

PROPOSAL FOR INTEGRATION OF ICU MEDICAL DEVICES WITH ELECTRONIC MEDICAL RECORD

*Presented on November 2011 to the Community Health Center
Board of Directors*

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COMMUNITY HEALTH MISSION:

TO PROVIDE SAFE, EFFICIENT, AND TIMELY CARE FOR ALL PATIENTS

5 year Strategic Areas of Focus



BACKGROUND:

- The 5 Year Quality & Patient Safety Strategic Plan incorporates use of technology to facilitate decreased medical errors through enhanced system based care, metrics, and targeted feedback.
- EMR Phase 1 Implementation - completed in 2010
 - Nursing and physician notes
 - Computerized Provider Order Entry (CPOE)
 - Nursing care plans
 - Integration with Pharmacy, laboratory and radiology

PHASE II: INTEGRATION OF ICU MEDICAL DEVICES WITH EMR

- Goal is to integrate cardiac monitors, smart pumps and smart ventilators with the EMR in intensive care areas.
 - Smart pumps have the ability to electronically communicate with the pharmacy and to integrate with the order entry system
 - Smart ventilators electronically transmit key patient information to the EMR

INSTITUTE OF MEDICINE REPORT

- The Institute of Medicine reported in 2006, that 1.5 million preventable medical errors occur in hospitalized patients every year.
- Medication administration errors account for 35% of all hospital errors.
- Medications administered via the intravenous (IV) route are likely to have the most serious outcomes.

BENEFITS OF MEDICAL DEVICE INTEGRATION

- Reduce medication errors
 - Integration of smart pumps increases patient safety by eliminating the programming and manual calculations required for intravenous infusions.
 - One medication error adds \$2000 to the cost of a hospitalization
 - Automated capture into the EMR versus manual transcription has been shown to decrease error rates by up to 75%

ADDITIONAL BENEFITS OF DEVICE INTEGRATION

- Return nurses to the bedside rather than spending time manually entering data
 - Automation reduces the time required for manual transcription of vital signs by an average of 96 seconds per reading (ICU vitals are typically entered to a flowsheet every 15 minutes saving 2.5 hours per day for every ICU patient)

MORE BENEFITS

- Improved work flows
 - Integration of ventilators has been shown to save respiratory therapists up to 60 minutes per shift due to reduced time for manual documentation
- Improved staff satisfaction.
- More informed decisions by clinicians due to real-time patient information

