THE ROLE OF BIOMEDICAL ENGINEERING IN HEALTH TECHNOLOGY MANAGEMENT

THE OPPORTUNITIES AND CHALLENGES IN A LOCAL HEALTH CARE SETTING

2017 CADTH SYMPOSIUM

HAL HILFI, CORPORATE MANAGER
THE OTTAWA HOSPITAL
APRIL 25, 2017
1. The role of Biomedical Engineers in testing, maintaining, and supporting the use of medical devices and equipment (Case study)

2. The potential to expand Biomedical Engineering roles and responsibilities in health technology management
Approx. 12,000 employees

Serving Eastern Ontario & Western Quebec population

Bed cap: 1,130 beds

Affiliated with:

- U of Ottawa Heart Institute & Faculty of Medicine
- Ottawa Hospital Research Institute

Biomed staff: 31 Biomed techs + 1 engineer covering 3 campuses

Medical assets: ~22,600
KEY SERVICES PROVIDED

Hours of Operation
✓ Monday to Friday: 0700 - 1600
✓ On-Call Coverage outside normal hours including weekends and statutory holidays

Primary Service
✓ Medical equipment emergency support
✓ Corrective maintenance
✓ Preventative Maintenance

Secondary Service
✓ Consultation and evaluation of new technology
✓ Special Projects
MEDICAL DEVICE LIFECYCLE

- 22,600 Active assets
- Approx. 10,000 PM hours

Medical Devices Lifecycle Management

- Planning
- Selection and Procurement
- Acceptance & Deployment
- Monitoring & Metrics
- End of Support (EoS) & (RFS)
- Risk Management
- Quality Impact
- Maintenance
- Cost Impact
CASE STUDY
INFUSION PUMPS
THE INFUSION PUMP STORY

• Colleague Pump

‘Colleague’ Pump Journey at TOH

2007

• TOH acquired Baxter Colleague pumps

2010

• FDA recall

2013

• Colleague version P1.7 approved by Health Canada

Decision Point
WHY CHANGE TO A ‘NEW’ PUMP?

• Challenges

➤ Address pump safety issues related to battery reliability
➤ DERS compliance
➤ Rapid wireless deployment of Master Drug Library (MDL)
➤ Asset utilization dashboard & optimization
➤ Continuous Quality Improvement (CQI) data & analytics
➤ Future auto-documentation (integration with EMR)
Old Pumps

New Pump

Qty = 1600 pumps
Implementation of wireless smart infusion pumps

✓ Wireless capability (Wi-Fi)
✓ Master Drug Library (MDL)
✓ CQI functionality
✓ Utilization reporting
✓ Consumable contract not impacted
RTLS Tag

Centralized Pool

Color Coded Asset Tag
1) Measure ‘DERS’ compliance with the implementation of wireless, smart infusion pumps at TOH. (DERS = Dose Error Reduction System)

2) Each CCA, analyze frequency of:
   a) Hard limits attempted
   b) Soft limits exceeded and pullbacks

3) Design and initiate CQI data analysis process to monitor performance of wireless, smart infusion pump system
Study design
• Descriptive study of 7 CCAs infusion data - Anesthesia OR, Critical Care, BU, Med/Surg., Neonatal, Oncology

Data collection
• 1,600 Spectrum pumps across TOH
• 12 months data

Data analysis
• Data collected is collected and analyzed on a quarterly basis by Biomed Engineering
• Report is presented to ‘Safe Medication Practice’ committee
• Feedback provided to CCA educators and pharmacy for proper actions
CQI DATA ANALYSIS RESULTS
### DERS COMPLIANCE (%) PER MONTH BY (CCA)

<table>
<thead>
<tr>
<th>AREA</th>
<th>APR 2016</th>
<th>MAY</th>
<th>JUNE</th>
<th>JULY</th>
<th>AUG</th>
<th>SEPT</th>
<th>OCT</th>
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<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>AVERAGE</th>
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<tbody>
<tr>
<td>Anesthesia (OR)</td>
<td>88.4%</td>
<td>88.3%</td>
<td>85.8%</td>
<td>84.1%</td>
<td>83.6%</td>
<td>85.5%</td>
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<td>84.3%</td>
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<td>84.7%</td>
<td>84.1%</td>
<td>86.0%</td>
<td>84.9%</td>
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<tr>
<td>Birthing Unit</td>
<td>99.6%</td>
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<td>Critical Care</td>
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<td>Hemodialysis</td>
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<td>Medicine/Surgery</td>
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<td>Neonatal</td>
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Hospital’s Weighted Average DERS compliance is > 98%
PERCENTAGE HARD LIMIT ATTEMPTS BY CARE AREA BASED ON DERS INFUSIONS JAN – MAR 2017

- Birthing Unit: 3.56%
- Critical Care: 3.00%
- Anesthesia (OR): 2.70%
- Medicine/Surgery: 2.49%
- Hemodialysis: 2.97%
- Neonatal: 3.05%
- Oncology: 1.15%
CONCLUSIONS

- Designed and proposed CQI data analysis process
- DERS compliance > 98%
- Top 5 drugs in each CCA are identified & investigated
- Soft and hard limits attempted analyzed quarterly and adjusted as necessary
- Feedback to CCA educators provided
- Appropriate action taken to improve MDL
- Compliance with Accreditation Canada ROP by providing data report to ‘Safe Medication Practice’ committee
**RECOMMENDED VS. CURRENT MODELS COMPARISON**

### Clinical Engineering Health Technology Management Services (Recommended)
- In addition to ‘current’ services:
- Centralized technology assessment group of experts
- Complete evaluation of new technologies prior to acquisition (planning phase), including life cycle cost analysis (TCO)
- Assessment of service contract req’t and vendor management (out of country repairs)
- On-going (lifecycle) medical equipment management program (risk analyses, repair cost control elements, CI)
- Comprehensive device tracking (Alerts & Recalls) management program
- Compliance with government and accrediting standards
- Comprehensive and ‘proactive’ EoS program

### Biomedical Engineering Health Technology Management Services (Current)
- Partial evaluation of new equipment – mostly corporate fleets
- Inspection & testing (functional, safety, performance)
- Preventive maintenance
- Corrective maintenance
- Calibration
- Incident reporting & investigation
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