

# Suburban Medical Center

## Implementing an EMR to Improve Care



NORTHWESTERN  
UNIVERSITY

MMI 404      Fall 2009      Group 1

**Gordon Bleil      Jennifer Liedel**

**Helena Hamilton      Jeffrey Schell**

**Diane Christopherson**

# EMR Steering Committee

- Chair: Gordon Bleil, MD, CMO
- Jennifer Liedel, RN, CNO
- Helena Hamilton, CIO
- Jeffrey Schell, CFO
- Diane Christopherson, Sr. Director,  
Clinical Informatics

# Hospital System

## Scope of Services

### 250 bed Community Hospital Services Provided:

<b>Obstetrics -</b>	<b>6 LDR's and 30 PP Beds</b>
<b>Nursery -</b>	<b>30 Bassinets</b>
<b>Surgery -</b>	<b>6 main OR's</b>
<b>ICU/CCU -</b>	<b>25 bed</b>
<b>Inpatient days -</b>	<b>30,000 days/year</b>
<b>ED -</b>	<b>40,000 visits/year</b>
<b>Pharmacy -</b>	<b>500,000 prescriptions/year</b>
<b>Laboratory -</b>	<b>400,000 tests/year</b>
<b>Radiology -</b>	<b>300,000 tests/year</b>

# Technology Current State

- Paper-based medical records
  
- Electronic Systems
  - Computerized Physician Order Entry System (CPOE)
  - ePrescribing (Hospitalists)
  - Radiology Information System (RIS)
  - Lab Information System (LIS)
  - Picture Archiving and Communication System (PACS)
  - Administrative Systems
    - Admission
    - Discharge
    - Billing

# Technology Future State

- Phase I: Implement an EMR in the ED
  - Integrate with current electronic systems
  - Built upon foundation of currently existing systems wherever possible to minimize costs
    - Desktops
    - Servers
  - Upgrade technology infrastructure for Phase II and III implementation
- Phase II: Implement EMR hospital-wide
- Phase III: Clinical Decision Support System, Telemedicine, Patient Portal

# Needs Assessment

A paper-based medical record does not give us the ability for all hospital staff to be connected to the key pieces of data necessary to efficiently and effectively treat our patients.

- Staff survey conducted 1 month ago
- Decrease in efficiency
  - Delay in appropriate care when chart is not accessible
  - Delay in quality of care when current lab or Rx results not available
- Potential for HIPAA violations when patient information is not locked in a secure location
- Other hospitals in the area are starting EMR integrations
- Healthcare reform, Joint Commission and other national initiatives are promoting EMR usage.
- We cannot share our information with research and disease registry initiatives to increase the understanding of critical disease states

# SMC Support of Evidence-based Medicine Guidelines

- 10 measures endorsed by National Quality Forum (NQF) for the ED
- Goals:
  - To reduce crowding
  - Decrease patient waits
  - Improve quality
- With an EMR, these measures can be more easily determined and monitored

# EBM Measures

<b>Measure</b>	<b>Measurement Criteria</b>
1. Median Time from ED Arrival to ED Departure for Admitted ED Patients	Median time from ED arrival to time of departure from the ED for patients admitted to the facility from the ED.
2. Median Time from ED Arrival to ED Departure for Discharged ED Patients	Median time from ED arrival to time of departure from the emergency department for patients discharged from the ED.
3. Admit Decision Time to ED Departure Time for Admitted Patients	Median time from admit decision time to time of departure from the ED for emergency department patients admitted as inpatients.
4. Door-to-Provider Time	Time of first contact in the ED to the time when a patient sees the physician (provider) for the first time
5. Left Without Being Seen	Percentage of patients leaving without being seen by a physician.
6. Severe Sepsis and Septic Shock Management Bundle	Initial steps in managing patients presenting with infection (severe sepsis or septic shock).
7. Confirmation of Endotracheal Tube Placement	Some method should be attempted to confirm ETT placement any time an endotracheal tube is placed into an airway in the ED, an endotracheal tube is placed by an outside provider and that patient arrives already intubated (EMS or hospital transfer), or when an airway is placed after patients arrive to the ED.
8. Pregnancy Test for Female Abdominal Pain Patients	Percentage of women 14 to 50 who present to the ED with a chief complaint of abdominal pain who have a pregnancy test (urine or serum) ordered in the ED.
9. Anticoagulation for Acute Pulmonary Embolus Patients	Percentage of patients newly diagnosed with a pulmonary embolus in the ED or referred to the ED with a new diagnosis of pulmonary embolus who has orders for anticoagulation (heparin or low molecular weight heparin) for pulmonary embolus while in the ED.
10. Pediatric Weight in Kilograms	Percent of ED patients under 13 with a current weight in kilograms documented in the ED record.

