



# **Electronic Medical Records (EMR) Cost Study**

## ***Final Report***

**FOR PUBLIC RELEASE**

**February 2011**

***Implementing and Operating Electronic Medical Records  
in the Long Term & Post-Acute Care Environment***

The Chief Information Officer Consortium ("CIOC") is a forum in which CIOs and senior technical executives/leaders within the long term care (LTC) industry can work together, learn from each other and collaborate with each other to grow the effectiveness of the utilization of information technology within LTC. CIOC participants lead information technology in more than 35 of the largest post-acute healthcare companies in America.

You may freely distribute this cost study as a complete PDF document. Please note this study is intended to be a benchmark estimate. Actual costs may vary based upon project decisions and related variables.

The CIOC is happy to respond to questions and inquiries about this survey or the CIOC overall; please contact Kerrie Griffith at [kgriffith@directs.com](mailto:kgriffith@directs.com) or 414.760.5892 and she will connect you with a member of the CIOC who can best help you.

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## What companies make up the CIO Consortium?

- ✓ ACTS Retirement Life Communities
- ✓ Avalon HCI
- ✓ Avamere
- ✓ Brookdale Senior Living
- ✓ Christian Homes
- ✓ Complete Healthcare Resources, Inc.
- ✓ Covenant Care
- ✓ Covenant Retirement Communities
- ✓ Cypress Health Group
- ✓ Diakon Lutheran Social Services
- ✓ Diversicare
- ✓ Ensign Facility Services, Inc.
- ✓ Erickson Retirement Communities
- ✓ Extendicare Health Services, Inc.
- ✓ Five Star Quality Care
- ✓ Fundamental
- ✓ Genesis
- ✓ Golden Living
- ✓ Good Samaritan Society
- ✓ Gulf Coast Health Care
- ✓ HCR Manor Care
- ✓ Harden Healthcare Services
- ✓ Health Care Navigator
- ✓ Kindred Healthcare
- ✓ LaVie Administrative Services
- ✓ Life Care Centers of America / Affinity Hospice of Life / Life Care at Home
- ✓ Medical Facilities of America
- ✓ NHS Management, LLC
- ✓ Reit Management and Research, LLC
- ✓ SavaSeniorCare
- ✓ Administrative Services
- ✓ Signature HealthCARE, LLC
- ✓ Skilled Healthcare
- ✓ Sun Healthcare Group
- ✓ Sunrise Senior Living / Greystone
- ✓ The Asbury Group
- ✓ Tara Cares, LLC
- ✓ UHS-Pruitt Corp

*"I am very pleased the CIOC decided to do this cost study. It's desperately needed in the LTC industry. Most companies in the LTC industry don't understand the resources and time investment needed to participate in the new world of EMR. As a participant in the CIOC and a contributor to the cost study, I hope that other companies can use the collective experience of 30+ LTC companies to set their internal direction for EMR participation. I personally have validated the numbers as it relates to Brookdale projects and find them directionally correct given our position in the market, our variety of product lines and the size of our company."*

Scott Ranson, VP & CIO, Brookdale Senior Living

*"The CIOC brings together a core group of talented, informed and experienced technical and business leaders in the Long Term Post-Acute Care (LTPAC) industry. This EMR Cost Study reflects the commitment and dedication of this group to moving the LTPAC industry forward. This is the first, of what I'm sure will be many practical and enlightening studies produced by the CIOC. There is a wealth of knowledge and experience within our group; I can personally attest to the rigor and attention to detail that went into the EMR Cost Study. I'm proud to wholeheartedly endorse it."*

C. Martin Diller, CIO  
Complete Healthcare Resources, Inc.

*"The CIOC represents a broad cross-section of the post-acute healthcare sector. The approach used for the EMR Cost Study leveraged the experience and insight of the CIOC to construct a model that provides a basis for estimating costs for a company of any size. The EMR Cost Study is the most accurate predictor of EMR implementation costs created to date."*

Loren Claypool, VP & CIO,  
Extendicare Health Services, Inc.

