Lakota Health System: eICU Pilot for Pine Ridge Indian Health Services Hospital

MMI 404 Health Enterprise Operations

Group 1
Rhona Banayat
Ralph Garcia
Nicole Hawkins
Mike Nowak

November 20, 2011
Presentation Summary

• Introduction
• Lakota Health System Mission
• Pine Ridge Indian Reservation and Health Service Hospital
• eICU Pilot Program Proposal
  – Rationale and Return on Investment
  – Clinical Approach
  – Implementation
    • Technical Solution
    • Plan and Schedule
    • Cost Estimate
• Conclusion
Lakota Health System

• Lakota Health System Mission
  – *Our Mission*... to deliver compassionate, high-quality health care services that improve the quality of life of Lakota Indians
  – *Our Goal*... to assure that comprehensive, culturally acceptable personal and public health *services are available and accessible* to Lakota Indians

• Pilot Program Request
  – Approval to implement a satellite eICU tele-monitoring system at Pine Ridge Hospital
  – The request includes temporarily reassigning PA & Nurse Personnel
Pine Ridge Indian Health Service Hospital

- Pine Ridge Indian Health Service Network
  - 9 small reservation medical satellite facilities aligned with the Sanford Hospital in Sioux Fall S.D.
- Pine Ridge Hospital is the largest satellite facility
  - 38-bed inpatient ward, including small ICU, OB/labor and delivery, emergency department, and surgery department
  - 5 full-time physicians with a severe intensivist shortage
  - Serves over 17,000 patients
- Sanford Hospital is the Hub Facility (Command Center)
  - 545 licensed beds
  - Over 24,000 annual admissions
  - Over 32,000 ER responses each year
  - Owns one helicopter and two fixed-wing aircraft
Pine Ridge Indian Reservation

- **Demographics**
  - Approximately 40,000 persons and 35% are under the age of 18
  - Largest town on the reservation is Pine Ridge, pop. 5,720 people

- **Employment Information**
  - Median income is approximately $2,600 to $3,500 per year
  - 97% of the population lives below Federal poverty levels

- **Living Conditions**
  - Most families live in rural areas, w/average 17 people per home
  - Over 33% of the Reservation homes lack basic water and sewage systems and electricity

- **Life Expectancy/Health Conditions**
  - The life expectancy is 48 years old for men and 52 for women
  - The rate of TB is approximately 800% higher than the U.S. average
- There is no public transportation available on the Reservation
- Predominant form of transportation is hitchhiking
- Weather is extreme ranging from 110 F to – 50 F
eICU Pilot Program Proposal
Proposal - Rationale and Return on Investment

Rationale

- Enhance collaboration between intensivists at the main hospital (Sanford) and staff at the satellite hospital (Pine Ridge)
- Provide continuous monitoring of patient data
- Minimize complications and improve patient safety

Return on Investment (ROI)

- Save $30,000 per ICU bed (~$1 million/year)
- Can generate additional revenue from decreased length of stay: ~$100,000/month
- Reduce patient transfer costs to main hospital by $1 million/year
Proposal – Clinical Approach

Clinical Background

• Role of the Intensivist

• Central Monitoring Station at Sanford Command Center

• Pine Ridge Hospital ICU
Proposal - Clinical Approach

Role of the Intensivist

- Physician who specializes in the treatment of critical care patients

- Typically work in the Intensive Care Unit setting

- Current national shortage of intensivists

- Most hospitals cannot afford an intensivist; only 10 to 15% of hospitals have a trained intensivist
Central Monitoring Station
At Sanford Command Center

- 24 hour staffing by intensivists
- Critical Care nurses assist intensivists with patient monitoring
- Patients monitored through a remote video camera
- Use advanced software for continuous, real time view of the patient
- Use electronic monitoring for vital signs; alarms activate if there are any changes in patient condition
- Use rule-based decision system
Pine Ridge Hospital Intensive Care Unit

- Nurse provides hands-on care at the patient bedside
- Nurse administers medication
- Nurses communicate by voice w/intensivist at main hospital
- Use house officers or ED physician to complete procedures such as intubation
eICU Implementation
Technical Implementation Goals & Objectives