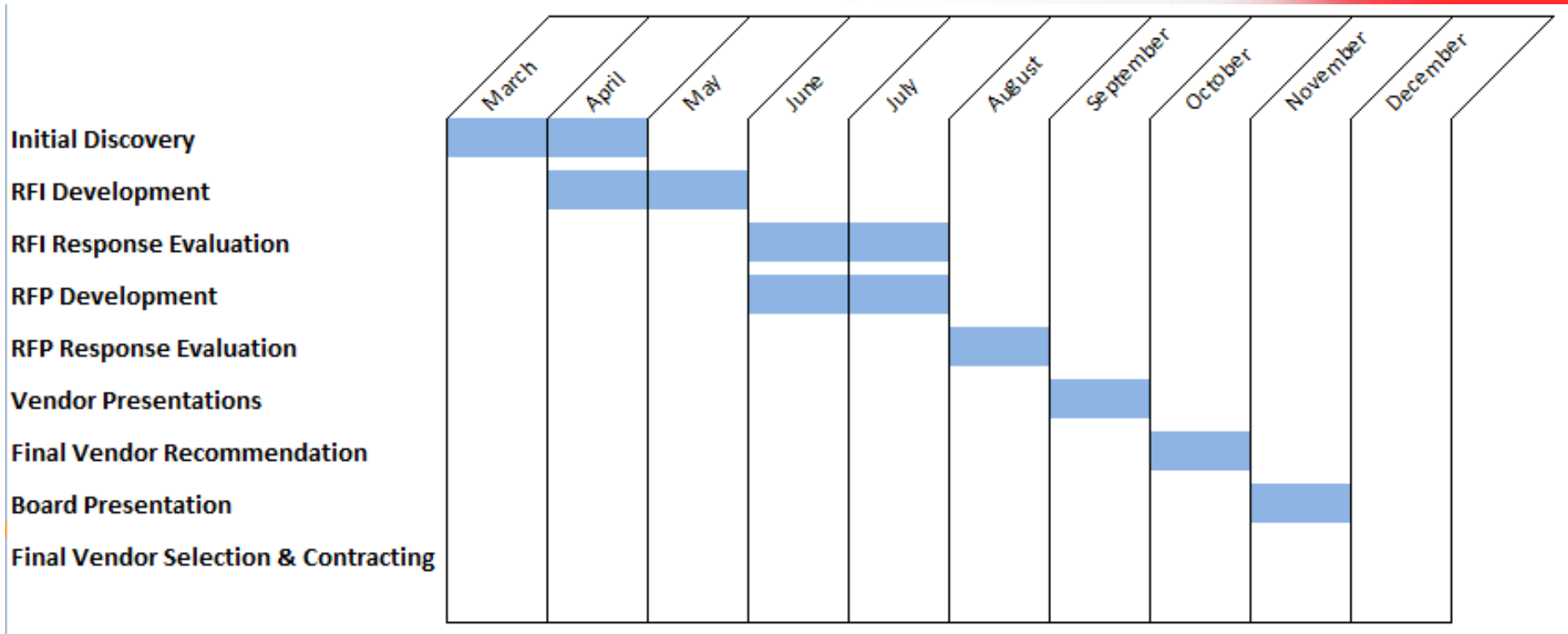


# EMR Core Features

- **Health information and data, from demographics to progress notes to discharge instructions**
- **Results management**
- **HIPAA compliant monitoring and reporting**
- **Alerts, reminders**
- **Evidence-based medicine guidelines**