*"Looking at the costs for implementing an electronic medical record, our organization put many hours of work into creating a first estimate for EMR project costs. Extrapolating the costs of this study for the size of our organization, the study proved to be within 5% of our initial estimate. I believe the cost study serves as a great tool for organizations to have a basic understanding of the costs of implementing an EMR."*

Rustan (Rusty) D. Williams, VP & CIO,  
The Evangelical Lutheran Good Samaritan Society

*"We have been planning and projecting costs for implementation of the EMR for over four years. The results of this project track very closely, within 6% of our current cost projections when adjusted for our company size and other key variables. We believe that this study is providing our industry with a valuable tool for predicting EMR costs for the multi-facility organization."*

Deborah Green, CIO, LaVie Care

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## Executive Summary

### Background

The CIO Consortium (CIOC) – and DSSI Forum Technology Subcommittee before them – often considered the costs of deploying technology supporting the facility clinical team. The issue increased in priority with the passing of the HITECH Act in early 2009 and its call for full electronic medical records by 2015. Senior management needs better information to guide implementation of electronic medical records. By undertaking a cost study, the CIOC takes a major step in formally aligning our understanding of the costs and options available as we go digital with medical records.

### Objective

Build study for “typical” 25-facility chain providing nursing care and rehabilitation services. Include all costs to evaluate, deploy and operate an Electronic Medical Record (EMR) system.

Use results from the study to:

1. Grow senior management awareness of EMR “cost of doing business,” including major options for deployment and key controllable decisions that determine cost.
2. Send united message of EMR cost structure and impact to HHS as meaningful use and incentives are extended to LTPAC sector.
3. Provide CIOs a common starting point for EMR cost benchmarks.

### Approach

Separate into four task force teams to divide the work and engage more experience and expertise:

**Task Force #1** – Define Company Profile and Cost Factors

**Task Force #2** – Centralized Costs – Application Implementation, Support, Data Center Costs

**Task Force #3** – Field Costs – Community Implementation, Training, Support, Ongoing Costs

**Task Force #4** – Industry Messaging / Task Force Oversight

The study launched in October 2010 from a sub-group of the CIOC advisory board, who conceived and designed an approach. A single member then sought to populate each task force, finding a chair and participating CIOC members. This same sub-group participated in task force #4 and sought to keep the work of each group aligned.

Each task force scheduled conference calls as needed to complete their work. Task force chairs along with task force #4 used brief check-in calls weekly to drive overall coordination and decision making. Task forces #2 and #3 completed their work by Christmas 2010. A final draft report was assembled and reviewed by task force chairs in January 2011, then sent to the full membership of the CIOs to consider for feedback during our Feb. 14, 2011 in-person meeting. The final report was prepared and released later in February.

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## Overall Considerations

- ✓ **Volunteer work by CIOC members.** All work was completed by volunteer members of the CIOC and their staff (see page 2 for the list of participating companies).
- ✓ **Actual vendor-supplied costs.** Several broad-based solution EMR solution vendors were contacted and asked to provide “typical street pricing”; vendors and their specific prices were de-identified and aggregated for final report.
- ✓ **eMAR / eTAR achieved.** Closed loop bar-coding with consequent costs is not included in this cost study.
- ✓ **Level of EMR achieved.** This study considers software and steps to achieve Stage 7 of the Savage-Gutkind EMR implementation model (see page 19). Thus, the state achieved allows for full internal electronic medical records but no connectivity to health information exchanges or other outside parties. (This represents the basic state of software at the time this study was prepared; any further work needed to achieve higher levels is outside the scope of this study).
- ✓ **Provider type this study best applies to.** Cost breakdowns are most relevant for a small to mid-sized chain of long term care and rehabilitation centers; readers should make adjustments to model as appropriate to best apply to larger chains, very small chains or individual free standing facilities.

