Educational Series

Module 1
Burden of Bleeding

Module 2
Clarifying the confusion in the adjunctive hemostat marketplace

Module 3
Science of Hemostasis

Module 4
Hemostasis Optimization Program

Module 5
Resident Training
Comprehensive value is increasingly important

All health care providers are working towards achieving this goal!

Value

- Improve outcomes
- Improve patient experience of care
- Lower costs
Surgical bleeding adversely affects patient outcomes, hospital costs, and resources

32-68% of cases in open procedures experience disruptive bleeding events\(^1\)

Challenging and uncontrollable bleeding during surgery is associated with **high mortality rates**\(^2\)

Complications related to surgical bleeding may **increase resource utilization**\(^3-7\)

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1. Corral et al., SABM, 2014  
3. Shippert, 2005  
4. Kahn et al., 2008  
5. Dasta, 2005  
6. Toner, 2011  
7. Zimlichman, 2013
Patient factors contribute to the increased risk of surgical bleeding

The “new normal”

• Patients suffer from a growing number of comorbidities, which increases surgical bleeding risk\textsuperscript{1,2}

• Comorbidities such as uncontrolled diabetes and obesity can affect the natural clotting process\textsuperscript{2}

• Aging demographics have led to increasingly complex and extensive surgeries\textsuperscript{2,3,4}

Patient medications and conditions increase the risk for surgical bleeding

- Several patient medications and conditions may lead to surgical bleeding in approximately 10% to 25% of procedures\textsuperscript{1,2,3}

- Growing incidence of cardiovascular disease increases use of anticoagulants and antiplatelets\textsuperscript{4,5,6}

\textit{Patient medications:}
- Aspirin
- Warfarin (COUMADIN)
- Clopidogrel (PLAVIX)
- Novel oral anticoagulants

Complications related to surgical bleeding may increase hospital-related costs

Sample unit costs associated with these resources

<table>
<thead>
<tr>
<th>General Hospital Resources</th>
<th>US Unit Cost of Resources ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR Time</td>
<td>$89 per minute(^1\text{-}^3)</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>$1240 per night(^4\text{-}^5)</td>
</tr>
<tr>
<td>ICU Stay</td>
<td>$1751-$3500 per day(^5\text{-}^6)</td>
</tr>
<tr>
<td>Infection: SSI</td>
<td>$20,785 per case(^7)</td>
</tr>
<tr>
<td>Transfusion</td>
<td>$254 per RBC unit(^8)</td>
</tr>
<tr>
<td>Ventilator</td>
<td>$93 per hour(^9)</td>
</tr>
</tbody>
</table>

Costs inflated from original resources date to current USD

Adjunctive hemostats help reduce resource utilization

Sample studies of adjunctive hemostats and sealants vs primary methods alone

<table>
<thead>
<tr>
<th>Resource</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Transfusion Requirements</td>
<td><strong>8% to 40% fewer patients transfused</strong> with the use of hemostats&lt;sup&gt;1-9&lt;/sup&gt;</td>
</tr>
<tr>
<td>Length of Stay</td>
<td><strong>LOS reduced by 1 to 4.4 days</strong> with the use of hemostats&lt;sup&gt;1,10,13&lt;/sup&gt;</td>
</tr>
<tr>
<td>Operation Time</td>
<td><strong>OR time reduced by 15.2 to 25 minutes</strong> with the use of hemostats&lt;sup&gt;11-13&lt;/sup&gt;</td>
</tr>
<tr>
<td>Re-admissions</td>
<td>Fibrin sealants significantly <strong>reduced readmission rate within 30 days</strong> (ie, 8.6 days vs 10.5 days; P&lt;0.001)&lt;sup&gt;14&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Controlling surgical bleeding significantly reduces hospital costs

<table>
<thead>
<tr>
<th>Surgical Category</th>
<th>Uncontrolled Surgical Bleeding</th>
<th>Controlled Surgical Bleeding</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Revascularization</td>
<td>$44,198</td>
<td>$35,288</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cardiac Valve Surgery</td>
<td>$60,531</td>
<td>$47,245</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cholecystectomy</td>
<td>$29,101</td>
<td>$17,483</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cystectomy</td>
<td>$41,708</td>
<td>$27,551</td>
<td>0.006</td>
</tr>
<tr>
<td>Pancreatic Surgery</td>
<td>$58,853</td>
<td>$37,039</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Partial Hepatic Resection</td>
<td>$43,649</td>
<td>$20,535</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pulmonary Surgery</td>
<td>$40,416</td>
<td>$24,266</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Radical Abdominal Hysterectomy</td>
<td>$23,266</td>
<td>$14,929</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>


The optimal use of available hemostatic options may lead to significant cost savings for controlled surgical bleeding.
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