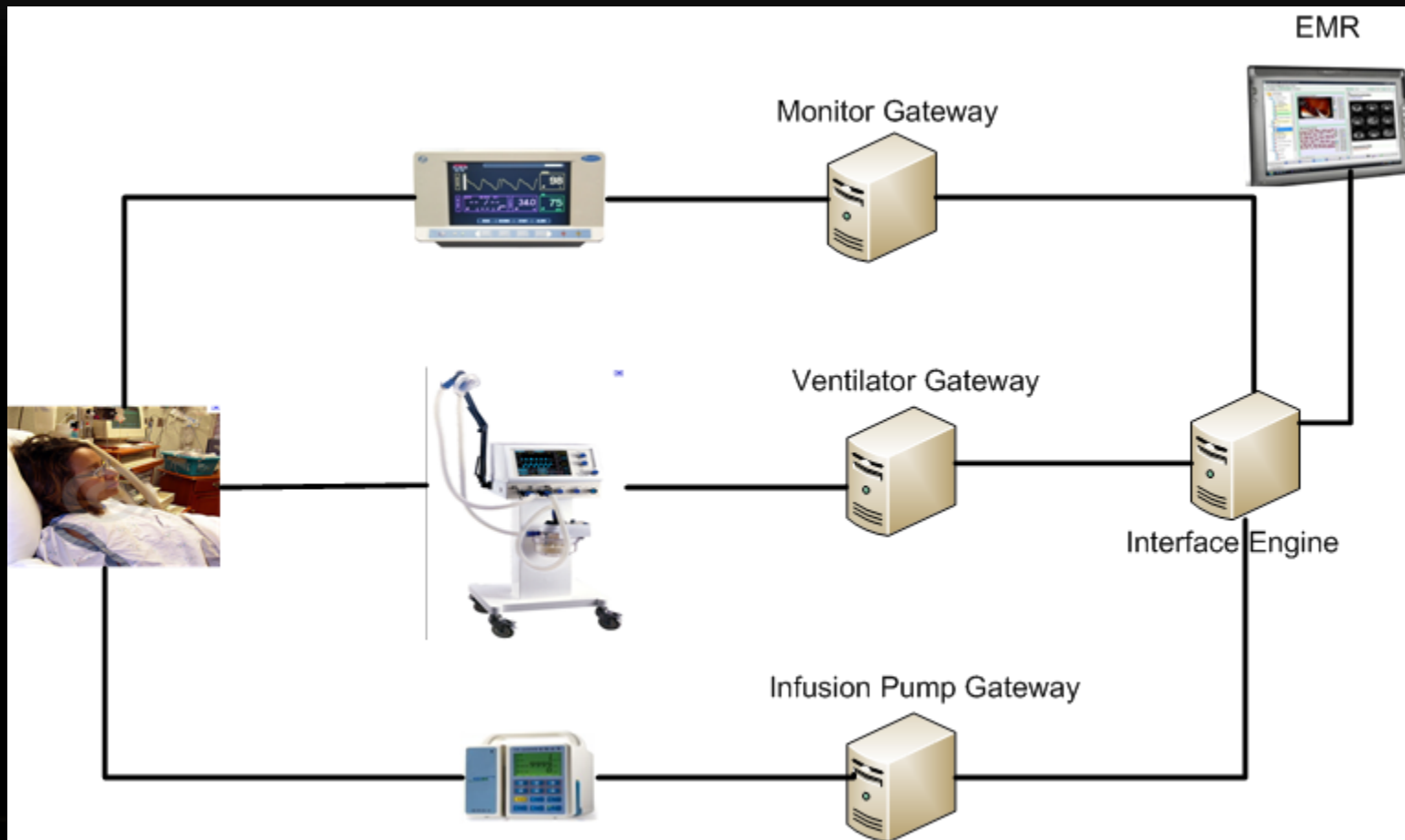
PROJECT SCOPE

- 50 ICU beds-22 Medical, 20 Surgical/trauma, 8 Pediatric
- Replace existing IV pumps with “smart” pumps
 - Requires purchase of 200 smart pumps for ICUs
- Replace ventilators which do not presently have the capability for device integration.
- Purchase and install “middleware” compatible with devices and EMR to allow data transmission.

OUT OF SCOPE

- Other areas which have cardiac monitoring, such as the Emergency Department and recovery areas of the Operating Room
- Capture and storage of real time waveforms from cardiac monitors and ventilators

VISUAL REPRESENTATION FOR THE PROPOSED ARCHITECTURE



FUNCTIONAL REQUIREMENTS

- The system will provide updated patient demographic information to the medical device
- All data sent through the interface will be reviewed and verified by appropriate clinical staff before being permanently filed into the EMR.
- The system will allow transmission of information from the barcode-enabled medication administration system to the smart pump and back to the pharmacy system.