– Implement iMDsoft’s MetaVision Central solution for ICU telemonitoring at Pine Ridge Hospital

– Partner with iMDsoft and Sanford Health IT resources to complete implementation

– Complete implementation in 4 months

– 12-month pilot study
High-Level Technical Architecture

Sanford Health System

eICU Command Center

Internet VPN

• Media Server
• MVCentral Server

Pine Ridge Hospital

Video and Telemetry Feeds
Implementation – Technical Solution

Detailed Technical Architecture

Pine Ridge Hospital

MetaVision Suite
# Implementation – Cost Estimate

## Capital and One-Time Costs for eICU Implementation

*Capital and One-Time Costs for eICU Implementation (Year 1)*

<table>
<thead>
<tr>
<th>Item#</th>
<th>Expense Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software License and Implementation Fees</td>
<td>$100,000</td>
</tr>
<tr>
<td>2</td>
<td>ICU Equipment Including Computers</td>
<td>$65,000</td>
</tr>
<tr>
<td>3</td>
<td>Network and Infrastructure Costs</td>
<td>$38,000</td>
</tr>
<tr>
<td>4</td>
<td>Non-Licensing and Implementation Software Costs</td>
<td>$25,000</td>
</tr>
<tr>
<td>5</td>
<td>Project Management and Consultant Costs</td>
<td>$20,200</td>
</tr>
</tbody>
</table>

**Total Implementation Costs**

$248,200

*Ongoing System Maintenance Costs (Year 2 moving forward)*

<table>
<thead>
<tr>
<th>Item#</th>
<th>Expense Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Annual Software Maintenance Support Fees*</td>
<td>$42,000</td>
</tr>
<tr>
<td>2</td>
<td>Annual Hardware Maintenance</td>
<td>$6,000</td>
</tr>
</tbody>
</table>

**Annual Maintenance Costs (for 5-ICU beds)**

$48,000

* 5% increase per year
# High Level Implementation Plan & Timeline

<table>
<thead>
<tr>
<th>Phase / Task</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop Workplan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify &amp; Obtain Resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Kick-off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Install Hardware &amp; Software</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish Network Connection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design eICU Workflow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Application</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Execute</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application Build / Config</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment Install</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional/Integrated Testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-User Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deploy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activation Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go-Live Activation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activation Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Project Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16-Week Implementation
In support of the Lakota Health System mission, the pilot program will provide continuous monitoring of critical care patients at the Pine Ridge satellite hospital.

The pilot program will also improve patient outcomes and provide substantial cost savings for the Lakota Health System.

We request approval to implement and conduct the eICU pilot program at Pine Ridge Hospital to provide high quality critical care services for the Lakota Indian community.
Link to eICU Video Demonstration

• Copy and paste this link (then click on the video screen under “See tele-monitoring at LVH”) for a demo of how an eICU works:

  http://www.imd-soft.com/tele-monitoring
Thank You!
Rhona, Ralph, Nicole and Mike
Appendix
Appendix A: Additional Information about Pine Ridge Indian Reservation

- **Demographic Information**
  - 58.7% of the grandparents are responsible for raising their own grandchildren
  - The school drop-out rate is over 70%

- **Employment Information**
  - The unemployment rate is approximately 83-85%
  - Little industry, technology or commercial infrastructure

- **Living Conditions**
  - Many residents carry water (often contaminated) from local rivers for their personal use
  - Most families live in rural and often isolated areas
  - Few paved roads and the weather is extreme
Appendix A: Additional Information about Pine Ridge Indian Reservation

- **Health Conditions**
  - Teenage suicide rate is 150% higher than the U.S. national average
  - The infant mortality rate is about 300% higher than the U.S. national average
  - More than half of adults battle addiction and disease
  - Residents live without health care due to lack of public transportation
  - Medical facilities are under-funded and under-staffed with outdated or non-existent equipment
  - The rate of diabetes is 800% higher than the U.S. national average
  - As a result of the high rate of diabetes on the Reservation, diabetic-related blindness, amputations, and kidney failure are common
  - Cervical cancer is 500% higher than the U.S. national average
Appendix B: Project Assumptions

