Best practices in blood utilization

A version of this analysis appears in Premier healthcare alliance’s Fall 2012 Economic Outlook

October 2012
Standardization of blood utilization practices could provide opportunity for improved outcomes, reduced costs

Background
Transfusion of blood products, including whole blood, red blood cells, platelets, plasma and cryoprecipitate, is a critical part of clinical care. Someone needs blood every three seconds; transfusion saves up to 4.5 million Americans each year, or more than 12,000 lives a day. It is the single most commonly billed procedure for patient utilizations receiving hospital care, with about 15 million blood product transfusions performed annually in U.S. hospitals at a cost of $10 to $15 billion. Every day approximately 44,000 units of blood products are used by hospitals and emergency treatment facilities across the country to treat patients with cancer and other serious diseases; for organ transplant recipients; and to help save the lives of accident and trauma victims.

Lack of availability of blood products is a relatively well-publicized issue in transfusion medicine. Effective blood stewardship is affected not only by an emergency-level donor deficit – the American Red Cross says its national blood supply is at the lowest level in 15 years due to severe weather and a slow donation summer – but also by the complexity of managing inventories of blood products and availability within hospitals and health systems.

Overuse or inappropriate use of blood products is a less-recognized problem that presents significant patient safety issues. Recent research indicates that use of blood products beyond a level deemed medically necessary can increase complication rates and length of hospitalization. Overuse can also substantially increase the cost of care. Although the cost of a single unit of red blood cells is about $210, when administration and supply costs are included, the total averages as much as $1,100.

Although there are many clinical practice guidelines for blood product usage, the scientific evidence supporting specific recommendations is not robust. The lack of strong evidence supporting specific practices often leads to overuse of blood products. The same lack of clarity can cause discrepancies in how and when surgeons and anesthesiologists order blood products.

Not surprisingly, care providers demonstrate sizable variations in their use of blood products.
**Variations in clinical guidelines**

A wide range of transfusion practices exist throughout the world, in part because of the limited high-quality evidence of their benefits and harm. For example, the most recent clinical practice guidelines for red blood cell transfusion from the AABB (formerly called the American Association of Blood Banks) cite strong evidence for a restrictive versus liberal transfusion strategy for hospitalized and stable patients.\(^1\) The recommendations also cite moderate quality evidence for a restrictive strategy in patients with cardiovascular disease, and no recommendation for or against a restrictive or liberal transfusion threshold for patients with acute coronary syndrome. AABB’s final recommendation that transfusion decisions should be influenced by symptoms, as well as hemoglobin concentrations, is graded as a weak recommendation with low-quality evidence.

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**Identifying opportunities with benchmarking**

To identify variations in blood product use and potential opportunities for improvement, the Premier healthcare alliance accessed a significant sample from its database to examine blood product utilization for the treatment of patients with similar conditions at 464 hospitals across the country.

De-identified patient data from 7.4 million discharges between April 2011 and March 2012 were analyzed—the largest study of blood product utilization in scope and scale conducted to date. Individual hospitals were compared to a benchmark set by the top-performing quartile—those hospitals with lowest utilization of blood products and better than expected patient outcomes. Comparisons took into account patient diagnoses and severity of illness.

**Results**

Premier found a significant variation in blood-product use across the 464 hospitals analyzed (Figure 1). If all hospitals analyzed were able to achieve blood product utilization similar to that of the top performing quartile, blood product use would be reduced by 802,716 units, with a savings of $165 million annually, while maintaining positive patient outcomes.

