Enhancing Patient Care - A Surgical Journey in Supply Chain Cost, Quality and Outcome

Wendy Watson
UHN OR Supply Chain Manager
UHN at a Glance

Ten program areas spread across Four Hospitals and Eight sites:

$2B Operating Budget
Over 1,200 patient beds
24,000 Surgical Procedures
Clinical Specialty Supply Chain (CSSC) Transformation Project at UHN

- Funding to support the OR Supply Chain Technology Transformation (or “CSSC”) at TGH and TWH
- 2006 – 2009 business case, procurement process, site readiness

<table>
<thead>
<tr>
<th>Vision</th>
<th>To create an integrated supply chain technology enabled environment that enhances clinical workflow, patient safety and delivers data for decision making</th>
</tr>
</thead>
</table>
| Objectives | • Automate all inventory ordering and costing  
• Automate tracking of consignment implants  
• Integrate all systems – inventory, clinical, and purchasing (Pyxis, ORSOS, and SAP)  
• Automate case costing and data reporting |
CSSC Project Goals

Surgeon Cost Data & Savings
• Surgeons not aware of cost of surgical supplies
• Nurse charting by exception – time and accuracy issues
• Procedure card accuracy

Clinical Time Efficiency & Patient Safety
• Time of 4 FTEs to manage inventory
• 30% of nurse time searching for supplies
• Implant manual entry errors with lot and serial numbers

ORSC Technology & Process Efficiency
• $35M annual supply spend
• Nurse pen and paper solution 80%
• 16,000 items
• No electronic data, reports or consignment tracking – recalls
• Manual annual counts
Before: Manual / Inefficient Silos

Manual OR Inventory Storage and Tracking

Manual Re-ordering of OR Inventory

Manual Clinical Charting in ORSOS

Manual Upkeep of ORSOS Inventory Data

Incomplete / Errors in Clinical Charts and Manual, Limited Case Costing

Patient Safety Concerns
<table>
<thead>
<tr>
<th></th>
<th>Current State</th>
<th>Future state</th>
<th>% Reduction</th>
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<tbody>
<tr>
<td>Number of Steps</td>
<td>25</td>
<td>14</td>
<td>44</td>
</tr>
<tr>
<td>Touch Time (minutes)</td>
<td>42</td>
<td>19</td>
<td>55</td>
</tr>
<tr>
<td>Total Process Time</td>
<td>14 hrs 12 mins</td>
<td>8 hrs 19 mins</td>
<td>41</td>
</tr>
</tbody>
</table>

All Inventory: Stock, Non-stock and Consignment Implants – mapped workflow to Point-of-Care
What is possible?

### Conferences
- Association for Healthcare Resource & Materials Management (AHRMM)
- Healthcare Information and Management Systems Society (HIMSS)

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### Request for Information (RFI)
- Vendor provided Information
- New solutions

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### Case Study Publications
- Leading USA Hospital Case Studies
- AHRMM Knowledge Center

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### 4 Team Site Visits:
- Phoenix Arizona, Children’s Hospital & Mayo Clinic
- Toronto, Sick Kids Hospital
- Augusta Georgia, University Hospital
- West Penn, Allegheny Health System

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RFP
Item Master

- Internal vs external
- Point-of-Care cost
- Item description - clinical requirements
- Complete for ALL items
Lean Mapping & Inter-disciplinary Team Planning

Lean Six Sigma Mapping
Site Readiness

Role Development
Knowledge Transfer

IT Planning

Policy Development
After: Pyxis Technology and Integration

SAP

Plexus data clerk creates OR item / vendor load sheet:
305C225 Valve Aortic Mosaic 25MM Medtronic

Pyxis

Automatically updated with item: 305C225 Valve Aortic Mosaic 25MM Medtronic (item can now be loaded in Pyxis by ORSC)

Pyxis

OR nurse takes 305C225 Valve Aortic Mosaic 25MM Medtronic by scanning the barcode

Reports / Business Insight

Clinical Charting Interface

Orders Interface

ORSOS

Database is automatically updated with item: 305C225 Valve Aortic Mosaic 25MM Medtronic

SAP

Plexus buyer automatically receives order 305C225 Valve Aortic Mosaic 25MM Medtronic just-in-time

