Collaborating to Implement Evidence-Based Medicine Tools

The St. John Sepsis Agent and the Interdisciplinary Sepsis Advisor
Learning Objectives

• Describe an effective implementation strategy for clinical decision support tools.
• Identify the importance of inter-professional collaboration throughout the system design life cycle.
• Summarize the impact of transformational leadership throughout this project.
Disclaimer

• This presentation is based off of a presentation given at the Cerner Health Conference 2016
• Presented by Denise Addis, Michele Curcio, AnneMarie Scekeres, and W. Michael Widmann
Excella Health
Our Mission
“To improve the health and well-being of every life we touch.”

Our Vision
We will be a high-quality, value driven community health and wellness system. We will proactively manage the health of the population we serve. Our caregivers and our community will work together to prevent disease or manage it with early intervention. We will continuously improve through education, communication and effective management. We will measure our progress by our communities’ willingness to recommend us and by performance in national quality standards.
The Excela Way

Positive Experience

We Put Patients First

Our Behavioral Standards
A compassionate and courteous approach.

Our Values
Integrity, Teamwork, Putting Patients First, Quality, Financial Stewardship, People

Our Mission
“To improve the health and well-being of every life we touch.”

Excela Health
Project Leadership
Quality / Patient Safety Integration

- Data Driven Decision Making
- 100% Perfect Patient Care
- Evidenced-based medicine, best practice, standard of care
- Clinical Decision Support Tools
Transformational Leadership

A leadership style where one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality.
Transformational Leadership Process

- Developing the Vision
- Selling the Vision
- Finding the Way Forward
- Leading the Charge
Talent Needed to be Successful

Not one of us is as good as all of us!!!
Leadership and Team Collaboration

• Provider Champions and Nurse Leads
  – Facilitated inquiry and feedback
  – Engaged colleagues and front-line users
  – Supported utilization, workflow, rationale
Team Integration

• Cerner Consultant Collaboration
  – Redesign by leveraging utilization to align the clinical decision support Advisor tools with the Lighthouse quality measure widget tools
Pre-Implementation Strategy
Approach to project planning

- Identify core project team members
- Identify clinical staff
- Performed GAP Analysis
- Develop Time Line
- Early education plan
- Early communication plan
Project Timeline

- Post Conversion Support
- Go-Live
- Integrated Testing
- Training
- Future State Validation
- Future State Review
- Current State Review
- 1/1/2015
- 12/2/2015
- 1/2/2016
- 2/2/2016
- 4/4/2016
- 5/5/2016
- 6/5/2016
- Excela Health
Clinical Staff

• Nursing representation for all three facilities
  – Emergency Department
  – CCU/ICU
  – Med/Surg
  – PCU

• Physician Champions

• Hospitalist Management Team
Gap Analysis / Project Readiness Review

• Foreign ED System
  – Weight documentation
  – No interface
• Verbal Orders
• No hard stop/requirement to use evidenced-based power plans
• Real time documentation of diagnosis and problems
• Discrete documentation vs. note/free text documentation
Early Education/Communication

- Demo of solution to core team
- Demo of solution to broader audience
- Early involvement of project participants
- Early communication - involvement of marketing
WE NEED A HERO!
SEPSIS AND VTE ADVISOR TOOLS PROVIDE CLINICAL DECISION SUPPORT DATA MINING AND DECISION LOGIC

SEPSIS ADVISOR
- Surveillance of sepsis data based upon the St. John Sepsis Algorithm
- System continually monitors patient results and alerts end-users upon recognition of SIRS or SEPSIS criteria
- Clinicians receive alert when patient meets SIRS or Sepsis criteria
- Provider uses Sepsis Management Advisor to treat and manage patient in compliance with Surviving Sepsis bundle
- Nurse completes orders placed by provider in compliance with Surviving Sepsis bundles

VTE ADVISOR
Collaborate to Stop the Clot! Assess, Prophylaxis, Monitor!
- Treatment in accordance with American College of Chest Physicians (ACCP) Guidelines
- Assess VTE Risk on Admission, upon transfer, and with significant change in patient status (i.e. surgical procedure)
- Individual Prophylaxis according to risk level with recognition of contraindications, renal status, weight, etc.
- Monitor for adverse events, adjust prophylaxis based upon change in status, and provide patient education

SEPSIS AND VTE ADVISOR COMING SOON!