# Vendor Selection Process

March – November 2009



- 10 question RFI submitted to nine vendors.
- Full RFP submitted to six vendors, based on strength of RFI responses
- Five vendors invited to present demos

# **RFI Questions**

- 1. Please provide a narrative or pictorial description of how the system handles the patient flow from registration and triage, through treatment and discharge (or inpatient admission).**
- 2. Please describe how your system handles electronic acquisition of vital sign, hemodynamic, and other medical device data.**
- 3. Please provide an overview of the system's clinical decision support features?**
- 4. Please describe how the ED solution integrates with lab, x-ray, and other ancillary systems?**
- 5. Explain how the system handles Code/Trauma workflows?**
- 6. Please describe your system's ability to create hard-copy personalized discharge**
- 7. Does your system support a time-stamp to track patient wait and activity times at each step of ED visit?**
- 8. How easily can system workflows be customized to fit our ED triage process?**
- 9. Please describe your system's standard suite of reports and the process for creating custom or ad-hoc reports.**
- 10. Please describe the support you provide during implementation, after go-live, and during system upgrades?**

# RFP Key Criteria

- **Clinical functionality**
  - Patient charting
  - Case management
- **Configuration and Customization**
- **Standard and ad-hoc reporting**
- **Potential interface to Clinical Decision Support**
- **Integration**
  - Integration (CPOE, radiology, lab)
  - Billing
  - Scheduling
- **Vendor Attributes**
  - References & experience
  - Vendor financial stability
- **System Support**
  - Implementation support
  - Ongoing system support
  - Service Level Agreements
- **Pricing and Costs**
  - Initial software costs
  - Initial hardware costs
  - Integration Costs
  - Ongoing maintenance costs

# Vendor Comparison Results

	Feature Set	Flexibility to Customize	Pricing & Total Cost	Reporting Capability	Integration Capability	System Support	Vendor Attributes	Total Score
Cerner	5	4	4	5	4	5	4	31
Epic	5	3	3	5	2	5	5	28
Meditech	4	4	5	2	3	3	4	25
McKesson	3	5	3	2	2	4	4	23
Centricity	2	2	5	5	3	2	3	22

