder: True Cost of Blood

- **RBC-unit costs fully loaded between $522 and $1183**

- **Direct / Indirect**
  - Laboratory processing
  - Nursing blood administration
  - Hospital cost/day (LOS)

- **Adverse reaction**
  - Treatment
  - Lost reimbursement
  - Legal expenses

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**Activity-based costs of blood transfusions in surgical patients at four hospitals**

Aryeh Shander, Axel Hoffmann, Sherri Ozon, Oliver M. Thewsberger, Hans Gonszcz, and Donat R. Spaha from the Society for the Advancement of Blood Management (SABM) and the Medical Society for Blood Management (MSBM)

**BACKGROUND:** Blood utilization has long been suspected to consume more health care resources than previously reported. Incomplete accounting for blood costs has the potential to misrepresent programmatic decision making by health care systems. Determining the cost of supplying patients with blood transfusions requires an in-depth examination of the complex array of activities surrounding the decision to transfuse.

**STUDY DESIGN AND METHODS:** To accurately determine the cost of blood in a surgical population from a health system perspective, an activity-based costing (ABC) model was constructed. Tasks and resource consumption (labor, third-party services, capital) related to blood administration were identified prospectively at two US and two European hospitals. Process frequency (i.e., usage) data were captured retrospectively from each hospital and used to populate the ABC model.

**RESULTS:** All major process steps, staff, and consumers to provide red blood cell (RBC) transfusions to surgical patients, including usage frequencies, and direct and indirect overhead costs contributed to the ABC-costs between $522 and $1183 (mean, $761 ± $294). These exceed previously reported estimates and were 2.5- to 4.6-fold higher than blood product acquisition costs. Annual expenditures on blood and transfusion-related activities, limited to surgical patients, ranged from $1.02 to $9.00 million per hospital and were largely related to the transfusion rate.

**CONCLUSION:** Applicable to various hospital practices, the ABC model confirms that blood costs have been underestimated and that they are geographically variable and identifies opportunities for cost containment. Studies to determine whether more stringent control of blood utilization improves health care utilization and quality, and further reduces costs, are warranted.

**The Cost of Blood Consensus Conference (CORCON) editorial board was convened in 2003 to outline a comprehensive, standardized, and generalizable method to estimate the cost of blood that would be useful for payers.**

**ABBREVIATIONS:** ABC = activity-based costing; ASC = General Hospital; CCM = Centre Hospitalier Universitaire Vaudois; CORCON = Cost of Blood Consensus Conference; EHM = Englewood Hospital Medical Center; SBH = Rhode Island Hospital.

From The Institute for Patient Blood Management and Bloodless Medicine at Englewood Hospital and Medical Center, Englewood, New Jersey; the Medical Society for Blood Management, Laxenberg, Austria; the Department of Anesthesiology, University Hospital Lausanne, Lausanne, Switzerland; the Institute of Anesthesiology, University Hospital Zurich, Zurich, Switzerland; and the Department of Anesthesiology and Intensive Care, General Hospital, Ljubljana, Slovenia.

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Funding for support this research, including ABC software development and manuscript preparation, was provided by the Society for the Advancement of Blood Management (SABM), made possible by a grant from Centocor Ortho Biotech Services, LLC, Janssen-Cilag NC and Janssen-Cilag GmbH. All contributors: Png and O.C.

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Hospitals seeking solutions to drive safety and efficiency.

Current thinking is that blood may not be as safe as previously believed.
Blood Management Program Elements

- **Post Operative Strategies**
  - Iron Therapy
  - Erythropoietin
  - Tolerate Low Hemoglobin

- **Transfusion Thresholds and guidelines**
  - RBC, Platelets, Plasma
  - Indications for Use

- **Intra-operative Strategies**
  - Blood Recovery
  - POC testing
  - Surgical Techniques
  - Hemostatics

- **Non-Surgical and Pre-operative Strategies**
  - Anemia Screening
  - Optimize Coagulation
  - Discontinue Drug Therapy