Excella Health
Inter-professional Collaboration Through Build and Design
Design Decisions

- Access to the Advisor
- Population Groups
- Suppression Criteria
- Current Workflow - continue or not continue
- Who would receive what alerts
- Customizing alerting to fit our needs
Project Education Plan
Education through Adult Learning

- Why?
- Self-directed Learning
- Utilize Learner Experience
- Solve Real Problems
- Immediate Application
- Gain Buy-in (internal motivation)
Sepsis

• A systemic, deleterious host response to infection” (Dellinger et al, 2013, p.583)

• “Severe Sepsis and septic shock are major healthcare problems, affecting millions of people around the world each year, killing one in four (and often more) and increasing in incidence” (Dellinger et al, 2013, p.583)

• “Severe sepsis … [has] an extremely high mortality rate of 30 to 60 percent” (Martin, Armola, & McQuillan, 2010)
Sepsis

- “Mortality from sepsis is greater than breast cancer, lung cancer, and colon cancer combined” (Martin, Armola, & McQuillan, 2010)

- “Is the number one cause of death in the non-coronary ICU.” (AACN, 2010)

- “Sepsis affects more than 750,000 patients and accounts for 215,000 deaths in the United States each year, at a cost of $16 billion” (Picard et al., 2006, p. 43)
## Excela Health Sepsis Screen

<table>
<thead>
<tr>
<th>Factor</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Tympanic</td>
<td>DegC</td>
</tr>
<tr>
<td>Temperature Temporal Artery</td>
<td>DegC</td>
</tr>
<tr>
<td>Temperature Oral</td>
<td>DegC</td>
</tr>
<tr>
<td>Temperature Rectal</td>
<td>DegC</td>
</tr>
<tr>
<td>Temperature Axillary</td>
<td>DegC</td>
</tr>
<tr>
<td>Temperature Intravascular</td>
<td>DegC</td>
</tr>
<tr>
<td>Is Temperature 38.3 C?</td>
<td></td>
</tr>
<tr>
<td>Is Temperature &lt; 36 C (98.8 F)?</td>
<td></td>
</tr>
<tr>
<td>Heart Rate Monitor</td>
<td>bpm</td>
</tr>
<tr>
<td>Peripheral Pulse Rate</td>
<td>bpm</td>
</tr>
<tr>
<td>Apical Heart Rate</td>
<td>bpm</td>
</tr>
<tr>
<td>Is Heart rate &gt; 90 bpm?</td>
<td></td>
</tr>
<tr>
<td>SBP/DBP Cuff</td>
<td>mmHg</td>
</tr>
<tr>
<td>Mean Arterial Pressure, Cuff</td>
<td>mmHg</td>
</tr>
<tr>
<td>Mean Arterial Pressure, Line</td>
<td>mmHg</td>
</tr>
<tr>
<td>Is SBP &lt; 90 or MAP &lt; 70 mmHg?</td>
<td></td>
</tr>
<tr>
<td>SBP decrease &gt; 40 mmHg from base</td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td></td>
</tr>
<tr>
<td>Is Respiratory rate &gt; 20</td>
<td></td>
</tr>
<tr>
<td>SpO2</td>
<td></td>
</tr>
<tr>
<td>FIO2</td>
<td></td>
</tr>
<tr>
<td>Oxygen Therapy</td>
<td></td>
</tr>
<tr>
<td>Oxygen Flow Rate</td>
<td></td>
</tr>
<tr>
<td>Increased O2 use to maintain SaO2</td>
<td></td>
</tr>
<tr>
<td>Level of Consciousness</td>
<td></td>
</tr>
</tbody>
</table>

### Sepsis Advisor

<table>
<thead>
<tr>
<th>Order Name</th>
<th>Status</th>
<th>Start</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis Advisor</td>
<td>Ordered</td>
<td>03/11/2016 15:13</td>
<td>03/11/16 15:13:00 EST, Within 24 hours EST</td>
</tr>
</tbody>
</table>
Project Implementation
Go-Live Support

• Three facilities at the same time
• Command Center
• Rounding Schedule
• Folders/Education for rounders
• Elbow Support
• Use of real time reports
Go-Live Support Continued

• Daily wrap-up call
• Project status update via e-mail distribution
• Hints and Tips
Post Implementation
Post Go-Live

• Weekly calls with core project team
  – Discuss provider feedback
  – Identify barriers to adoption
  – Trouble Shoot Technical issues
  – Optimize solution
  – Review reports
Temperature vs Diagnosis

![Temperature vs Diagnosis Graph]
Heart Rate vs Diagnosis

- Frequency vs Heart Rate
- Comparison of Heart Rate with and without Diagnosis
- Data representation with shaded bars for each heart rate bin
Lessons Learned

• Ongoing education plan and strategy
  – One on one instruction

• Physician Champions and Early Adopters

• Addressing Alert Fatigue
  – Medical Surgical units versus Critical Care unit Algorithms

• Demonstration of Value Added by:
  – Sharing Data with providers and staff
  – Improved Mortality Rates
Quality Outcomes
Sepsis Analysis Details