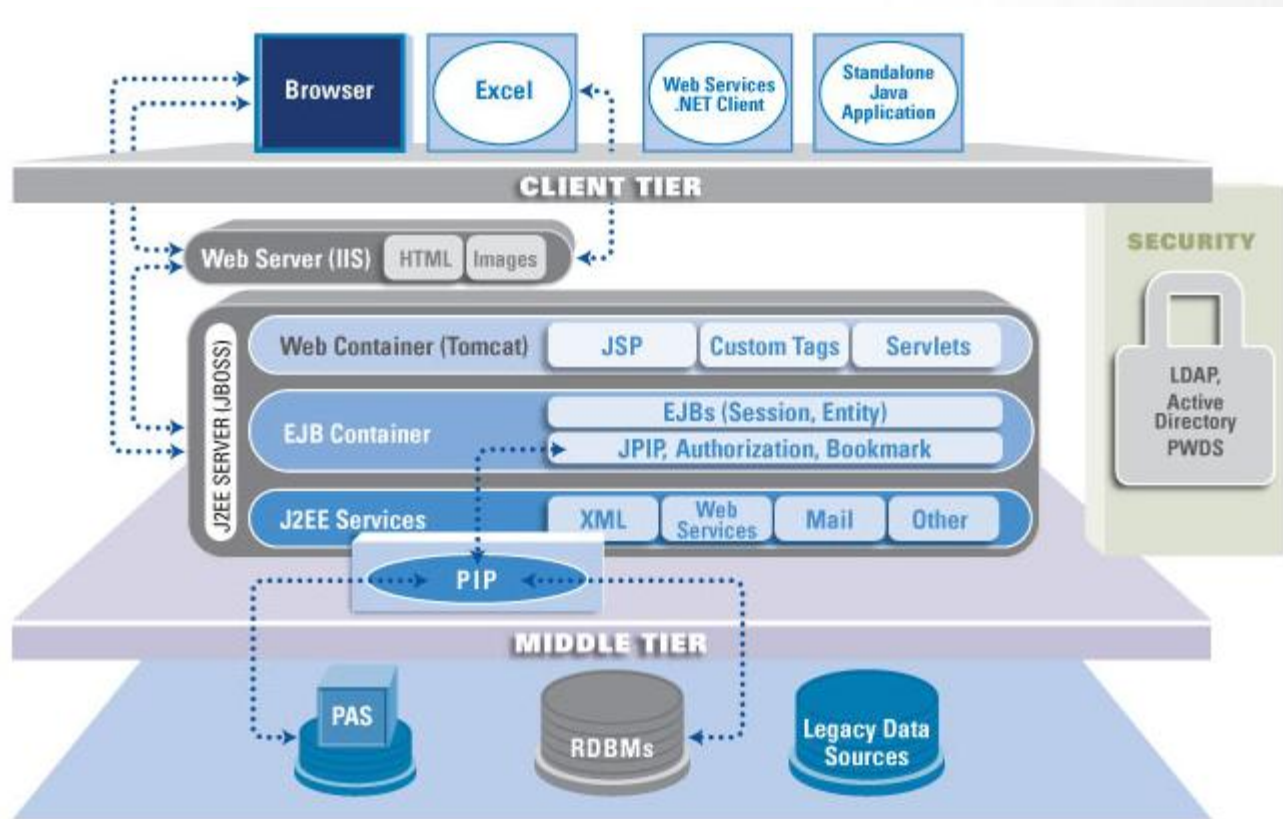
## Decision Points

- Cerner provides the best overall match for our needs, for an acceptable price.
- Epic provides rich features and reporting, but is difficult to integrate, in addition to being less flexible and more costly.
- Meditech and McKesson are weak on reporting, while Centricity lacks many desired features and provides inadequate support.

# RFP Key Criteria Definitions

<b>Feature Set</b>	How robust and comprehensive is the functionality offered by this system. Do the systems strengths align well with our organization's priorities?
<b>Flexibility to Customize</b>	How difficult and/or expensive is it to customize system functionality to fit a client's specific needs or work-flows. Can some changes be handled using configuration settings, or is custom-coding required for everything?
<b>Pricing and Total Cost</b>	Direct costs associated with the implementation of this system, including software licensing, expected customization costs, integration, training, post go-live support, and ongoing maintenance.
<b>Reporting Capability</b>	Does the system come with a full suite of useful standard reports? Does the client have unfettered access to the underlying data and does the system provide easy-to-use tools to create ad-hoc and user-defined reports?
<b>Integration Capability</b>	Is the data accessible using standard data protocols and ETL tools? Does the system provide a user-friendly API through which underlying data can be retrieved? Are there any built in data exchange functions?
<b>System Support</b>	Does the vendor provide strong support from implementation, through deployment, and post go-live? Does the vendor provide strong service level agreements?
<b>Vendor Attributes</b>	How experienced is the vendor in successfully implementing the system with clients similar to us? Does the vendor have strong references and growing market-share? Is the vendor financially stable.

