The Purchase and Implementation of Smart Infusion Pump Technology: Lessons Learned at a Multi-Hospital System

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Background

- Leading Integrated Delivery Network in South Jersey (20 miles outside Philadelphia)
  - 4 Acute Care Hospitals (950 beds)
  - 2 Long Term Care Facilities
  - Outpatient Health Centers, Outpatient Surgery Centers, Home Care and Fitness Center

- Non-Profit Organization
  - Employs 7,300 clinical and administrative personnel
  - 1,800 medical staff members

- Early adopter of Six Sigma in healthcare
Objectives

- Share experiences regarding the purchase and implementation of Smart Infusion Pumps
- Demonstrate the use of Six Sigma and the principles of DMAIC methodology to improve utilization of the medication library to achieve optimal compliance
- Understand the utilization of technology as a catalyst to the culture of safety journey
Timeline of Events

- March 2004 - Leadership Approval of Smart Infusion Pumps
- Vendor evaluations, trials, RFP process occurred over 16 month period
- July – November 2005 - Contract awarded, implementation plan developed, including IT and drug library build
- March 2006 - Virtua Health replaced over 800 IV infusion pumps with Hospira’s Plum A+ pump and implemented use of drug library and began trending library utilization
- January 2007 - Trending reports indicated utilization of the Hospira pump MedNet® Safety Software was low

June 2007 - Hospira Six Sigma Team Kick off
Defining the Problem

<table>
<thead>
<tr>
<th>Noted increased overrides and poor compliance</th>
<th>Utilization of safety software low (~12%)</th>
<th>Nursing, pharmacy, &amp; clinical education attempted to drive increased compliance</th>
<th>Virtua &amp; Hospira collaborated to review CQI data</th>
<th>Hospira Six Sigma Team Kick off project</th>
<th>Interdisciplinary team using DMAIC principles to implement change and provide overall process improvement</th>
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<tbody>
<tr>
<td>January 2007</td>
<td>June 2007</td>
<td>June 29, 2007</td>
<td>Present</td>
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Hospira Pumps were implemented in March 2006. The May 2006 compliance results were 12.85%.
What is Six Sigma?

• **Measure of Quality**

• **Process For Continuous Improvement**

• **Enabler for Culture Change**
## DMAIC Methodology

<table>
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<tr>
<th>Define</th>
<th>Define (Who are the customers? What are the customers’ requirements for products and services? What are the customer expectations?)</th>
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<tbody>
<tr>
<td></td>
<td><em>For Hospira, the customer is Virtua, as well as the registered nurses and patients</em></td>
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<tr>
<td>Measure</td>
<td>Measure the performance</td>
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<td><em>For Hospira, we are measuring compliance with the utilization of the MedNet® safety software</em></td>
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<td>Analyze</td>
<td>Analyze the data collected and process map to determine root causes of defects and opportunities for improvement</td>
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<td><em>For Hospira, key root causes of poor compliance included: knowledge deficit, confidence in own skill, and time issues</em></td>
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<td>Improve</td>
<td>Improve the target process by designing creative solutions to fix and prevent problems</td>
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<td><em>For Hospira, improvement is around education (competencies and real time), availability of pumps, and continuous monitoring by APNs</em></td>
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<tr>
<td>Control</td>
<td>Control the improvements to keep the process on the new course</td>
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<td><em>For Hospira, this is ongoing monitoring of compliance reports</em></td>
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Customer Need
- Nurses will adhere to using the MedNet Library prior to administration of IV medications
- Enhance patient safety by reducing the frequency and severity of medication errors for medications delivered intravenously
- Develop process for integrating MedNet reports into current Process Improvement/Continued Quality Improvement plan
- Revise reporting parameters to meet nursing management needs to monitor and take action when appropriate
- Maintain and update library on a more consistent basis

Critical To Quality:
- Increase overall compliance in the utilization of MedNet Library to 30% (Focus on Critical Care areas)

Prioritised Project Y
- Y1: Number of times yes is selected to “drug library” when programming and administering IV medications
- Y2: Number of hours between the upload transfer and when new library is accepted at the pump
62% of quality efforts fail, we think from lack of attention to the cultural and people side of change — the “A.”
The goals of the Hospira Project are aligned with the Virtua STAR

- Supports a culture of safety
- State of art patient care
- Decrease the incidence of medication errors related to pumps
- Utilize data to develop, implement and monitor continuous quality improvement
- Increase nursing staff’s competency in use of technology
- Reduce cost of treatment with decreasing medication errors
Lessons Learned
“Hindsight is 20/20”

- Pharmacy – standardized medication policies, doses, concentrations and review standing orders
- IT- understanding server capability, wireless capability, bad pump behavior
- Departmental roles and responsibilities - Biomed, IT, CSR, Operations
- Project Management (facility and vendor) is crucial
- Assessment of number of pumps needed – evaluation of current policies
- Inventory/Asset Management – do you have a current system?
- Underestimation of work load by all stakeholders
- Understanding of data availability…shortcomings
- Poor compliance vs. high cost of equipment
- Current “culture of safety” within the organization not clearly understood
Lessons Learned

"Moving Forward"

- Provide managers with unit specific data and demand accountability
- Clearly written nursing practice P&Ps need to be in place and implemented
- Clearly communicate the difference between old/new equipment capabilities during roll-out
- Recognize the value of the Advanced Practice Nurses (or other entity) in initiatives
- Vendor relationships/partnerships are critical to success
- Global metric for performance improvement as a system
- Monitor IV related adverse drug events and evaluate...we have not had an adverse event since project began, and heightened awareness
- Library pushes and server require constant monitoring
- Role for System Administrator
- Use of Six Sigma Methods and tools to drive improvement
Overall Compliance Since Implementation of Hospira Infusion Pump

% Compliance

- Pre Six Sigma Project
- Six Sigma Project
Virtua Health

Coming in 2010 - Healthcare Campus of the Future
Questions?