- **Transfusion Committee for Peer Review**

- **Patient Blood Management**

- **Audit, Metrics and Feedback**
Blood Management

• **Analyze** laboratory data, C/T Ratios, transfusion data by procedure

• **Identify** opportunities in cost, process, utilization, variation between physicians

• **Develop** teams to address opportunities to improve quality and reduce cost

• **Implement** changes in process and/or practice in target populations

• **Monitor** with metrics; provide feedback to stakeholders
The Approach

- Focus on guidelines for service lines
- Use the evidence, education, and engagement to drive change
- Develop metrics and monitoring for feedback

Annals of Internal Medicine

Red Blood Cell Transfusion: A Clinical Practice Guideline From the AABB

Jeffrey L. Carson, MD; Brenda J. Grossman, MD, MPH; Steven Kleinman, MD; Alan T. Tinmouth, MD; Marisa B. Marques, MD; Mark K. Fung, MD, PhD; John B. Holcomb, MD; Orieji Illoh, MD; Lewis J. Kaplan, MD; Louis M. Katz, MD; Sunil V. Rao, MD; John D. Roback, MD, PhD; Aryeh Shander, MD; Aaron A.R. Tobian, MD, PhD; Robert Weinstein, MD; Lisa Grace Swinton McLaughlin, MD; and Benjamin Djulbegovic, MD, PhD. for the Clinical Transfusion Medicine Committee of the AABB

BACKGROUND: Blood utilization has long been expected to consume more health care resources than previously reported. Incomplete accounting for blood costs has the potential to misdirect programmatic trans- fusion making by health care systems. Determining the cost of supplying patients with blood transfusions requires the evaluation of the costs of all activities surrounding the decision to transfuse.

STUDY DESIGN AND METHODS: To accurately determine the cost of blood in a surgical population from a health system perspective, an activity-based costing (ABC) model was constructed. Tasks and resource consumption (materials, labor, third-party services, capital) related to blood administration were identified prospectively at two US and two European health centers. Process frequency (i.e., usage) data were captured retrospectively from each hospital and used to populate the ABC model.

RESULTS: All major processes steps, staff, and consumables to provide red blood cell (RBC) transfusions to surgical patients, including usage frequencies and direct and indirect overhead costs contributed to per-RBC-unit costs between $522 and $1183 (mean, $761 ± 294). These exceed previously reported estimates, and were 2.3- to 4.8-fold higher than blood

Recommendation 2: The AABB suggests adhering to a restrictive transfusion strategy in hospitalized patients with preexisting cardiovascular disease and considering transfusion for patients with symptoms only and a hemoglobin level of 8 g/dL or less (Grade: weak recommendation, moderate-quality evidence).

Recommendation 3: The AABB cannot recommend for or against a liberal or restrictive transfusion threshold for host...
The Process

• Establish “best-practices” evidence-based transfusion guidelines

• Enhance existing transfusion committee efforts with education

• Establish multi-disciplinary modalities and methods that promote the optimal use of blood products

• Create current utilization and outcome metrics to provide feedback for performance improvement
DATA
Data? What Data?

- Where do I get data?
  Laboratory
- C/T ratio by service line by physician
- Monthly usage data by product by cost
- Wastage data by product by cost
- Emergency release
- Hemoglobin, Platelet count, INR for transfused product
Data? What Data?

Blood Utilization Data

• Where are the products used? Transfused?
• What and how much does each service line use?
• What and how much does each physician use?
• How do we do peer review?
• Is there a scorecard?
• Is it a priority?
• Who can help?
Evaluating the Impact of Peer Review

Outcome measures preferred over process measures

Measures the result of a goal - directed activity, function or process (processes you implemented to change transfusion practice)

Collect data to provide clinicians with meaningful feedback

Examples:

- Average pre-transfusion hemoglobin overall and by provider
- Average number of units transfused per patient by DRG
- Percentage of inpatients transfused
- Number of transfusions with post-transfusion hemoglobin above 10 g/dl
A Reminder for Engaging Physicians

• Collect data to provide clinicians with meaningful feedback
  – Utilization
  – Characterize Context (Indication, H&H, INR, base deficit, Temp, BP, etc.)
  – Facilitate identifying practice pattern variation