# Hardware/Software Specifications



# Strategic Plan – Phase I

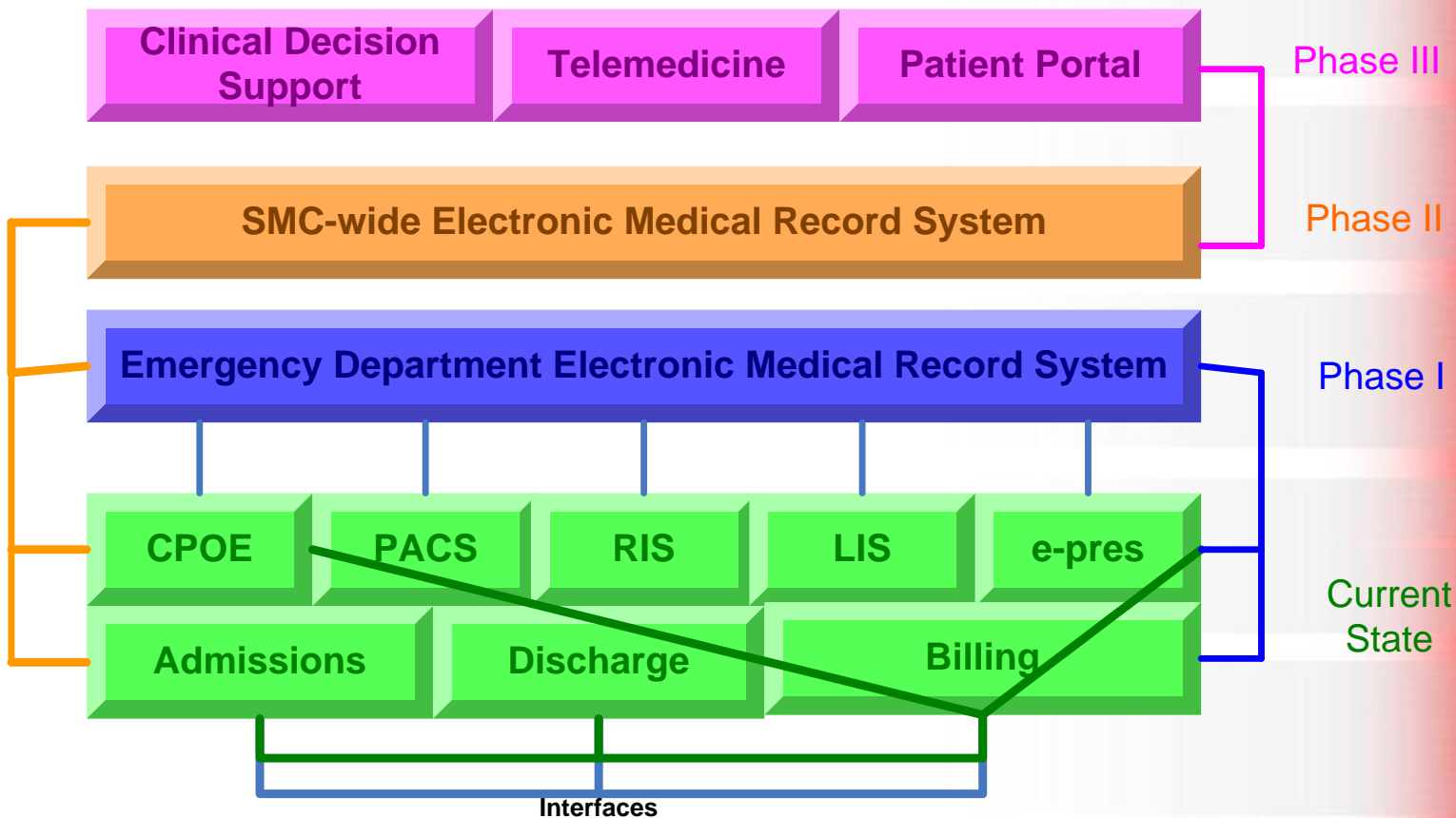
- Establish goals for system and measures of success
- Implement Electronic Medical Record (EMR) in the ED
  - Requires full connectivity to other systems
  - Most urgent need for rapid results
  - High usability requirements
- Upgrade the IT infrastructure for the entire facility
- Establish initial and ongoing training for ED staff
- Use measures of success to improve implementation of Phase II
- Critical Success Factors
  - ED user engagement and application
  - Super users always available for problem solving
  - Hospital Training Staff will train end-users