PROPOSED PROJECT PLAN

- Discovery Phase:
 - ICU device inventory was assessed
 - Statement of work with a tentative budget has been developed
 - Board of Directors presentation for funding and project approval
- Next Steps:
 - Request for proposal for vendor selection
 - Contract negotiations and completion of budget
 - Project timeline confirmed
 - Project team formation
 - Estimated go-live 7 mos. from contract completion

METRICS FOR SMART PUMP INTEGRATION

Meets IOM Aims for:

- Safe Care
- Timely Care
- Efficient Care

Goal:

- Decrease in medication errors related to incorrect IV pump programming by nurse
- Decrease time spent by nursing calculating medication doses and programming pump

Measure:

- # of adverse drug events post smart pump integration
- Time from pharmacy medication delivery to patient administration
- # of steps required for nursing IV medication administration pre/post smart pumps

SUPPORTING DATA

- Study from Good Samaritan , San Jose, CA
 - In 2003, pump-related errors accounted for 22% of dosing errors, compared with 41% in 2002.
- Study from Lancaster General Health in Lancaster, PA
 - Decrease in the amount of time nurses spent programming infusion pumps by 24.8%.
 - Streamlined workflow by reducing the number of infusion pump programming steps from 17 to 7.

METRICS FOR VENTILATOR INTEGRATION

Objective:

- Provide Safe and Efficient Care
- Automating process for JCAHO compliance requiring ventilators to be checked on a routine basis

Goal:

- Decrease rates of developing ventilator associated complications due to increased response time
- Decrease time respiratory therapists spend on activities not directly related to patient care (eg. documenting ventilator settings)

Measure:

- Amt of time spent documenting ventilator settings

SUPPORTING DATA

- Study conducted at Baptist Health South Florida, FL
- Summary :
 - Integrated Ventilators with EMR
- Results:
 - Time for documenting ventilator settings dropped from 5 minutes to 3 minutes on average.

METRICS FOR MONITOR INTEGRATION

Objective:

- Meaningful Use Compliance
- Efficient Care

Goal:

- Decrease time nurses spend documenting vital signs
- Reduce Data Entry/Transcription errors

Measure:

- Amount of time nurses spend documenting ICU vitals
- Number of vital sign transcription errors into EMR before and after device integration

SUPPORTING DATA

- Observational study of vital sign entry conducted at Baptist Health South Florida, FL
 - Results:
 - Average time input vital signs in intensive care units dropped from 4 minutes to 20 seconds
- Similar study conducted at Medical University of South Carolina, SC
 - Results:
 - 15.2% of vital sign sets had one or more errors when documented in an EMR

PROJECT COST PROJECTIONS

Capital Equipment

Item	Quantity	Unit Cost	Cost
Ventilators	30	\$25,000	\$750,000
Infusion Pumps	200	\$7,000	\$1.4M
Device Gateways	3	\$10,000	\$30,000
Interface Engine	1	\$100,000	\$100,000
Network Failover Enhancements	1	\$20,000	\$20,000

PROJECT COST PROJECTIONS

Other Contracted Expense

Item	Cost
Training	\$50,000
Vendor Professional Services (planning, configuration, system integration, testing, Go-Live support)	\$200,000

REQUIRED INTERNAL RESOURCES

Project Phase	FTE's	Duration (months)	FTE Cost*
Planning	3.75	1.5	\$ 62,969
Implementation	4	3	\$126,563
Testing	2	2	\$ 36,667
Go-Live	2.75	0.5	\$ 13,073

*See appendix A & B for detailed breakdown of internal resource requirements

DIRECT COSTS

Item	One Time Cost
Capital - new devices	\$2,150,000
- integration hardware & software	\$ 150,000
Other Vendor Expense	\$ 250,000
Total "new funding" requested	<u>\$2,550,000</u>
Internal Resource Costs	\$239,272
Estimated Total Direct Costs	<u>\$2,789,272</u>

INDIRECT COSTS

Item	Cost / year
Operations Management (activation, shutdown, job control, backup and recovery)	\$13,000 (0.10 FTE)
System Management (problem, change and performance management management)	\$32,500 (0.25 FTE)
Hardware and Software Maintenance (preventive and corrective maintenance, general housekeeping)	\$13,000 (0.10 FTE)
Ongoing License Fees	\$19,000 (20% of software costs)

INDIRECT COSTS (CONTINUED)