- **Diagnosis Codes:**
  - **Septicemia:** 038.X
  - **SIRS:** R65.10, R65.11
  - **Sepsis:** 995.91, 771.81, A02.1, A22.7, A26.7, A32.7, A40.0, A40.1, A40.3, A40.8, A40.90, A40.9, A41.01, A41.02, A41.1, A41.2, A41.3, A41.4, A41.50, A41.51, A41.52, A41.53, A41.59, A41.81, A41.89, A41.9, A42.7, A54.86, B37.7
  - **Severe Sepsis:** 995.92, R65.20
  - **Septic Shock:** 785.52, R65.21

- **Go Live:** May 3, 2016
Alert Metric Definitions

- **True Positive (TP):** Alert Positive and Condition Positive (Hit – a sepsis patient that had an alert)
- **False Positive (FP):** Alert Positive and Condition Negative (False Alarm – A non-sepsis patient that had an alert)
- **False Negative (FN):** Alert Negative and Condition Positive (Miss – A sepsis patient that did not have an alert)
- **True Negative (TN):** Alert Negative and Condition Negative (Correct Rejection – A non-sepsis patient that did not have an alert)

- **Sensitivity:** Proportion of Condition Positives that are correctly identified as such. $\frac{TP}{TP + FN}$
- **Specificity:** Proportion of Condition Negatives that are correctly identified as such. $\frac{TN}{TN + FP}$

- **Positive Predictive Value:** Proportion of Alert Positives that are True Positives. $\frac{TP}{TP + FP}$
- **Negative Predictive Value:** Proportion of Alert Negatives that are True Negatives. $\frac{TN}{TN + FN}$
Sepsis Histogram
Triggering Criteria

<table>
<thead>
<tr>
<th>Metric</th>
<th>Count</th>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>WBC</td>
<td>5838</td>
<td>75%</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>5794</td>
<td>74%</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>3458</td>
<td>44%</td>
</tr>
<tr>
<td>Temperature</td>
<td>3446</td>
<td>44%</td>
</tr>
<tr>
<td>Glucose</td>
<td>1596</td>
<td>21%</td>
</tr>
<tr>
<td>Lactate</td>
<td>1566</td>
<td>20%</td>
</tr>
<tr>
<td>MAP</td>
<td>1248</td>
<td>16%</td>
</tr>
<tr>
<td>SBP</td>
<td>939</td>
<td>12%</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>661</td>
<td>8%</td>
</tr>
<tr>
<td>Bands</td>
<td>514</td>
<td>7%</td>
</tr>
<tr>
<td>Creatinine</td>
<td>406</td>
<td>5%</td>
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Alert Timing

Frequency

Time between last criteria and alert
Sensitivity and Specificity

<table>
<thead>
<tr>
<th>Month</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive Predictive Value</th>
<th>Negative Predictive Value</th>
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<tbody>
<tr>
<td>October</td>
<td>90.00%</td>
<td>80.00%</td>
<td></td>
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<tr>
<td>November</td>
<td>95.00%</td>
<td>85.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>92.00%</td>
<td>82.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>91.00%</td>
<td>81.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>90.00%</td>
<td>80.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>92.00%</td>
<td>82.00%</td>
<td></td>
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</tbody>
</table>
Excela Health Sepsis
Severe Sepsis and Septic Shock
10/1/2015 - 1/31/2017 Discharges

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Frick</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>33.3</td>
<td>61.5</td>
<td>66.7</td>
<td>54.6</td>
<td>53.9</td>
<td>68.8</td>
<td>42.9</td>
<td>53.3</td>
<td>35.7</td>
<td>41.2</td>
<td>42.9</td>
<td>33.3</td>
</tr>
<tr>
<td>Latrobe</td>
<td>33.3</td>
<td>42.9</td>
<td>38.5</td>
<td>52.9</td>
<td>41.7</td>
<td>48</td>
<td>53.9</td>
<td>41.2</td>
<td>50</td>
<td>41.7</td>
<td>52.9</td>
<td>33.3</td>
<td>52.9</td>
<td>36.4</td>
<td>42.9</td>
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<tr>
<td>Westmd</td>
<td>63.6</td>
<td>45.5</td>
<td>12.5</td>
<td>46.2</td>
<td>37.5</td>
<td>40</td>
<td>42.9</td>
<td>63.6</td>
<td>45.5</td>
<td>42.1</td>
<td>52.6</td>
<td>47.6</td>
<td>33.3</td>
<td>28.6</td>
<td>60.0</td>
</tr>
</tbody>
</table>
Crude Mortality Rate

Overall Sepsis
Overall Health System
Linear (Overall Sepsis)
Linear (Overall Health System)