## Conclusions

**CIO Consortium members used their collective experience to design EMR\*Care, a hypothetical chain of 25 long term care and rehabilitation centers. Reasonable, five-year costs to deploy currently available EMR technology and eliminate paper records range from \$254,000 per facility for third party-hosted solution to \$259,000 for vendor hosted Software as a Service (SaaS) to \$356,000 for an in-house hosted solution.**

**Please note this study is intended to be a benchmark estimate. Actual costs may vary based upon project decisions and related variables. To apply these conclusions to a specific company, assumptions contained in the detailed schedules may be modified for individual situations. All costs in this analysis are on a cash basis; information in detailed schedules may be used to calculate capitalization per individual corporate policy.**

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## Financial Schedules

EMR\*Care is designed as a typical long term care and rehabilitation center with 25 facilities. A variety of investments are needed to support the EMR system. Summarized five-year costs in the tables below include investments in the areas of:

- ✓ Software and interfaces
- ✓ Different and additional computing devices –both stationary and mobile – needed for additional users closer to the point of patient care
- ✓ Systems hosting, whether handled internally or by a contracted or SaaS provider
- ✓ Added technical and clinical-technical support staff to support the added user load
- ✓ Systems to help manage the support for users
- ✓ Telecommunications cost for added bandwidth and wireless networks within facilities

For greater cost detail, refer to the following schedules later in this study:

- ✓ EMR\*Care Profile for details about labor, practice, revenue, before and after infrastructure
- ✓ Central Costs for all centralized expenses, typically residing at corporate headquarters
- ✓ Facility Costs for all expenses typically residing at each facility

## Annual Cost<sup>1</sup>

<b>SaaS Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$627,950	\$584,100	\$598,932	\$627,200	\$632,635	<b>\$3,070,817</b>
Field:	\$1,621,733	\$90,175	\$92,656	\$1,511,413	\$98,067	<b>\$3,414,044</b>
<b>Total Costs:</b>	<b>\$2,249,683</b>	<b>\$674,275</b>	<b>\$691,588</b>	<b>\$2,138,613</b>	<b>\$730,702</b>	<b>\$6,484,861</b>

<b>Hosted Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$668,215	\$541,600	\$548,398	\$612,650	\$572,062	<b>\$2,942,925</b>
Field:	\$1,621,733	\$90,175	\$92,656	\$1,511,413	\$98,067	<b>\$3,414,044</b>
<b>Total Costs:</b>	<b>\$2,289,948</b>	<b>\$631,775</b>	<b>\$641,054</b>	<b>\$2,124,063</b>	<b>\$670,129</b>	<b>\$6,356,969</b>

<b>In House Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$1,212,615	\$989,200	\$1,012,684	\$1,198,870	\$1,062,984	<b>\$5,476,353</b>
Field:	\$1,621,733	\$90,175	\$92,656	\$1,511,413	\$98,067	<b>\$3,414,044</b>
<b>Total Costs:</b>	<b>\$2,834,348</b>	<b>\$1,079,375</b>	<b>\$1,105,340</b>	<b>\$2,710,283</b>	<b>\$1,161,051</b>	<b>\$8,890,397</b>

<sup>1</sup> Costs are on cash basis; detailed schedules later in this report may be used to account for capital versus non-capital.

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## Cost by Facility<sup>2</sup>

<b>SaaS Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$25,118	\$23,364	\$23,957	\$25,088	\$25,305	<b>\$122,833</b>
Field:	\$64,869	\$3,607	\$3,706	\$60,457	\$3,923	<b>\$136,562</b>
<b>Total Costs:</b>	<b>\$89,987</b>	<b>\$26,971</b>	<b>\$27,664</b>	<b>\$85,545</b>	<b>\$29,228</b>	<b>\$259,394</b>

<b>Hosted Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$26,729	\$21,664	\$21,936	\$24,506	\$22,882	<b>\$117,717</b>
Field:	\$64,869	\$3,607	\$3,706	\$60,457	\$3,923	<b>\$136,562</b>
<b>Total Costs:</b>	<b>\$91,598</b>	<b>\$25,271</b>	<b>\$25,642</b>	<b>\$84,963</b>	<b>\$26,805</b>	<b>\$254,279</b>