Item	Cost / year
Upgrade Costs	\$10,500 (assumes hardware replaced every 3 years)
User Support (on-going training, help desk, problem resolution costs)	\$32,500 (0.25 FTE)
Environmental Factors (air conditioning, power supply, housing, floor space)	\$1000
Estimated Total Indirect Costs over 10 year project lifetime of system	<u>\$1,215,000</u>

TOTAL COST OF OWNERSHIP (TCO)

Total Direct Costs	\$2,789,272
Total Indirect Costs (over 10 years)	\$1,215,000
TCO (over 10 years)	<u>\$4,004,272</u>

EXPECTED OUTCOMES

- Enhanced Patient safety
- Risk management
- Efficiencies in clinical work flow
- Accurate data management
- Labor Cost Savings
- Improved Operational scorecards

RETURN ON INVESTMENT

- TCO for ICU device integration over a 10 year period is estimated to be \$ 4, 004, 272.
- The expectations for savings are estimated to be (without inflation adjustment)
 - Nursing time savings for vital sign entry \$823,134 per year X 10 years= \$8,231,340
 - Respiratory therapist documentation time savings \$132, 860 /year X 10 years= \$1,328,600
 - Pump programming savings \$ 337,350 savings /year X 10 years= \$3,373,500
 - Total estimated savings due to staff efficiency gains*: \$ 5, 525, 230

*Savings due to error avoidance are not factored into ROI

SUMMARY

- Board approval and funding are being requested to proceed with Strategic Quality Plan Phase II: ICU device integration
- This project is consistent with organizational strategic goals for use of technology for patient safety, staff efficiency, and improved outcomes for our community.
- We believe the gains in staff efficiencies alone offset the costs of this project.
- Funding of \$2.55 M requested to initiate project.

REFERENCES:

- [http://www.leapfroggroup.org/media/file/Leapfrog-Computer Physician Order Entry Fact Sheet.pdf](http://www.leapfroggroup.org/media/file/Leapfrog-Computer%20Physician%20Order%20Entry%20Fact%20Sheet.pdf)
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- http://www.nursingcenter.com/prodev/ce_article.asp?tid=1035575

Appendix A

INTERNAL RESOURCE COSTS

Resource Type	Burdened Cost per Year
Project Leader	\$90,000
Quality	\$115,000
Physician	\$250,000
Nurse	\$130,000
Pharmacist	\$130,000
IT	\$130,000

Appendix B

DETAILED RESOURCE REQUIREMENTS

Project Phase	Resource Type	FTE's
Planning	Project Leader	1
	Quality	0.25
	Physician	0.50
	Nursing	0.50
	Pharmacy	0.50
	IT	1
Implementation	Project Leader	1
	Quality	0.25
	Physician	0.25
	Nursing	0.25

Appendix B

DETAILED RESOURCE REQS - CONT

Project Phase	Resource Type	FTE's
Implementation - continued	Pharmacy	0.25
	IT	2
Testing	Project Leader	1
	IT	1
Go-Live	Project Leader	1
	Physician	0.25
	Nursing	0.25
	Pharmacy	0.25
	IT	1
Lifecycle Management	IT	0.25

APPENDIX C: DETAILS FOR ESTIMATED SAVINGS

- Calculations for expected savings:
 - Nursing time savings for vital sign entry (3.66 minutes X 4 times/hr X 2080 hrs/year X 50 ICU beds X 75% occupancy)= 19,032 hrs X \$43.25/hr (avg w/ benefits) = \$823,134 per year
 - Respiratory therapist documentation time savings (1 hour/shift X avg 7 therapists/all ICUs/shift X 2 shifts/day X 365 days/year)=5110 hrs X \$26/hr avg= \$132,860 /year
 - Pump programming savings (25% time savings /pump X 2 min/pump X 12 times/day avg X 2080 hrs/year X 50 ICU beds at 75% occupancy= 7800 hours/year X \$43.25/hr= \$ 337,350 savings /year