On-demand Reports

• Scheduling Interface
• Item Master Interface
• Orders Interface
• Clinical Charting Interface
After: Fully Integrated OR Supply Chain Solution

Automation
OR Nurse or MDRD scans/press button to vend the item

- Re-orders via SAP (just-in-time)
- Clinical Documentation
- Real-time Utilization Inventory, Surgeon Case Reports
OR Technology Workflow
Real-time Supply Costs
<table>
<thead>
<tr>
<th>Item Name</th>
<th>Item ID</th>
<th>Quantity</th>
<th>Unit of Issue</th>
<th>Unit Cost</th>
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<tr>
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## Results

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<tr>
<th>$4.6M Soft Savings</th>
<th>$9.8M Hard Savings</th>
<th>Patient Safety Improvements</th>
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<tr>
<td><strong>Time-saving from automation of:</strong></td>
<td><strong>Inventory Efficiencies from:</strong></td>
<td><strong>Clinical Chart Accuracy Improved by Scanned Implant Lot &amp; Serial #</strong></td>
</tr>
<tr>
<td>• Clinical Charting (Nurse)</td>
<td>• Reduced Carrying Costs</td>
<td>• Recalls Identified</td>
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<tr>
<td>• Item Master</td>
<td>• Par Level Reduction</td>
<td>• Stock-outs Minimized</td>
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<tr>
<td>• Orders</td>
<td>• Inventory Back-up Elimination</td>
<td>• Expiration Dates &amp; Latex Alerts</td>
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<tr>
<td>• Annual Counts / Value on hand</td>
<td>• Product Standardization</td>
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</table>
Barcode Challenges

Multiple Barcodes – Clinical Confusion – What to Scan?

2010 - Missing Barcodes, Proprietary Barcodes, Barcode Errors - Not Scanning
2013 upgraded to smart scanning
2018 – Barcode variation
Barcode Variation

Stacked
multiple scans required to refill Pyxis

2D Matrix- specific scanner

Linear

Scanner – upgrade to read all types
Barcode Standards

GS1

Industry Challenges:
DI many-to-one relationship, fluid

Sources – GUDID, GDSN

HIBCC

UDI Example

Required on the device label, packaging or, in some cases, on the device itself
Code in plain text and machine readable format (AIDC)

UDI = DI + PI

Health Care Barcode Structure

Primary Code (DI) / Secondary Code (PI)

HIBCC system identifier
Labeller’s ID “LIC”

Product Code
Expiry Date

Packaging Index
ID Expiry Date

Serial Number
Separator and ID
LOT up to 18 digits
UDI Tracking
## UDI EPR Integration

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<tr>
<th>Inv ID</th>
<th>Description</th>
<th>Serial #</th>
<th>Lot #</th>
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<th>Site</th>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Mfr Cat #</th>
<th>Supplier</th>
<th>Mfr ID</th>
<th>Date Rec'd</th>
<th>Charge</th>
<th>UDI</th>
<th>GTIN/Device Id</th>
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<tbody>
<tr>
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<td>BIOMSI</td>
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<td>3800</td>
<td></td>
<td>07812998012986</td>
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</table>
AHRMM* CQO Movement – Focus on Value

• A comprehensive, physician-led, sustainable process in which clinical and administrative stakeholders collaborate to establish, prioritize, implement, and monitor initiatives that align resources while maintaining or improving quality and outcomes

• Value increases when quality is improved and when cost is decreased (Value = Quality / Cost)

THE INSTITUTE FOR HEALTHCARE IMPROVEMENT (IHI)’S TRIPLE AIM CALLS FOR:

1. Improving the patient experience of care (including quality and satisfaction)
2. Improving the health of populations
3. Reducing the per capita cost of healthcare
Physician Engagement is Key to a Robust Value Analysis Program

SMI Value Analysis Maturity Curve

**Value Analysis Novice**
- No Strategy
- No process
- Purchases driven by demand
- Minimal criteria
- Many brands/duplications for same use

**Price Strategy**
- Often single site
- Procure items with review of new products
- V.A. Committee created
- Cost reduction is primary driver of decisions
- Reliance on supplier-provided data

**Value Analysis Intermediate**
- Price & Standardization
- Data-driven decisions based on usage across all sites
- Strives for system-wide involvement
- Clinician engagement with supply chain limited
- V.A. committee makes final decisions
- Limited development of objective non-financial criteria

