The ROI for Electronic Vital Sign Equipment at Every Bedside

Dr. Glen Geiger
Chief Medical Information Officer
The Ottawa Hospital
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Conflict of interest disclosure

DR. GLEN GEIGER, BASC, MDCM, FRCPC, MAŚC, MBA
HAS NO REAL OR APPARENT CONFLICTS OF INTEREST TO REPORT.
Learning Objectives

1. Apply process improvement techniques to a 'real world' example of clinical process change, specifically the transition to online vital signs documentation

2. Analyze the results of time motion studies of clinical workflow to determine the impact of the proposed investment on nursing efficiency

3. Define a clinical return on investment for a multi-million dollar capital infrastructure project
Satisfaction: The electronic vital signs process redesign delivered high levels of satisfaction for nurses and physicians.

Treatment: The new workflow improved patient safety by verifying the patient's bar-code wristband prior to collecting the patient's vitals and automatically transmitting the results directly to the EMR.

Electronic Information/Data: The provision of patient vitals in the EMR allows clinicians to trend vitals over time, and view the information graphically.

Patient Engagement/Population Management: The provision of dedicated bedside vital signs devices has demonstrated our commitment to patient safety through reducing the risk of transmissible infections through equipment sharing.

Savings: This project allowed us to realize time savings of 250,000 hours per year, equivalent to $11 million dollars or 1% of our operating budget.
Outline

• Our Story
• I’ve got an idea!
• The ROI
• Implementation
THE OTTAWA HOSPITAL

• 1100 Beds
• $1.2 B Operating Budget
• 47,000 Admissions/Year
• 1 Million Ambulatory Visit
• Average Occupancy ~ 104%

The Hospital’s Vision - “To provide each patient with the world-class care, exceptional service and compassion that we would want for our loved ones”
## INNOVATION AND CHANGE AT THE OTTAWA HOSPITAL

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Customization of Electronic Patient Registration System</td>
</tr>
<tr>
<td>2001</td>
<td>Web-based Electronic Medical Record Viewer</td>
</tr>
<tr>
<td>2007</td>
<td>Full integration of Surgical Scheduling System with Instrument Picking and Carousel System</td>
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<tr>
<td>2009</td>
<td>Corporate Clinical Data Warehousing and Dashboards</td>
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<tr>
<td>2010</td>
<td>Mobile Electronic Health Record at the Ottawa Hospital</td>
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<tr>
<td>2011</td>
<td>Introduction of Care Process Management and Tools</td>
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<tr>
<td>2012</td>
<td>Mobile Electronic Physician Ordering for Lab and DI / Custom Clinical Whiteboards</td>
</tr>
<tr>
<td>2012</td>
<td>Physician Self-edit documentation with integrated Speech Recognition</td>
</tr>
<tr>
<td>2013</td>
<td>Transition to Electronic Medication Reconciliation</td>
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<tr>
<td>2014</td>
<td>Electronic Handover Tool</td>
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The Ottawa Hospital runs a custom mobile EMR and has deployed over 3000 iPads to clinicians.

Our Clinical Mobile App allows users to access:
- Lab Results / DI reports
- PACS images
- Complete Electronic Documents

The Ottawa Hospital became the first hospital in the world to place an electronic order using a native iPad application on March 27, 2012!

We have now added:
- Electronic Medication Reconciliation
- Electronic Handover
So wait…you’re expecting me to copy the patient’s vital signs from one computer…to another computer? Are you mental?
So the Ottawa Hospital IS Team began to analyze the feasibility of uploading vital signs directly from the mobile spot vitals equipment.
SURE ENOUGH, DIRECT INTEGRATION OVER WIFI PROVED TO BE TECHNICALLY FEASIBLE
A lot of my staff don’t bother with those machines because it takes too much time. And what are you going to do in the isolation rooms?
SO I TOOK A LONG HARD LOOK AT THE WARDS
THE IDEA

It wouldn’t be feasible to install a spot vitals device at every bedside…would it?
THE RETURN ON INVESTMENT ANALYSIS
The Biomed and IS teams undertook an observational Time-Motion Study with the Nursing staff to determine the impact on nursing workflow if we put dedicated multi-function vital sign monitors at every bedside.