• Facilitate evidence-based practice and development of clinical guidelines

• Establish/revitalize transfusion utilization committee
  – Peer based accountability
  – Medical staff’s responsibility

• Laboratory operational performance matters
  – Turn around times for results
  – Timeliness of blood availability
Reporting the Data

Types of reports

- Service specific reports
- Provider specific reports
  - Provider “report cards”
- Diagnosis / procedure specific reports
  - Can report by provider
- Global reports and trending data
  - Program “report cards”
## Transfusion “Report Cards”
### Exception Reporting

<table>
<thead>
<tr>
<th>Percent Transfusion HGB</th>
<th>Pretransfusion HGB Average</th>
<th>PreTransfusion HCT Average</th>
<th>Posttransfusion HGB Average</th>
<th>Posttransfusion HCT Average</th>
<th>Average # of Units Transfused</th>
<th>Total Units Transfused</th>
<th># of Transfusion Episodes</th>
<th># of Single Unit Transfusions</th>
<th>Percent Single Unit Transfusion</th>
<th>Percent SUT w/ 2nd Unit w/ 124 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.7</td>
<td>21.9</td>
<td>7.6</td>
<td>24.0</td>
<td>1.0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7.1</td>
<td>22.9</td>
<td>8.4</td>
<td>26.7</td>
<td>1.0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.7</td>
<td>20.7</td>
<td>8.3</td>
<td>24.1</td>
<td>1.0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.0%</td>
<td>6.8</td>
<td>21.8</td>
<td>8.1</td>
<td>24.9</td>
<td>1.0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>100.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

**Pre-transfusion Hgb**

| KM48811 | | 11.2 | 33.0 |
| KT54571 | |      |      |
| HLJ05911 | |      |      |
| KH64383 | | 7.0  | 21.3 |
Distribution of Pretransfusion Hematocrits

2006
- Mean 24.3
- St Dev 4.28

2011
- Mean 20.9
- St Dev 3.24
Percent of Transfusions @ > 24% HCT
Total Blood Volume by Top 10 MS DRG

<table>
<thead>
<tr>
<th>DRG Codes</th>
<th>Total Blood Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-DRG 3 ECMO of Trach w MV 96+ hrs or PDX</td>
<td>2500</td>
</tr>
<tr>
<td>MS-DRG 216, 217, 218, 219, 220, 221 Cardiac</td>
<td>1500</td>
</tr>
<tr>
<td>MS-DRG 5, 6 Liver Transplant</td>
<td>1000</td>
</tr>
<tr>
<td>MS-DRG 377, 378, 379 G.I. Hemorrhage</td>
<td>750</td>
</tr>
<tr>
<td>MS-DRG 853, 854, 855 Infectious &amp; Parasitic</td>
<td>500</td>
</tr>
<tr>
<td>MS-DRG 515 Other Musculoskeletal Sys &amp; Conn</td>
<td>250</td>
</tr>
<tr>
<td>MS-DRG 239, 234, 235, 236 Coronary Bypass</td>
<td>200</td>
</tr>
<tr>
<td>MS-DRG 441, 442, 443 Disorders of Liver Except</td>
<td>100</td>
</tr>
</tbody>
</table>
## Total Hip Volume
- Annual case volume: 820
- Annual case volume that used blood: 163
- % cases with Blood: 20%

