Regional Inventory Management
Rural Ontario

Infused with Six Sigma & Lean Methodologies

InterHospital Laboratory Partnership
Huron Perth Healthcare Alliance – Stratford General Hospital

Robert Scheuermann, MLT, BSc., MBA/HCM
GHEST meeting
September 28th, 2013
Presentation Goals

1. *Describe our Rural regional laboratory system*
2. *Explain how DMAIC was used to vastly improve red cell inventory management*
3. *Provide some ways to use our model for some of your own improvements*
InterHospital Laboratory Partnership

1. Stratford General Hospital, Laboratory, HPHA, Stratford, ON
2. St. Mary's Memorial Hospital Laboratory, HPHA, St. Mary's, ON
3. Seaforth Community Hospital Laboratory, HPHA, Seaforth, ON
4. Clinton Public Hospital Laboratory, HPHA, Clinton, ON
5. South Huron Hospital, Exeter, ON
6. Hanover & District Hospital, Hanover, ON
7. Alexandra Marine & General Hospital, Goderich, ON
8. Listowel Memorial Hospital Laboratory, LWHA, Listowel, ON
9. Wingham & District Hospital Laboratory, LWHA, Wingham, ON
10. Groves Memorial Community Hospital, Fergus, ON
11. Louise Marshall Hospital Laboratory, NWHC, Mt. Forest, ON
12. Palmerston District Hospital, NWHC, Palmerston, ON
IHLP Rural Regionalized Healthcare
Background

This initiative, through 2012, served to optimize red blood cell (RBC) conservation and inventory management to deliver a high level of blood transfusion support for 230,000 people over a large rural area of Ontario of approximately 9,000 km2.

Our inventory redistribution system was optimized leveraging the strengths of the InterHospital Laboratory Partnership (IHLP) of twelve hospital laboratories with the support of ORBCoN and Canadian Blood Services (CBS).
The IHLP region annual operational statistics:

- 10,000 Group & Screens
- 6,500 Crossmatches
- 500 Antibody Investigations
- 150 FTEs Total Lab personnel (not individuals)
Ontario Blood Utilization 2008-2011

Inventory Management/Utilization
Provincial 3 Year Data Trend

Ontario RBC All Disposition FY 2008, 2009, 2010

- **2008/09**
  - Tx = 397910
  - Outdate = 5178 (1.3%)
  - Wastage = 8874 (2.2%)
  - Transferred = 13240

- **2009/10**
  - Tx = 390784
  - Outdate = 5373 (1.3%)
  - Wastage = 8910 (2.2%)
  - Transferred = 15399

- **2010/11**
  - Tx = 381043
  - Outdate = 4765 (1.2%)
  - Wastage = 8132 (2.1%)
  - Transferred = 16304
Inventory Management/Utilization
Regional 3 Data Year Trend

Southwest Region
RBC_ALL Disposition FY 2008, 2009, 2010

- **2008/09 Tx = 123454**
  - Outdate = 1159 (0.9%)
  - Wastage = 1959 (1.6%)
  - Transferred = 4577

- **2009/10 Tx = 125812**
  - Outdate = 1654 (1.3%)
  - Wastage = 2567 (2.05)
  - Transferred = 4579

- **2010/11 Tx = 123169**
  - Outdate = 1803 (1.4%)
  - Wastage = 2761 (2.0%)
  - Transferred = 4776
SGH Blood Utilization 2008-2011

**Hospital MAK Code 510115 Stratford General RBC all Component Disposition FY 2008, 2009, 2010**

- **2008/09**
  - Tx = 2300
  - Outdate = 249 (9.7%)
  - Discard, other = 4 (0.2%)
  - Transferred = 1340

- **2009/10**
  - Tx = 2163
  - Outdate = 576 (26.7%)
  - Discard, other = 14 (0.5%)
  - Transferred = 1063

- **2010/11**
  - Tx = 2297
  - Outdate = 614 (26.2%)
  - Discard, other = 38 (1.6%)
  - Transferred = 794

**Current Q2 data for 2011/2012**

- Tx = 1146
- Outdates 253 (17.9%)
- Transferred = 392
As dedicated stewards of Canada’s finite blood resources, the IHLP was committed to markedly decrease the amount of outdated RBCs. The cost of outdated RBCs to the healthcare system for this region in 2011 was approximately $170,000.00 equating to an 11.2% outdated rate.
Study Design/Methods

DMAIC (Define, Measure, Analyze, Improve, Control) Lean Six Sigma Project plan

Define:
A Project Charter detailed the following components:
Problem Statement, Objectives and Goals, Scope, Metrics, Business Needs, and Schedule.
Project Objectives and Goals:
To optimize utilization of red blood cell units in the IHLP:

• Decrease the number of discarded red blood cells to the total number of units received and entered into inventory at the Stratford General Hospital (SGH) Site.