The comparison was to existing spot-vitals devices and manual documentation:
- Non-invasive BP cuffs
- Traditional syphygmomanometers already at the patient bedside in most rooms
- Digital Thermometers
- Electronic Oximeters
TIME MOTION STUDY RESULTS

Average Time to Collect/Return Vital Sign Monitors per Patient Vitals

Event:
- Average of Collect plus Return Equipment (min)
- Max of Collect plus Return Equipment (min)
- Min of Collect plus Return Equipment (min)

Unit where Time Study was Conducted (General):
- 5NW
- 6E
- 6W
- 7E
- 7NCC
- 7NWE
- CCU

Time in Minutes

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## IMPACT ON NURSING TIME WITH A DEVICE AT EVERY BEDSIDE

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Estimated Savings/Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eliminate Nursing Time to collect/return mobile equipment</td>
<td>2.5 minutes per event (confidence interval of 1.7 to 3.3 minutes 95% confidence level)</td>
</tr>
<tr>
<td>Eliminate Nursing Time to Clean between patients</td>
<td>37 seconds per event (confidence interval of 29 to 45 seconds 95% confidence interval)</td>
</tr>
<tr>
<td>Total non-value added time added to each vital measurement event</td>
<td>3.0 minutes per event</td>
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</tbody>
</table>
# Extrapolation of Benefits Across All Acute Care Wards

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Estimated Savings/Benefit</th>
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<tbody>
<tr>
<td>Extrapolating 24 minutes per 12 hour shift time, across TOH for installing a spot vitals device at every bedside</td>
<td>252,000 hours of nursing time $11.3 million/yr worth of nursing time (soft saving)</td>
</tr>
<tr>
<td>Further time savings of 30 seconds per observation from not having to transcribe vitals and communicate them to physicians</td>
<td>42,000 hours of nursing time $1.8 million/yr of nursing time</td>
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</tbody>
</table>
Infection Control: Reduce risk of vitals sign monitors (including cuffs) being moved between patients without cleaning

Quality of Care: Improve accuracy of devices
  - Currently devices are not calibrated as per manufacturer requirement due to mobility and lack of Biomed resources, new technologies allow for remote calibration

Quality of Care: Eliminate average of 2 hour delay between vitals measurement and transcription onto paper chart.

Quality of Care: Eliminate transcription error and lost vitals measurement

Supports the de-clutter initiative

Support environmental initiative around mercury
# ROI Calculation on Bedside Vital Signs / E-Vitals

<table>
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<tr>
<th>Cost</th>
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<tr>
<td>Contract Cost of 1800 Vital Sign Monitor including integration</td>
<td>$6 million</td>
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<tr>
<th>Hard Savings over Five Years</th>
<th></th>
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<tbody>
<tr>
<td>Estimate of Spending on Vital Sign Monitor replacement due to age</td>
<td>1.76 million</td>
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<tr>
<td>Estimate of Spending on Vital Sign Monitors due to shortages</td>
<td>0.40 million</td>
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<tr>
<td>Estimate of spending on replacement Oximeters</td>
<td>0.42 million</td>
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<tr>
<td>Estimate of spending on replacement Thermometers</td>
<td>0.07 million</td>
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| Hard Dollar Cost to Fund Initiative                                  | $3.33 million |

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<th>Soft Savings</th>
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<td>Annual Nursing Time savings - 252,000 hours / year - Recurring</td>
<td>$11.3 Million</td>
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On the basis of a strong financial business case the Ottawa Hospital implemented electronic vital signs equipment at every bedside throughout the inpatient med-surg care areas.
VITAL SIGNS EQUIPMENT REPLACEMENT

• New Equipment was purchased and installed at almost 1000 beds in Acute Care Med Surg
  – The Equipment measures NIBP, Temp, SPO2, Pulse
  – Patient modifiers and qualifiers (e.g. pain and respiration) can be documented on the device
BEDSIDE VITALS / E-VITALS WORKFLOW

1 - Scan Staff ID badge
2 - Scan Patient ID wristband
3 - Take Patient Vitals
4 - Confirm vitals and send

Instantly Available to Everyone
The vital sign monitor is intuitive and easy to use.

The wall mounted monitor at the patient bedside is a positive.

The vital sign monitor meets clinical needs for BP, Temp and SPO2 measurement.

I would recommend a similar Vital Sign Monitor deployment to other units.
E-VITALS WENT LIVE ON AUG 12TH, 2014
AND THIS IS WHAT HAPPENED

eVitals - Number of Observations / Month
SUMMARY OF BENEFITS

Through the installation of ‘State-of-the-Art’ Bedside Spot Vital Signs monitors and the integration of these devices directly into the Electronic Medical Record we achieved:

- **4,144,006** patient vital signs automatically written into the Electronic Health Record within the first year

- Nursing time savings of **252,000** hours per year from not having to find and clean the legacy mobile vital signs equipment

- Soft Dollar Savings of **$11.3 million** per year on a net capital investment of **$3.3 million**
Satisfaction: The electronic vital signs process redesign delivered high levels of satisfaction for nurses and physicians.

Treatment: The new workflow improved patient safety by verifying the patient's bar-code wristband prior to collecting the patient's vitals and automatically transmitting the results directly to the EMR.

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ggeiger@toh.on.ca