**Value Analysis Advanced**
- Quality, Waste Reduction, Standardization
- Focus moves beyond cost reduction
- Clinical and supply chain integration
- Reduce or eliminate waste and variety
- Objective non-financial criteria strives to use evidence
- System device formulary established
- Incorporates forum for new technology assessment

**Value Analysis Future**
- Utilization, Reduced Variation, Population Management
- Focus on safety, quality, and total cost of care across the patient experience
- Clinically driven teams target utilization variation
- Data-driven decisions utilize information from:
  - EMR systems
  - National metrics
  - Outcome protocols
- Policy requires that all decisions are evidence-based

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The Surgeon Cost Report Card

JAMA Surgery

- **5.9% cost reduction** seen 3 months post-implementation in laparoscopic Roux-en-Y gastric bypass at TWH

- With 293 gastric bypasses performed at our hospital in 2014, setting this target would mean **potential yearly savings of up to $160,000** for RYGB alone – the equivalent of **64 additional cases**
Surgeon Lead Cost Savings

1. TWH Neuro Surgery LED by Dr. Tymianski
   - Disposable Cost Reduced 30%
   - Additional Surgeries Made Possible
   - $750,000 Savings
   - 4 Months

2. 4 Gen. Surg. Surgeons LED by Dr. Tim Jackson
   - Rouxen - Y Gastric Bypass
   - Surgeon Cost Report Pilot
   - $160,000/Year Potential Savings
   - 7 Months

- Additional surgeries made possible with reduced disposable costs.
- Potential savings reported through the surgeon lead cost report pilot.
- Rouxen - Y Gastric Bypass procedure led to additional surgeries and cost savings.

Total savings:
- $750,000
- $160,000/Year
## Average Surgeon Cost Comparison
### VATS Lobectomy

<table>
<thead>
<tr>
<th>Category</th>
<th>Group Avg. (52 cases)</th>
<th>Surgeon A (12 cases)</th>
<th>Surgeon B (2 cases)</th>
<th>Surgeon C (7 cases)</th>
<th>Surgeon D (9 cases)</th>
<th>Surgeon E (16 cases)</th>
<th>Surgeon F (6 cases)</th>
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</thead>
<tbody>
<tr>
<td>Catheters</td>
<td>$6.48</td>
<td>$6.34</td>
<td>$6.21</td>
<td>$6.21</td>
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<tr>
<td>Drains</td>
<td>$64.38</td>
<td>$71.29</td>
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<td>$71.00</td>
<td>$55.22</td>
<td>$64.56</td>
<td>$53.83</td>
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<tr>
<td>Dressings</td>
<td>$33.12</td>
<td>$71.44</td>
<td>$52.82</td>
<td>$24.08</td>
<td>$23.76</td>
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<td>Disposables</td>
<td>$58.66</td>
<td>$37.86</td>
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<td>$111.72</td>
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<td>Harmonics / Ligasure</td>
<td>$83.18</td>
<td>$0.00</td>
<td>$339.59</td>
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<td>Medical Surgical</td>
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<td>$163.53</td>
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<td>Staples and Reloads</td>
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<td>$1,519.52</td>
<td>$1,577.12</td>
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<td>$1,204.54</td>
<td>$1,366.58</td>
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<tr>
<td>Sterile Supplies</td>
<td>$35.54</td>
<td>$37.73</td>
<td>$35.60</td>
<td>$32.02</td>
<td>$34.27</td>
<td>$35.72</td>
<td>$36.65</td>
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<tr>
<td><strong>Average Overall</strong></td>
<td>$1,917.23</td>
<td>$1,913.73</td>
<td>$2,276.07</td>
<td>$2,304.40</td>
<td>$1,595.94</td>
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<td>$2,480.91</td>
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<tr>
<td>% Over / Under Average</td>
<td>0.00%</td>
<td>-0.18%</td>
<td>18.72%</td>
<td>20.19%</td>
<td>-16.76%</td>
<td>-12.64%</td>
<td>29.40%</td>
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<tr>
<td><strong>Avg. LOS (days)</strong></td>
<td>4.44</td>
<td>3.42</td>
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<td>4.43</td>
<td>4.11</td>
<td>5.69</td>
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CQO Report Card Project at UHN: A Value-Based Approach to OR Supply Chain