![Image: Variation in blood product use among 464 hospitals](image)

Source: A database maintained by the Premier healthcare alliance

**Opportunities for resource utilization improvement**

Results across all 464 hospitals show that, to treat similar patients, the top performing quartile used fewer units of all blood products, although the largest difference was in the use of red blood cells (Figure 2). The potential opportunities, or number of units of blood product used above the benchmark, that are summarized in Figure 2 only reflect the cost of product purchasing. These figures may underestimate the total cost savings achievable, because they do not include the additional expenses associated with blood testing, and with the storage, transportation and administration of blood products. Nor do these costs account for complications or harm to patients occurring due to the administration of unnecessary blood products.
Opportunities at the business-line level (Figure 3) indicate that usage variations exist across the inpatient service areas. The largest volume of potential opportunity identified was in internal medicine (196,699 units), followed by cardiac surgery (167,490 units) and general surgery (156,326 units).

**Total opportunities by service line for reducing blood use among 464 hospitals**

<table>
<thead>
<tr>
<th>Blood product</th>
<th>Blood product acquisition cost</th>
<th>Number of opportunities</th>
<th>Total savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryoprecipitate</td>
<td>$50</td>
<td>89,106</td>
<td>$4,455,300</td>
</tr>
<tr>
<td>Plasma</td>
<td>$61</td>
<td>183,850</td>
<td>$11,214,850</td>
</tr>
<tr>
<td>Platelets</td>
<td>$534</td>
<td>134,642</td>
<td>$71,898,828</td>
</tr>
<tr>
<td>Red blood cells</td>
<td>$211</td>
<td>358,617</td>
<td>$75,668,187</td>
</tr>
<tr>
<td>Whole blood</td>
<td>$50</td>
<td>36,501</td>
<td>$1,825,050</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>802,716</strong></td>
<td><strong>$165,062,215</strong></td>
</tr>
</tbody>
</table>

Source: A database maintained by the Premier healthcare alliance
Improvement opportunities by inpatient diagnosis

Information for the top 10 inpatient diagnoses (by Medicare MS-DRGs), based on potential opportunity for reduction in utilization, is shown in Figure 4. Data suggest that treatment of sepsis presents the highest individual opportunity (35,560 units) for reducing utilization, based on volume of patients, and the extreme hospital-to-hospital variation indicates a clear need to review standard practice.

Data also suggest that total joint replacement represents the second highest individual opportunity at 34,087 units. Five of the remaining eight diagnoses involve major cardiac surgeries, despite the fact that none has a total inpatient volume in the top 25.

**Figure 4**  Top 10 inpatient diagnoses based on volume of total opportunity

Source: A database maintained by the Premier healthcare alliance

Summary

The opportunity to achieve significant savings in healthcare is well recognized, but benchmarks and metrics are needed to identify specific actionable opportunities. Without the ability to benchmark usage rates and outcomes, providers cannot define and apply practice, including optimal blood product utilization.

Some variation in blood usage among providers is both expected and appropriate and can be attributed to factors such as differences in patient diagnosis and severity of illness. The variation can also be attributed to the lack of strong scientific evidence supporting specific recommendations on the utilization of blood products.

Given the variation of blood product use presented by this analysis, hospital leaders should review their organization’s practices and protocols to identify potential waste while maintaining care quality. In some instances, case-by-case review may be valuable. In addition, based on experiences working with member hospitals and national experts, Premier recommends the following critical factors for successful blood management:

1. Using a multi-disciplinary blood stewardship team.
2. Working collaboratively with clinicians and supply chain executives to explore alternative products and procedures.
Bon Secours Health System transfusion guidelines safely reduce complications, length of stay and costs

A campaign by Bon Secours Health System (Marriottsville, Md.) to reduce blood transfusions during heart surgery is part of a growing national trend to standardize care and rein in differences in how doctors and hospitals practice medicine.

When Bon Secours used the Premier healthcare alliance’s database to look for areas of improvement about four years ago, it found several, including blood transfusions during heart surgery. This data helped heart surgeons create new blood transfusion guidelines at five Bon Secours hospitals in Virginia, New York and South Carolina. As a result, the hospitals have reduced blood utilization, by 65 percent, adverse events by 14 percent, length of stay by 20 percent and saved nearly $2 million.

the share of heart surgery patients receiving transfusions fell to 42 percent from 66 percent, and the average amount of blood transfused dropped by nearly half. In the process, these Bon Secours hospitals reduced length of stay from 9.5 days to 7.5 days, and saved $1.97 million.