<table>
<thead>
<tr>
<th>Facilities</th>
<th>Total Volume</th>
<th>Volume - Case without blood</th>
<th>Volume - Case with blood</th>
<th>% cases with blood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital A</td>
<td>109</td>
<td>92</td>
<td>17</td>
<td>16%</td>
</tr>
<tr>
<td>Hospital B</td>
<td>24</td>
<td>22</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Medical Center C</td>
<td>100</td>
<td>69</td>
<td>31</td>
<td>31%</td>
</tr>
<tr>
<td>Hospital D</td>
<td>22</td>
<td>17</td>
<td>5</td>
<td>23%</td>
</tr>
<tr>
<td>Medical Center E</td>
<td>76</td>
<td>66</td>
<td>10</td>
<td>13%</td>
</tr>
<tr>
<td>Medical Center F</td>
<td>57</td>
<td>37</td>
<td>20</td>
<td>35%</td>
</tr>
<tr>
<td>Hospital G</td>
<td>120</td>
<td>106</td>
<td>14</td>
<td>12%</td>
</tr>
<tr>
<td>Medical Center H</td>
<td>248</td>
<td>200</td>
<td>48</td>
<td>19%</td>
</tr>
<tr>
<td>Hospital Y</td>
<td>64</td>
<td>48</td>
<td>16</td>
<td>25%</td>
</tr>
<tr>
<td><strong>TPC</strong></td>
<td><strong>820</strong></td>
<td><strong>657</strong></td>
<td><strong>163</strong></td>
<td><strong>20%</strong></td>
</tr>
</tbody>
</table>
Total Hip by Physician Hospital D

![Graph showing ALOS Cases without Blood, ALOS Cases with Blood, and % Cases using blood over time.](graph.png)
### Physician Variation

#### St Elsewhere

Severity scores are in the 3.5-3.7 range for all surgeons (1 as low, 4 as high)

**MSDRG 219 Cardiac Valve & CV Proc wo Cath w MCC**

Blood Products: Charge Detail by MD

<table>
<thead>
<tr>
<th>2012</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Revenue Code Group</th>
<th>Charge Code</th>
<th>Unit Variable Cost</th>
<th>Avg All Cases</th>
<th>Bunson, W</th>
<th>Drake, D</th>
<th>Gregg, T</th>
<th>Kester, J</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Volume</td>
<td>Avg Units per Patient</td>
<td>Avg Variable Cost per Patient</td>
<td>Volume</td>
<td>Avg Units per Patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Avg Variable Cost per Patient</td>
<td>Avg Variable Cost per Patient</td>
<td></td>
<td>Avg Variable Cost per Patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>180</td>
<td>7.59</td>
<td>1,728.00</td>
<td>36</td>
<td>10.83</td>
</tr>
<tr>
<td>Blood Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>702580831</td>
<td>RBC LEUKO REDU (A1) PROCESS</td>
<td>$231.00</td>
<td>3.58</td>
<td>$827</td>
<td>4.22</td>
<td>$975</td>
<td>3.62</td>
</tr>
<tr>
<td>702594193</td>
<td>PLATELET PHERESIS LR PROCESS</td>
<td>$520.00</td>
<td>1.03</td>
<td>$545</td>
<td>1.64</td>
<td>$868</td>
<td>0.62</td>
</tr>
<tr>
<td>717398713</td>
<td>CRYO POOLED (S) PROCESS</td>
<td>$116.00</td>
<td>0.79</td>
<td>$251</td>
<td>1.33</td>
<td>$422</td>
<td>0.15</td>
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<tr>
<td>702591153</td>
<td>FFP PROCESS</td>
<td>$46.00</td>
<td>2.18</td>
<td>$105</td>
<td>3.64</td>
<td>$174</td>
<td>1.62</td>
</tr>
</tbody>
</table>

Average LOS 12.7 12.7 15.5 13.7 11
Average Age 66 62 58 65 69
Make or Buy?

Make
• What is your current system?
• What resources will you need?
• Is there anything available?
• How much will this effort cost in time and resources?

Buy
• How will the vendor get the data?
• How long does it take?
• What is the cost?
• Is this easy to use?
• What is the ROI?
Blood Management Solutions

Improving Hospital Performance

- **Reduce Cost**
  - Goal of 10% - 15% reduction in overall blood spend
  - >20% reductions at the service line level

- **Improve Patient Care**
  - Fewer transfusion related adverse effects

- **Improve Quality**
  - Determine hospital “quality metrics”
IMPACT Online
Blood Management Intelligence Tool

Web-based tool for clinicians and administrators
Insight to blood use and clinical metrics
Analysis to understand trends
Measurement for program success
Comprehensive metrics specific to the advancement of blood management practices