• Increase productivity and excise waste by decreasing the total number of red cell units received by the main hub lab at SGH; thus, less units are received into inventory, which decreases the cycle time in that component of the process.
Study Design/Methods

Project Objectives and Goals (cont.):

• Increase productivity and excise waste by decreasing the blood inventory levels in the region as a whole system; thus, decreasing the number of units we receive and transport throughout the region.

• Decrease the total number of old red cell units, (close to expiry) from the regional labs, received by the main hub lab at SGH.

• As stewards of the national blood supply, decrease the total cost of wasted units to the healthcare system.
### Measure Phase: Project Metrics: Baseline, Goal, and Actuals

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Goal</th>
<th>Actual 2012</th>
<th>Actual 2013 YTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # Units Transfused</td>
<td>1750</td>
<td>&lt;1750</td>
<td>1792</td>
<td>1028 (1542)</td>
</tr>
<tr>
<td>Total # Units Outdated</td>
<td>395</td>
<td>&lt;100</td>
<td>28</td>
<td>7 (12)</td>
</tr>
<tr>
<td>Total # Units Received into Inventory</td>
<td>3533</td>
<td>&lt;3500</td>
<td>3308</td>
<td>1760 (2574)</td>
</tr>
</tbody>
</table>
## Project Metrics: Baseline, Goal, and Actuals

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Goal</th>
<th>Actual 2012</th>
<th>Actual 2013 YTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Outdated/Total # Units Received into Inventory</td>
<td>11.2 %</td>
<td>&lt;3.0 %</td>
<td>0.9 %</td>
<td>0.47%</td>
</tr>
<tr>
<td>Cost ($) of Outdated Red Cell Units/Year</td>
<td>$167,875.00</td>
<td>&lt;$45,050.00</td>
<td>$11,900.00</td>
<td>$3,400.00</td>
</tr>
<tr>
<td>% Transfused Red Cell Units/ Total # Red Cell Units</td>
<td>49.5 %</td>
<td>&gt;50.0 %</td>
<td>54.5 %</td>
<td>58.8 %</td>
</tr>
<tr>
<td>Received into Inventory (Over processing metric)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Project Metrics: Baseline, Goal, and Actuals

<table>
<thead>
<tr>
<th>Metric</th>
<th>Baseline</th>
<th>Goal</th>
<th>Actual 2012</th>
<th>Actual 2013 YTD (Projected 2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # Received (close to expiry) Red Cell Units from IHLP Labs into Inventory</td>
<td>490</td>
<td>&lt;500</td>
<td>566</td>
<td>304 (456)</td>
</tr>
<tr>
<td>Total # Units Transferred (fresh) Red Cell Units to IHLP</td>
<td>615</td>
<td>&lt;500</td>
<td>520</td>
<td>286 (429)</td>
</tr>
</tbody>
</table>
Analyze

The **RBC Inventory Management current state map** and the Ishikawa Diagram allowed for the visualization and identification of possible causes for poor red cell inventory management. The causative agents were prioritized using Pareto Analysis.
## Pareto Chart Data
(from Ishikawa Diagram)

<table>
<thead>
<tr>
<th>Poor Red Cell Inventory Management</th>
<th>Weighted Effect on Inventory Management</th>
<th>Cumulative Weighted Effect</th>
<th>Percentage</th>
<th>80% Marker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large IHLP Region/Multi-Sites</td>
<td>20</td>
<td>20</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Units not Released/Cancelled when Appropriate</td>
<td>18</td>
<td>38</td>
<td>38%</td>
<td>80%</td>
</tr>
<tr>
<td>Inventory Levels based on Comfort/Not Evidence</td>
<td>16</td>
<td>54</td>
<td>54%</td>
<td>80%</td>
</tr>
<tr>
<td>No Lean/Visual Controls eg: Expiring List</td>
<td>14</td>
<td>68</td>
<td>68%</td>
<td>80%</td>
</tr>
<tr>
<td>No FIFO/Organization</td>
<td>12</td>
<td>80</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Lack of Consistent Experience/Knowledge</td>
<td>8</td>
<td>88</td>
<td>88%</td>
<td>80%</td>
</tr>
<tr>
<td>Manual Techniques Prohibited (eg. I.S.)/BBK Automation</td>
<td>6</td>
<td>94</td>
<td>94%</td>
<td>80%</td>
</tr>
</tbody>
</table>
## Pareto Chart Data
(from Ishikawa Diagram, Cont.)