• Funding to support the development and implementation of a “CQO Report Card” at UHN
  • $500,000 over 2 years (Mar 2018 – Feb 2020)
• Working with Techna Institute at UHN

<table>
<thead>
<tr>
<th>Vision</th>
<th>Develop CQO reporting solution that will enable value-based decision-making that will support safe and cost-effective patient care</th>
</tr>
</thead>
</table>
| Objectives | 1. **Reporting Platform & Data Analytics**: Build technology platform and use data analytics to develop dynamic reports  
2. **Procedure Cohort Development**: Develop procedure cohorts for like-procedure comparison  
3. **Clinical Outcomes**: Link Pyxis supply cost data to NSQIP patient outcomes |

**Out of Scope / Limitations**
• Outcomes for NSQIP-participating divisions
• Outcomes not real-time (90-day lockout period)
1. Reporting Platform & Data Analytics

![Service Cost Table](image)

### Service Cost

**Surgeon Name:** Jane Doe  
**Surgical Division:** Thoracic Surgery  
**Site:** TGH  
**Reporting Period:** Oct 2016 – Dec 2016

<table>
<thead>
<tr>
<th>Procedures</th>
<th>VATS Lobectomy</th>
<th>Surgeon Name: Jane Doe</th>
<th>Surgical Division: Thoracic Surgery</th>
<th>Site: TGH</th>
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<tbody>
<tr>
<td>Your Avg. Total Case Length (Hours):</td>
<td>02:57</td>
<td>Your Average</td>
<td>$1,920</td>
<td>Group Average</td>
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<tr>
<td>Your Avg. Surgical Time (Hours):</td>
<td>03:10</td>
<td>(5 cases)</td>
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<td>(52 cases)</td>
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<tr>
<td>Group Avg. Total Case Length (Hours):</td>
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<td>Group Avg. Surgical Time (Hours):</td>
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<td>Group Avg. Total Time (Hours):</td>
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<td>Site: TGH</td>
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#### Surgeon Cost (No. of Units)

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<tr>
<th>Inventory Category</th>
<th>Group Cost (No. of Units)</th>
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<td>CATHETER THORACIC</td>
<td>(1.0) 6.48</td>
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<tr>
<td>DRAINAGE THORACIC (CHEST DRAIN / TUBING)</td>
<td>(1.8) 64.88</td>
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<tr>
<td>DRESSINGS (SPONGES, PATTIES, SURGICELL, STERI STRIPS)</td>
<td>(7.6) 33.12</td>
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<tr>
<td>VENTS DISP (TROCARS, CAUTERY, CLIPS, BLADES, ENDO C)</td>
<td>(1.6) 58.66</td>
</tr>
<tr>
<td>MED SURG (PACKS, CLIPS, DRAINS, SUCTION, PREP)</td>
<td>(21.9) 151.95</td>
</tr>
<tr>
<td>STAPLES AND RELOADS</td>
<td>(7.1) 1,464.27</td>
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<tr>
<td>STERILE SUPPLIES</td>
<td>(25.0) 35.54</td>
</tr>
<tr>
<td>SUPPLIES GENERAL MDSURG POUR SOLUTIONS</td>
<td>(0.1) 0.09</td>
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<tr>
<td>SUPPLIES GENERAL MEDSURG POUR SOLUTIONS</td>
<td>(0.8) 0.10</td>
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<tr>
<td>SUPPLIES GENERAL MEDSURG POUR SOLUTIONS</td>
<td>(10.0) 20.14</td>
</tr>
</tbody>
</table>
1. Reporting Platform & Data Analytics

![Image of reporting platform]

The image shows a screenshot of a reporting platform used for cost analysis and data analytics in the context of medical procedures. The platform provides detailed information on service costs, including surgeon name, surgical division, and site. It also displays average costs for procedures such as VATS LOBECTOMY, with metrics like average total case length, average surgical time, and group average costs. The platform integrates inventory and ORSOS case data, with categories like catheter thoracic, drainage thoracic (chest drain/tubing), and dressings. The data is segmented by procedure date, inventory ID, category, description, quantity, and cost.
2. Procedure Cohort Development