<b>In House Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$48,505	\$39,568	\$40,507	\$47,955	\$42,519	<b>\$219,054</b>
Field:	\$64,869	\$3,607	\$3,706	\$60,457	\$3,923	<b>\$136,562</b>
<b>Total Costs:</b>	<b>\$113,374</b>	<b>\$43,175</b>	<b>\$44,214</b>	<b>\$108,411</b>	<b>\$46,442</b>	<b>\$355,616</b>

## Cost per Bed<sup>3</sup>

<b>SaaS Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$209.32	\$194.70	\$199.64	\$209.07	\$210.88	<b>\$1,023.61</b>
Field:	\$540.58	\$30.06	\$30.89	\$503.80	\$32.69	<b>\$1,138.01</b>
<b>Total Costs:</b>	<b>\$749.89</b>	<b>\$224.76</b>	<b>\$230.53</b>	<b>\$712.87</b>	<b>\$243.57</b>	<b>\$2,161.62</b>

<b>Hosted Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$222.74	\$180.53	\$182.80	\$204.22	\$190.69	<b>\$980.98</b>
Field:	\$540.58	\$30.06	\$30.89	\$503.80	\$32.69	<b>\$1,138.01</b>
<b>Total Costs:</b>	<b>\$763.32</b>	<b>\$210.59</b>	<b>\$213.68</b>	<b>\$708.02</b>	<b>\$223.38</b>	<b>\$2,118.99</b>

<b>In House Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Total</u></b>
Centralized:	\$404.21	\$329.73	\$337.56	\$399.62	\$354.33	<b>\$1,825.45</b>
Field:	\$540.58	\$30.06	\$30.89	\$503.80	\$32.69	<b>\$1,138.01</b>
<b>Total Costs:</b>	<b>\$944.78</b>	<b>\$359.79</b>	<b>\$368.45</b>	<b>\$903.43</b>	<b>\$387.02</b>	<b>\$2,963.47</b>

<sup>2</sup> Based on 25 facilities, please see “EMR\*Care Profile” section for complete detailed assumptions

<sup>3</sup> Based on 3,000 beds, please see “EMR\*Care Profile” section for complete detailed assumptions

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## Cost per Patient Day<sup>4</sup>

<b>SaaS Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Avg</u></b>
Centralized:	\$0.668	\$0.621	\$0.637	\$0.667	\$0.673	<b>\$0.653</b>
Field:	\$1.725	\$0.096	\$0.099	\$1.608	\$0.104	<b>\$0.726</b>
<b>Total Costs:</b>	<b>\$2.394</b>	<b>\$0.717</b>	<b>\$0.736</b>	<b>\$2.275</b>	<b>\$0.777</b>	<b>\$1.380</b>

<b>Hosted Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Avg</u></b>
Centralized:	\$0.711	\$0.576	\$0.583	\$0.652	\$0.609	<b>\$0.626</b>
Field:	\$1.725	\$0.096	\$0.099	\$1.608	\$0.104	<b>\$0.726</b>
<b>Total Costs:</b>	<b>\$2.436</b>	<b>\$0.672</b>	<b>\$0.682</b>	<b>\$2.260</b>	<b>\$0.713</b>	<b>\$1.353</b>

<b>In House Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Avg</u></b>
Centralized:	\$1.290	\$1.052	\$1.077	\$1.276	\$1.131	<b>\$1.165</b>
Field:	\$1.725	\$0.096	\$0.099	\$1.608	\$0.104	<b>\$0.726</b>
<b>Total Costs:</b>	<b>\$3.016</b>	<b>\$1.148</b>	<b>\$1.176</b>	<b>\$2.884</b>	<b>\$1.235</b>	<b>\$1.892</b>

## Cost as Percent of Annual Revenues<sup>5</sup>

<b>SaaS Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Avg</u></b>
Centralized:	0.24%	0.22%	0.23%	0.24%	0.24%	<b>0.23%</b>
Field:	0.62%	0.03%	0.04%	0.58%	0.04%	<b>0.26%</b>
<b>Total Costs:</b>	<b>0.86%</b>	<b>0.26%</b>	<b>0.26%</b>	<b>0.82%</b>	<b>0.28%</b>	<b>0.50%</b>

