**Economic Value of Blood Conserving Surgery**

**Revolutionizing Bone Surgery**

Ultrasonic bone cutting with the Misonix BoneScalpel represents a technological shift with unique advantages over traditional methods for orthopedic and spinal surgery. BoneScalpel empowers the surgeon to dissect bone with the efficiency of a sharp chisel, the control of a Kerrison punch, the convenience of a high-speed drill and the finesse of a micro saw but with a new dimension that only ultrasound provides: a gentle approach that reduces bleeding and spares soft tissues while cutting bone with highest precision.

![BONESCALPEL™](image)

**Supporting Blood Management**

Blood loss can be significant in spinal surgery. As reported in journal articles blood loss varies with the extent and complexity ranging from 100 mL to 3,100 mL in standard fusions, up to 4,700 mL in revisions and vertebral osteotomies, and up to 7,000 mL have been reported\(^1\). Harmful effects of significant blood loss are fluid shifts during surgery, increased use of transfusions, exposure to various blood products, higher risk for transmission of diseases and infections, risk of adverse reactions, and prolonged stay in the ICU. Additional risks include transfusion related acute lung injury (TRALI) and variant Creutzfeld-Jacob disease (vCJD). Increasingly restrictive donor selection criteria have contributed to a shrinking donor pool. Shortages in blood supply exist in the U.S. and worldwide making blood management an important consideration from every aspect.

Bartley et al.\(^2\) demonstrated significant reductions in blood loss and blood transfusions from cell salvage in comparison to using standard tools when using BoneScalpel in multi-level fusions.

**Blood Loss in Multi-level Spinal Fusion**

- Control A: 886 mL
- Control B: 799 mL
- BoneScalpel: 550 mL

\(-31\%\) against control A and \(-38\%\) against control B (most recent cases prior using BoneScalpel)

**Cell Salvage in Multi-level Spinal Fusion**

- Control A: 198 mL
- Control B: 184 mL
- BoneScalpel: 94 mL

\(-53\%\) over control A (Cobb matched) and \(-49\%\) over control B (most recent cases prior using BoneScalpel)

\[\text{Blood loss was reduced by } 38\% \text{ against control A (Cobb matched) and by 31\% against control B (most recent cases prior using BoneScalpel)}\]

\[\text{Cell savers transfused were reduced by 53\% over control A (Cobb matched) and 49\% over control B (most recent cases prior using BoneScalpel)}\]
Blood Management Equals Cost Management

The use of blood transfusion and cell salvage comes at an additional cost to the hospital — the sum of direct acquisition costs plus overhead charges for processing and logistics.

Most commonly used blood products in spine surgery are red blood cells at an average cost of $909.46 per patient and cell salvaged blood at $1,736.00 per patient. The use of platelets and fresh frozen plasma result in even higher per patient costs around the $2,500.00 mark.

**Cost of Blood Products**

<table>
<thead>
<tr>
<th>Blood Product Used*</th>
<th>Cost per Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blood cells</td>
<td>$909.46</td>
</tr>
<tr>
<td>Whole blood</td>
<td>$312.24</td>
</tr>
<tr>
<td>Fresh frozen plasma</td>
<td>$2,520.41</td>
</tr>
<tr>
<td>Platelets</td>
<td>$2,467.89</td>
</tr>
<tr>
<td>Cryoprecipitate (frozen plasma)</td>
<td>$1,571.05</td>
</tr>
</tbody>
</table>

* Allogeneic only

Average total cost to treat the patient, sum of direct and overhead cost

Sampled from 268 U.S. hospitals for ICD-9-CM coded procedures for cervical fusion (81.01-03), anterior lumbar fusion (81.04, 01.06), posterior lumbar fusion (81.05, 81.07-08), cervical refusion (81.31-33), anterior lumbar refusion (81.34, 81.36) posterior lumbar refusion (81.35, 81.37-38) and 360 degree fusion (81.61)

**Cost of Cell Salvage**

<table>
<thead>
<tr>
<th>Blood Product Used**</th>
<th>Cost per Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell salvage was prepared and used in 32% of cases but not used in 68% of cases</td>
<td>$1,736.00</td>
</tr>
<tr>
<td>Cell salvage was not available</td>
<td>$1,012.00</td>
</tr>
</tbody>
</table>

** Allogeneic plus autologous

Average cost calculated from cost of allogeneic transfusion, setting up the cell saver recovery system and infusing autologous blood from the cell saver

Sampled from a single U.S. hospital for single-level lumbar fusions which may underestimate the cost in multi-level fusions

More sophisticated financial analysis like cost-effectiveness and cost-utility models would consider the financial exposure to risks from disease transmission, infections, adverse events and/or litigations as they relate to the use of allogeneic blood products or autologous cell salvage.

**Conclusion**

Blood management is of major importance for patient safety and hospital economics. Most commonly used blood products in spine surgery are red blood cells at an average per patient cost of $909.46 and cell salvaged blood at $1,736.00. In multilevel fusions BoneScalpel reduces blood loss up to 31-38% and cell savers transfused up to 49-53%². Ultrasonic bone cutting with BoneScalpel is blood conserving and thus reduces blood management costs during spinal surgery.

**References**


Schedule a BoneScalpel demonstration by contacting your local Misonix representative or Misonix Customer Service at 1-800-694-9612 (U.S.) or +1-631-694-9555 (Int).

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