• Lakota Health System will invest in new EMR application: *iMDsoft’s MetaVision* software
• Lakota Health System will invest in ICU tele-monitoring application: *MVCentral* software
• The pilot program will be conducted first at Pine Ridge Hospital to determine if eICUs can be used at other satellite hospitals in the future
• Cost of staff intensivist, nurse practitioner and physician assistant will be paid by Sanford Regional Hospital
### eICU Cost Estimates - Detail

#### Detailed Cost Breakdown

<table>
<thead>
<tr>
<th>Item#</th>
<th>Expense Item Description</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software License and Implementation Fees</td>
<td>$100,000</td>
</tr>
<tr>
<td></td>
<td>- S/W License</td>
<td>$40,000</td>
</tr>
<tr>
<td></td>
<td>- Implementation Fees</td>
<td>$60,000</td>
</tr>
<tr>
<td>2</td>
<td>ICU Equipment Including Computers</td>
<td>$65,000</td>
</tr>
<tr>
<td></td>
<td>- Computer Hardware</td>
<td>$20,000</td>
</tr>
<tr>
<td></td>
<td>- Video Equipment</td>
<td>$10,000</td>
</tr>
<tr>
<td></td>
<td>- Media &amp; Telemetry Servers</td>
<td>$35,000</td>
</tr>
<tr>
<td>3</td>
<td>Network and Infrastructure Costs</td>
<td>$38,000</td>
</tr>
<tr>
<td></td>
<td>- Network Hardware (Switches &amp; Appliances)</td>
<td>$30,000</td>
</tr>
<tr>
<td></td>
<td>- Internet Connection</td>
<td>$8,000</td>
</tr>
<tr>
<td>4</td>
<td>Non-Licensing and Implementation Software Costs</td>
<td>$25,000</td>
</tr>
<tr>
<td>5</td>
<td>Project Management and Consultant Costs</td>
<td>$20,200</td>
</tr>
<tr>
<td></td>
<td>- 1 Project Manager (20 hrs at $185/hr)</td>
<td>$3,700</td>
</tr>
<tr>
<td></td>
<td>- 1 Technical Consultant (35 hrs at $165/hr)</td>
<td>$5,775</td>
</tr>
<tr>
<td></td>
<td>- 1 Integration Consultant (65 hrs at $165/hr)</td>
<td>$10,725</td>
</tr>
</tbody>
</table>

**Total Implementation Costs**

$248,200
Appendix D – Additional ROI Information

**eICU ROI from Other Health Care Organizations**

- **Avera Health System, Sioux Falls, SD**
  - Saved $6.4 million over 3 years
  - Continues to save $1,000 per patient day

- **St Mary’s Hospital, Jefferson City, MO**
  - Increased revenue by $1.2 million in first 2 years-reduced LOS

- **University of MA Memorial Health Center, Worcester, MA**
  - Saved $5,000/case due to early detection of patient problems

- **Resurrection Health Care, Chicago, IL**
  - Over 2 years, saved 9200 ICU days (~$11.5 million)
Appendix E – eICU Clinical, Quality and Cost Measures*

• Average patient length of stay
• Rate of ventilator associated pneumonia
• Rate of central line associated bloodstream infection
• Number of patients with pressure ulcers
• Reduction of nosocomial infections
• Patient mortality
• Patient satisfaction (pain management, provider responsiveness, quality of care)
• Provider satisfaction (staff communication, technology impact on workflow)
• Average eICU cost per patient

*Measured quarterly during 12 month pilot eICU program
Appendix F – Questions and Answers

• Question: Who will run the 12 month pilot study?
  Answer: A nurse manager from Sanford Hospital will act as the pilot study coordinator.

• Question: Who is responsible for data collection and reporting pilot study information to the board?
  Answer: The nurse manager will work with Sanford IT to mine data from eICU patient files and will present quarterly reports to the board (see Appendix E for quality & performance measures).

• Question: How will the project be evaluated after implementation?
  Answer: Staff from Sanford Hospital clinical and finance departments will analyze measures in Appendix E to determine the effectiveness and efficiency of the pilot eICU program.
References

References

References