<b>Hosted Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Avg</u></b>
Centralized:	0.26%	0.21%	0.21%	0.23%	0.22%	<b>0.22%</b>
Field:	0.62%	0.03%	0.04%	0.58%	0.04%	<b>0.26%</b>
<b>Total Costs:</b>	<b>0.87%</b>	<b>0.24%</b>	<b>0.24%</b>	<b>0.81%</b>	<b>0.26%</b>	<b>0.49%</b>

<b>In House Option</b>	<b><u>Year 1</u></b>	<b><u>Year 2</u></b>	<b><u>Year 3</u></b>	<b><u>Year 4</u></b>	<b><u>Year 5</u></b>	<b><u>5 Yr Avg</u></b>
Centralized:	0.46%	0.38%	0.39%	0.46%	0.41%	<b>0.42%</b>
Field:	0.62%	0.03%	0.04%	0.58%	0.04%	<b>0.26%</b>
<b>Total Costs:</b>	<b>1.08%</b>	<b>0.41%</b>	<b>0.42%</b>	<b>1.03%</b>	<b>0.44%</b>	<b>0.68%</b>

<sup>4</sup> Based on 939,900 patient days, please see “EMR\*Care Profile” section for complete detailed assumptions

<sup>5</sup> Based on \$261,919,833 annual revenue, please see “EMR\*Care Profile” section for complete detailed assumptions

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## EMR\*Care Profile

### EMR\*Care Background

EMR\*Care is a for-profit, long-term, post-acute care company of 25 facilities located in the states of Florida and North Carolina. North Carolina is a case mix reimbursement state. Florida is a cost plus with limits reimbursement state. Facility operations must comply with regulation 1202, which dictates minimum staffing levels irrespective of patient mix. Key facts and statistics driving cost and revenue metrics are shown in Table 1.

	<b>NC</b>	<b>FL</b>	<b>Totals</b>
<i>Type of Organization:</i>	For-Profit		
<i>States of Operation:</i>	North Carolina, Florida		
<i>Types of Facilities:</i>	Skilled Care		
<i>Number of Facilities:</i>	Total 25 (10 in NC and 15 in FL)		
<i>Range in Bed Size:</i>	80 – 240		
	<b>NC</b>	<b>FL</b>	<b>Totals</b>
<i>Average Licensed Bed:</i>	120	120	120
<i>Average Total Licensed Beds:</i>	1200	1800	3000
<i>Average Total Patient Days:</i>	1044	2069	3133
<i>Average Total Occupancy:</i>	87%	87%	87%
<i>Average Medicare Occupancy:</i>	16%	20%	18.4%
<i>Average Medicaid Occupancy:</i>	67%	58%	61.6%
<i>Average Occupancy – All Other:</i>	17%	22%	20%
<i>Number of Employees (assume 60 overhead):</i>	1127	2270	3457
<i>Average Medicare Rate:</i>	463.5	420	441.75
<i>Average Medicaid Rate:</i>	203.5	166.5	185
<i>Average Rate – All Other:</i>	197	141	169
<i>Annual Revenue:</i>			\$261,919,833

All beds are dual-certified. Facilities are located in a mix of urban and rural communities. EMR\*Care’s home office is located in Atlanta, and there are two regional teams providing operations and clinical consulting support to facilities. Regional team members work out of their home office and commute to assigned facilities. Healthcare services offered across all facilities include skilled care, long term care and rehabilitation. Specialized services such as Alzheimer’s and ventilator care units are offered in selected facilities. Therapy services are provided by internal company resources.

EMR\*Care maintains shared services housed at the home office to support local facility operations. Shared services include AP, Payroll, Accounting, Financial Reporting, Information Technology, Cost Reporting, Risk Management and Purchasing. Group purchasing arrangements enable EMR\*Care to leverage its volume to reduce operating costs.

<sup>6</sup>Occupancy rates used are from AHCA “The State of Long-Term Health Care,” July 2009, (data 2008). State rate data is a blend from several CIOC members’ experiences in FL and NC for 2009.