Bon Secours Executive Vice President & Chief Medical Officer Marlon Priest, M.D. suggests that, due to differences in need and condition, not all patients are best served by the new transfusion criteria. Thus, physicians are still expected to use their judgment.

"There will be patients that fall outside of those parameters. We accept that. But we shouldn’t accept that there should be no standards of practice," Priest said. 18

4. Providing education and clinical decision support tools to inform clinicians of guidelines in real-time.
5. Developing processes to monitor adherence to guidelines and provide feedback to clinicians.
6. Monitoring utilization on an ongoing basis while measuring the impact of improvement.

About the analysis
Premier’s database is the nation's largest clinical, financial and outcomes de-identified database with information on one in every four patient discharges, 2.5 million real-time clinical transactions a day and $43 billion in annual purchasing data. The information in this comparative de-identified database is severity-adjusted.

Benchmark utilization rates and unit quantity per case were established for each blood product type, business line and diagnosis. Opportunities for improvement were calculated as a percentage of total opportunities (units of blood product in excess of the benchmark) identified during the analysis and represent the amount considered achievable through process change.

In this study, Premier applied its first-of-its-kind “waste dashboard,” which identifies different categories of potential savings opportunities in hospitals. The dashboard analyzes hospitals with opportunities for savings improvement, and is customized by hospital to provide the most actionable information possible. According to the dashboard analysis, blood utilization represents the eighth highest savings opportunity for hospitals – a savings of $1.06 million per hospital, per year.

This analysis of 7.4 million patient discharges demonstrated important variation in the utilization of blood products among hospitals across the country - and substantial opportunity to reduce usage and attain top-quartile status for utilization and patient outcomes. Reducing unnecessary utilization of blood products represents an important step in health system improvement by simultaneously reducing costs, reducing potential risks to patients, and maintaining high quality care and positive patient outcomes.16

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Blood and its components

**Whole blood**  
- Historically, whole blood was transfused without further processing  
- Most blood is now split and transfused into components that include platelets, plasma

**Plasma**  
- Maintains blood pressure and volume to supply critical proteins for blood clotting and immunity  
- Transfused to trauma patients and patients with severe liver disease or multiple clotting factor deficiencies

**Cryoprecipitate**  
- Prepared from plasma  
- Controls bleeding in those with hemophilia  
- Applied to a wound site to prevent bleeding

**White blood cells**  
- Protects body from foreign substances such as bacteria and viruses by surrounding, destroying and invading them  
- Aids in immune defense system

**Red blood cells**  
- Carry oxygen  
- Transfused to patients with:  
  - Chronic anemia from disorders such as kidney failure or gastrointestinal bleeding  
  - Acute blood loss resulting from trauma or surgery  
  - Congestive heart failure

**Platelets**  
- Aids in clotting by sticking to the lining of blood vessels  
- Helps prevent massive blood loss from trauma  
- Vital to recovery of cancer, leukemia, open-heart surgery and transplant patients

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About the Premier healthcare alliance, Malcolm Baldrige National Quality Award recipient

Premier is a performance improvement alliance of more than 2,700 U.S. hospitals and 90,000-plus other sites using the power of collaboration and technology to lead the transformation to coordinated, high-quality, cost-effective care. Owned by hospitals, health systems and other providers, Premier operates a leading healthcare purchasing network with more than $4 billion in annual savings. Premier also maintains the nation’s largest clinical, financial and outcomes database with information on 1 in 4 patient discharges. A world leader in delivering measurable improvements in care, Premier works with the Centers for Medicare & Medicaid Services. Headquartered in Charlotte, N.C., Premier also has an office in Washington. [https://www.premierinc.com](https://www.premierinc.com).
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