<table>
<thead>
<tr>
<th>Poor Red Cell Inventory Management</th>
<th>Weighted Effect on Inventory Management</th>
<th>Cumulative Weighted Effect</th>
<th>Percentage</th>
<th>80% Marker</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Central Review of Inventory/No Standardized L.I.S.</td>
<td>4</td>
<td>98</td>
<td>98%</td>
<td>80%</td>
</tr>
<tr>
<td>CBS Move to Brampton/Distance to Blood Supplier Increased</td>
<td>2</td>
<td>100</td>
<td>100%</td>
<td>80%</td>
</tr>
</tbody>
</table>
Pareto Chart (Cont.)

- Large IHP Region/Multi-Sites
- Units not Released/Cancelled when...
- Inventory Levels based on Comfort/Not...
- Lack of Consistent Experience/Knowledge
- Manual Techniques Prohibited (eg...)
- No Central Review of Inventory/No...
- CBS Move to Brampton/Distance to Blood...

Weighted Effect on Inventory Management

- Percentage
- 80% Marker
Improve Phase: Pareto Chart Data
(from Ishikawa Diagram, Cont.)

There are 9 main reasons that lend to poor red cell inventory in our rural region (IHLP):

1. Large IHLP Region with multi-sites
   - Requirements of the partner labs
   - Expectations of the partner labs
2. Units are not released or cancelled when appropriate
Improve Phase:

Pareto Chart Data
(from Ishikawa Diagram, Cont.)

Dr. Robert Liston
3. Minimum and maximum inventory levels based on comfort and not evidence
# Too Little – Too Comfortable

<table>
<thead>
<tr>
<th>ABO/Rh</th>
<th>WAS (NOV 2011)</th>
<th>THEN (DEC 2011)</th>
<th>NOW FEB 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>O+</td>
<td>45</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>O-</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>A+</td>
<td>45</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>A-</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>B+</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>B-</td>
<td>8</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>AB</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
4. No Lean® visual controls
Pareto Chart Data
(from Ishikawa Diagram, Cont.)

5. No OIFO (Oldest-In-First-Out) organization of red cell units
Choice is NOT an option for expiring red cell units!

I agree O-positive is rather nice, but my favourite by far is AB-negative...
6. Lack of consistent technical knowledge and experience
7. Unable to leverage best technology available
8. No standardized Laboratory Information System (L.I.S.).
9. Centralization of blood supply services
Control (Sustain) Phase

Methods used to maintain the improvements or to continuously improve are documented in the Control phase.
Results

The results of the year-long project were remarkable. In the past year and half, efforts made to address inventory levels have resulted in a decrease of outdate rates from 20% in 2010/11, to 11% in 2011/12, to an outstanding low of <0.5% in 2013 to date.

Approximately $156,000.00 was saved to the Healthcare system in one calendar year 2012, and sustained through 2013 (Total savings >$300,000.00).
Presentation Summary

Know where you’re starting from to see where you need to go:

- 6σ/DMAIC project plan
- Gantt Chart with timelines for deliverables
- Current State Process Map
- Ishikawa Diagram to visualize multiple causes
- Pareto Analysis
- Develop metrics/performance measures or goals
Take-Away Messages

Consistent and constant messages to your team
Need Passion to want to make a difference.
Celebrate your wins and improved performance regularly
Use positive momentum to continually lower the bar to 0% Outdates!
An Inventory Management Champion does not have to be a Blood Bank subject expert to make a difference.

Someone with Technical expertise in Blood Bank ≠ Excellent Inventory Management.

Need to have passion to be a steward of our nation’s finite blood supply.
Presentation Summary

At SGH, we are getting pretty close to a Just-In-Time situation for red blood cell inventory management in the IHLP region.

Thanks for listening!

Email:
Robert.Scheuermann@hpha.ca