# Measures of Success

Measure	Goal
➤ Patient satisfaction survey rating	➤ Increase 25% in year 1, additional 10% in year 2
➤ Patient wait time	➤ Decrease by an average of 40 minutes per patient
➤ Increase quality – EBM guideline adherence	➤ 100% of 10 measures
➤ Length of stay	➤ Decrease by .5 days
➤ Staff retention	➤ Increase by 17%
➤ Decrease overtime	➤ Decrease by 14%, 6 months post implementation
➤ Reportable errors	➤ Decrease by 25-50%
➤ HIPAA compliance	➤ 100%
➤ Share data for research and disease registries	➤ 9 months - year post implementation (Cardiology and Cancer Registries, Northwestern Research)

# Strategic Roll-out Plan



- Computerized Physician Order Entry System (CPOE)
- Picture Archiving and Communication System (PACS)
- Radiology Information System (RIS)
- Lab Information System (LIS)
- ePrescribing

# Training

- Training
  - User acceptance testing will include “super users”
  - Vendor training will be “train the trainer”
  - Super users will be trained first
  - SMC staff will train all staff
  - Quick reference cards
  - Training Sharepoint site
    - Dashboard/Status report
    - Training calendar
    - Contact List
    - FAQs
  - On-going
    - New employee
    - Refresher
- Communication
  - E-mail with status notes and key dates
  - Posters
- Training Survey

# Implementation Plan

1. Workflow and Process analysis
  - Analyze current processes and procedures
  - Identify sources of data and interfaces
  - Determine location of workstations
  - December – January
2. System Installation
  - Order and install hardware
  - Implement IT infrastructure, including computer room redesign
  - Install software
  - Customize software
  - User acceptance testing
  - January – April
3. Staff Training
  - Train staff
  - Update procedure manuals
  - March – May
4. Communication
  - Establish multiple mechanisms, including Sharepoint, e-mail, sharing forums
  - December – on-going
5. Preparation for go-live
  - Date (historically low volume)
  - Staffing plan
  - Process for reporting and correcting issues
  - June

# Project Reporting and Communication

- Status Reports
  - Vendor Progress Report
    - Responsible Party – Vendor
  - Steering Committee Report
    - Responsible Party – Steering Committee
  - CEO progress report
    - Responsible Party – Project Manager
  - Board Report
    - Responsible Party – Steering Committee
  - Medical Staff
    - Responsible Party – CMO
  - Nursing Leadership
    - Responsible Party – CNO
- Leader's Dashboard
- Conference Calls

# Budget, Investment and ROI



# Implementation Costs

			Initial & Year 1 (ER only)	Year 2 (total hospital)	Year 3
<b>Costs</b>					
	<b>Software</b>	Implementation Licensing Training (including employee training cost)	300,000	150000 (additional custom integration, if needed)	
		Support , maintenance and Software upgrades	200000		
	<b>Security</b>		100000		
	<b>Hardware</b>	Infrastructure (servers routers, computers, servers, cables, wi- fi, printers, installation)	230000		
		Hardware maintenance (incl scheduled upgrades, battery replacement)	100000		Battery replacement
	<b>Support (internal)</b>	IT supervisor and support	70000 (1 FTE)	120000 (2 FTE)	120000 (2 FTE)
	<b>Total</b>		<b>1000000</b>	<b>270000</b>	<b>120000</b>