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## EMR\*Care Information Technology Background

EMR\*Care operating philosophy is to in-source (versus out-source) service and support, though a software as a service (SaaS) approach is sometimes used when optimal. IT services provided to each facility include:

- ✓ Equipment and solutions procurement
- ✓ Technical and applications support via an internal IT Help Desk
- ✓ Claims editing
- ✓ Business intelligence
- ✓ Selected development efforts
- ✓ Provisioning of all telecom services
- ✓ Application Hosting (including clinical and billing/AR systems, financial systems, email)

EMR\*Care uses a centralized approach to systems provision and hosts applications using dedicated space at a single data center in Atlanta. The IT Department manages all aspects of data center operations.

## Impact of New EMR Information Technology

EMR\*Care is in the final stages of confirming its EMR solutions strategy. Implementation planning and modeling will be completed and roll-out will begin prior to the end of the first year of the five-year schedule. The company expects to continue with its current clinical and billing systems provider and license additional modules to complete the electronic medical record. These added components will include at a minimum:

- ✓ Medication and treatment administration records
- ✓ Activities of daily living (ADLs)
- ✓ Clinical documentation
- ✓ Therapy documentation

Existing Information Technology (IT) hours of operation are 7 am to 7 pm Eastern time Monday through Friday, with on-call coverage evening and weekends. With EMR implementation, coverage will expand to 24/7/365. The existing basic IT help request tracking solution will be upgraded to meet the more sophisticated needs of EMR support. Beyond staffing additions to cover around-the-clock support, IT anticipates the need for more staff to support added users. Furthermore, clinical systems expertise will be added to the IT team for training, facility support and to execute clinical data strategies.

Device technology used to access the current system is adequate to support business operations and the existing hybrid medical record (partial electronic, partial paper). The standard device is a fixed workstation, with laptops used in some facilities. With full EMR implementation, EMR\*Care anticipates the need for 2 – 2.5 times the number of access devices per facility to support increased personnel and usage demand nearer to point of care.

Current field connectivity consists of a private network with T1 connecting to each location; monitoring and management of field connections is outsourced. All internet traffic is monitored and managed at the data center. With EMR implementation, guaranteed data rates may be expanded to all locations and the data center. WLANs are not in place today, though they are planned as a predecessor step to EMR rollout.

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Current field location network infrastructure consists of wired networks with inconsistent wireless installation and coverage. With EMR implementation a secure, enterprise-class, centrally managed wireless solution will be installed.

Further detail on IT-related metrics with existing and projected infrastructure is included in Table 2.

Aspect	Pre Point-of-Care EMR	Post Point-of-Care EMR
<i>WAN:</i>	Private T1 – Basic MPLS	Private T1 –Expanded MPLS
<i>Back-up Network:</i>	None - Air Cards for selected PCs to enable access to central systems	Auto-failover to backup connection (business grade cable to T1s, based on availability)
<i>Facility Wireless:</i>	Essentially none - Minimal APs in place for guest wireless	Secure, enterprise-class, centrally managed solution – company wide
<i>Clinical &amp; Billing Solution(s):</i>	Integrated clinical & billing system, .NET, centralized deployment	Integrated EMR and billing/AR solution, browser-based – SaaS, third party-hosted or self-hosted
<i>Computers/Devices per Facility:</i>	16	45
<i>Systems Users:</i>	1660	3300
<i>IT Leadership(CIO, VP or Director)</i>	1	1
<i>User Support:</i>	4 Techs	10 Techs
<i>IT Infrastructure Support:</i>	1 Engineer	4 Engineers
<i>Clinical IT Support:</i>	0 Clinical Specialists	1 Specialist
<i>Development/BI:</i>	1 Developer	2 Developers
<i>Total IT FTEs:</i>	7 IT FTEs	18 IT FTEs

While total user counts are expected to at least double with full EMR implementation, the IT staffing increases are not likely to be linear, given the need to provide coverage over a full 24-hour period 7 days per week. Staffing levels reflected above are based on the assumption of continued In-House option for systems hosting and support.