Example 1: One Matched Sub Procedure

PROCEDURE COMBINATION
MAIN PROCEDURE:
- THYROIDECTOMY (G19615)
SUB PROCEDURES:
- TRACHEOSTOMY (G19055)
- REIMPLANT PARATHYROID (G09720)

RESULTED COHORT
THYROIDECTOMY, TRACHEOSTOMY

Example 2: More Than One Matched Sub Procedure

PROCEDURE COMBINATION
MAIN PROCEDURE:
- THYROIDECTOMY (G19615)
SUB PROCEDURES:
- MEDIASTINOSCOPY (G10055)
- DISSECTION NECK (G19970)

RESULTED COHORT
THYROIDECTOMY, MEDIASTINOSCOPY, DISSECTION NECK

Example 3: No Matched Sub Procedure

PROCEDURE COMBINATION
MAIN PROCEDURE:
- THYROIDECTOMY (G19615)
SUB PROCEDURES:
- ALLERGY LATEX (G09971)

RESULTED COHORT
THYROIDECTOMY

### Table

<table>
<thead>
<tr>
<th>Service</th>
<th>Total Case Volume</th>
<th>Annual Procedure Code Combinations</th>
<th>Surgeon Reports Current State</th>
<th>Surgeon Reports Future State</th>
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</thead>
<tbody>
<tr>
<td>OTOLARYNGOLOGY</td>
<td>1101</td>
<td>515</td>
<td>515</td>
<td>515</td>
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</table>
3. Clinical Outcomes

- ACS NSQIP captures **30-day outcomes** on patients undergoing major operations
- Enables external benchmarking among participating sites with risk-adjustment
- UHN pilot in 2012 (General Surgery); expanded to include almost all divisions by 2016
  - Vascular, Cardiac and Thoracic Surgery participate in SVS VQI / STS
- **Ontario Surgical Quality Improvement Network** (31 hospitals)
  - Dr. Timothy Jackson, Provincial Clinical Lead at Health Quality Ontario
- **Mercy Health System (45 hospital network) also linking supply costs to NSQIP outcomes**
  - Reducing variation is key to realizing operational efficiencies
    -Standardization
    - Cost per case
    - Post market surveillance
An Example from UHN – Orthopaedic Surgery

- High rate of surgical site infections (SSIs) in patients undergoing knee replacements at UHN, compared to other centres (risk-adjusted NSQIP data)

- Orthopaedic Surgery adopted J&J triclosan-coated sutures for all TKR and THR

- SSI rate dropped by 1.5% (TKR) pre versus post intervention

- Incremental cost per suture of $0.12 ($700 annually); but assuming SSI direct cost of $4,000, represents potential savings of $44,000 annually (TKR and THR)

- Note: WHO suggests use of triclosan-coated sutures for purpose of reducing risk of SSI, independent of the type of surgery\[^1\]

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• “VATSL costs vary widely by surgeon and are influenced by disposable equipment use”

• “Cost-effective instrumentation selection can decrease the cost of VATSL by 19% with equivalent outcomes”

• “Surgeons can safely reduce intraoperative VATSL costs by eliminating use of unproven, expensive surgical adjuncts/disposables”
**An Example from Centura Health – Orthopaedic Surgery**

**Challenge:**
- **Significant variation** in usage of antibiotic-impregnated bone cement in total joint replacements; some physicians using in every patient, whether or not a new joint replacement or revision.
- Also variation in type of antibiotic used along with the dosage, and disagreement re use of premixed cement or compounding on site.

**Solution:**
- Collaboration between Hayes (*review of the evidence*) and multiple stakeholders at Centura Health resulted in **standard of practice in use of antibiotics in bone cement**, identifying: 1) when to use an antibiotic and for which patients, 2) proper dosing, and 3) use of premix vs. compounding.

- Identified up to $900,000 [USD] annual savings.
A Value-Based Approach to OR Supply Chain

- Reducing costs is no longer enough – quality, outcomes and evidence need to become driving forces in supply decisions
- A provider-led, physician-engaged sourcing model and "patients first" focus
- Evidence-based clinical outcomes to select medical products focuses on value, not lowest cost
- Fostering clinical alignment between physicians and supply chain delivers significant savings without compromising patient care
Questions?

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