# Return on Investment-Phase I

- The capital invested in the initial project will not result in a 1:1 return in the first year
- The benefits accrued from the ED implementation will partially offset the investment
- The time invested in the ED will facilitate a smoother and rapid transition in other areas of SMC, reducing implementation costs



# Return on Investment-Phase I

			Initial & Year 1 (ER only)
<b>Costs</b>			
	<b>Software</b>	Implementation Licensing Training (including employee training cost)	300,000
		Support , maintenance and Software upgrades	200000
	<b>Security</b>		100000
	<b>Hardware</b>	Infrastructure (servers routers , computers, servers , cables , wi-fi , printers , installation)	230000
		Hardware maintenance (incl scheduled upgrades , battery replacement)	100000
	<b>Support (internal)</b>	IT supervisor and support	70000 (1 FTE)
	<b>Total</b>		<b>1000000</b>
<b>Benefits</b>			
	<b>Revenue</b>	Coding	20000
		Lost charges recouped/year	30000
		Increase in patient number	120000
	<b>Cost reduction</b>	Error (hospital absorbed)	21750
		Transcription	12000
		Charts (average \$3/encounter)	120000
		Office supplies	6000
		Medical record storage	1000
		Staff reduction	50000
		Malpractice premium	
	<b>Total</b>		<b>380750</b>
<b>Net ROI</b>			<b>-619250</b>

# Return on Investment-Phase II

- The hospital wide implementation of the EMR and continued use in the ED will result in a near complete return of investment by the end of the 2nd year and profit by the 3rd year
- Benefits will be recouped in improved patient care (less error, fewer denials for unnecessary/duplicate care), accurate billing, reduction in malpractice rates
- Additional benefit from reduction in clerical staff, diminished needs for office supplies and storage, etc.

# Return on Investment-Phases I & II

			Initial & Year 1 (ER only)	Year 2 (total hospital)	Year 3
<b>Costs</b>					
	<b>Software</b>	Implementation Licensing Training (including employee training cost)	300,000	150000 (additional custom integration, if needed)	
		Support , maintenance and Software upgrades	200000		
	<b>Security</b>		100000		
	<b>Hardware</b>	Infrastructure (servers routers, computers, servers, cables, wi- fi, printers, installation)	230000		
		Hardware maintenance (incl scheduled upgrades, battery replacement)	100000		Battery replacement
	<b>Support (internal)</b>	IT supervisor and support	70000 (1 FTE)	120000 (2 FTE)	120000 (2 FTE)
	<b>Total</b>		<b>1000000</b>	<b>270000</b>	<b>120000</b>
<b>Benefits</b>					
	<b>Revenue</b>	Coding	20000	60000	60000
		Lost charges recouped/year	30000	270000	270000
		Increase in patient number	120000	150000	
	<b>Cost reduction</b>	Error (hospital absorbed)	21750	61100	48880
		Transcription	12000	24000	24000
		Charts (average \$3/encounter)	120000	90000	
		Office supplies	6000	10000	10000
		Medical record storage	1000	4000	4000
		Staff reduction	50000	150000	100000
		Malpractice premium			5% reduction
	<b>Total</b>		<b>380750</b>	<b>819100</b>	<b>516880</b>
<b>Net ROI</b>			<b>-619250</b>	<b>-70150</b>	<b>+326650</b>

# Investment Summary

- Purchase of hardware, software within year 1
- Upgrade to hospital infrastructure
- Training and Support
- One critical department implementation

# Summary and Recommendations

- Implementation of an EMR in the ED will provide:
  - Improved patient experience
  - A significant upgrade to our ability to collect and maintain patient data and improve care
  - Increase our ability to retain and recruit staff
  - Advance SMC's reputation as a premier hospital in the community
  - Facilitate staff training and staff acceptance
  - ROI in 3 years
  
- Infrastructure and interfaces to critical systems in place in Phase I
  
- Upgrades to the infrastructure will prepare us for a hospital-wide implementation of EMR



Questions?