Billing Systems

Blood Bank

Lab Results

Hospital-wide and Department Blood Use and Clinical Outcomes

BloodTrack®

ADT System
Cardiovascular – all products/procedures


**Total Units Transfused by Product**

<table>
<thead>
<tr>
<th>Product</th>
<th>Total Units</th>
<th>Transfused Patients</th>
<th>Units Per All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allo RBC</td>
<td>1,937.0</td>
<td>261</td>
<td>4.34</td>
</tr>
<tr>
<td>PAD</td>
<td>3.0</td>
<td>2</td>
<td>0.01</td>
</tr>
<tr>
<td>Platelets</td>
<td>457.0</td>
<td>118</td>
<td>1.02</td>
</tr>
<tr>
<td>Plasma</td>
<td>657.0</td>
<td>109</td>
<td>1.47</td>
</tr>
<tr>
<td>Cryo.</td>
<td>108.0</td>
<td>29</td>
<td>0.24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Patients</th>
<th>446</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Transfused Patients</td>
<td>274</td>
</tr>
<tr>
<td>Transfusion Rate</td>
<td>61.4%</td>
</tr>
<tr>
<td>Units per Transfused Patient</td>
<td>11.54</td>
</tr>
<tr>
<td>Units Per All Patients</td>
<td>7.09</td>
</tr>
</tbody>
</table>

### 4/2012 – 3/2013

**Total Units Transfused by Product**

<table>
<thead>
<tr>
<th>Product</th>
<th>Total Units</th>
<th>Transfused Patients</th>
<th>Units Per All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allo RBC</td>
<td>1,199.0</td>
<td>205</td>
<td>3.32</td>
</tr>
<tr>
<td>PAD</td>
<td>1.0</td>
<td>1</td>
<td>0.00</td>
</tr>
<tr>
<td>Platelets</td>
<td>232.0</td>
<td>83</td>
<td>0.64</td>
</tr>
<tr>
<td>Plasma</td>
<td>451.0</td>
<td>82</td>
<td>1.25</td>
</tr>
<tr>
<td>Cryo.</td>
<td>49.0</td>
<td>16</td>
<td>0.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Patients</th>
<th>361</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Transfused Patients</td>
<td>215</td>
</tr>
<tr>
<td>Transfusion Rate</td>
<td>59.6%</td>
</tr>
<tr>
<td>Units per Transfused Patient</td>
<td>8.99</td>
</tr>
<tr>
<td>Units Per All Patients</td>
<td>5.35</td>
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</tbody>
</table>

- ▼ 24%
- ▼ 37%
- ▼ 15%
- ▼ 42%

Gross Savings ~ $298,369.00
# Blood Management Program Results

<table>
<thead>
<tr>
<th></th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
<th>YEAR 4</th>
<th>YEAR 5</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td><strong>Blood Spend</strong></td>
<td>$6,000,000</td>
<td>$4,860,000</td>
<td>$4,131,000</td>
<td>$3,717,900</td>
<td>$3,457,647</td>
<td>$22,166,547</td>
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<tr>
<td><strong>Savings per Year</strong></td>
<td>$1,140,000</td>
<td>$729,000</td>
<td>$413,100</td>
<td>$260,253</td>
<td>$172,882</td>
<td>$2,715,235</td>
</tr>
<tr>
<td><strong>Total Savings over 5 Years</strong></td>
<td>$5,700,000</td>
<td>$2,916,000</td>
<td>$1,239,300</td>
<td>$520,506</td>
<td>$172,882</td>
<td>$10,548,688</td>
</tr>
<tr>
<td><strong>Based on acquisition price only</strong></td>
<td>19%</td>
<td>15%</td>
<td>10%</td>
<td>7%</td>
<td>5%</td>
<td></td>
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Blood Management Program Goals

• Encourage optimal and appropriate use of blood resulting in:
  – Improvement in patient outcomes and LOS
  – Reduction of health care expenditures
  – Conservation of a precious, vital and finite resource

• Establish metrics and ongoing measurement

• Drive new behaviors into the fabric of the organization