In evaluating and projecting costs for EMR implementation and maintenance, EMR\*Care considered the following factors:

- ✓ Location of facilities
- ✓ Number of states in which the company operates
- ✓ Payer mix
- ✓ Revenue
- ✓ Variety of specialty units
- ✓ Facility sizes – average licensed beds/facility, range of bed size for company
- ✓ Occupancy %
- ✓ Number of employees
- ✓ Staffing levels in IT support areas
- ✓ Number of systems users

<sup>7</sup> Infrastructure stats based on CIOC members’ experience, adjusted for environment and demands on a 25-facility chain.

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## Detail Cost Analysis Approach and Three Key Scenarios

### Centralized and Facility Costs

All costs are based on factors detailed in the EMR\*Care Profile section and projected over the first five years of system use. All cost estimates are based on common budgeting practices used by experienced members of the CIO Consortium in late 2010.

### Centralized Costs

Three key scenarios are considered when evaluating centralized costs:

- ✓ SaaS Option (Software as a Service) – EMR\*Care contracts directly with the EMR vendor for a contract-hosted EMR solution, typically for an annual service charge and contracted service levels; EMR\*Care provides their own tier 1 help desk support
- ✓ Hosted Option – EMR\*Care purchased EMR software from an EMR vendor and contracts with a third-party for hosting tier 1 help desk support and contracted service levels
- ✓ In-House Option – EMR\*Care purchases EMR software with maintenance from the EMR vendor, then hosts in their own data center using their own purchased equipment and provides their own tier 1 help desk support

For all three key scenarios, leading EMR solution vendors were asked in October 2010 to provide typical quotes for the EMR\*Care organizational profile. These vendor quotes were aggregated and de-identified, resulting in the costs used in the three tables in the Central Costs section.

Detailed assumptions for each above scenario are contained in the tables in the Central Costs section.

### Facility Costs

Facility-level costs are estimated as the same for all three key scenarios and presented in a single table in the Facility Cost section. These costs include additional end-user computing devices needed beyond what already exists, installation and support of a live backup network and end-user training. Also assumed is a three-year hardware refresh cycle replacing all end-user computing devices in the fourth year, both new and those existing before installation.

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## Central Costs

Table 3 – SaaS Option

<b>EMR*Care Central Costs - SaaS OPTION (5-year run rate)</b>					
Major assumptions identified in EMR*Care Profile. Additional assumptions identified within and below cost table.					
<b>Central Costs</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Labor</b>	<b>\$480,000</b>	<b>\$494,400</b>	<b>\$509,232</b>	<b>\$524,509</b>	<b>\$540,244</b>
4X60 User Support, 1X80 IT Infrastructure Support, 1X80 Clinical IT Support, 1X80 BI		3% increase			
<b>Consulting</b>					
<b>Project Management</b>	<b>\$12,500</b>				
<b>Training Support</b>	<b>\$17,000</b>				
Corporate users only with 10% T&E included					
<b>Initial Configuration</b>	<b>\$18,750</b>				
	\$750/facility				
<b>Data Center</b>					
<b>Hardware - n/a</b>					
<b>Software License Fees</b>	<b>\$9,000</b>	<b>\$9,000</b>	<b>\$9,000</b>	<b>\$9,270</b>	<b>\$9,270</b>
Helpdesk Software License Expansion	(6) @ \$1500			3% increase	
<b>Storage and Backup Costs - n/a</b>					
<b>Telecommunications - n/a</b>					
<b>Application Software &amp; Implementation - n/a</b>					
<b>Annual Maintenance Fees - included in annual fees</b>					
<b>Annual Fees</b>	<b>\$36,000</b>	<b>\$36,000</b>	<b>\$36,000</b>	<b>\$37,080</b>	<b>\$37,080</b>
				3% increase	
<b>Data Warehouse Costs</b>	<b>\$11,500</b>	<b>\$1,500</b>	<b>\$1,500</b>	<b>\$11,845</b>	<b>\$1,545</b>
\$10K for the local server and \$1,500 monthly fee for service (set-up the replication, manage it, update SQL Views)				Tech Refresh & 3% increase	
<b>Integration Points (5) Maintenance &amp; Support</b>	<b>\$43,200</b>	<b>\$43,200</b>	<b>\$43,200</b>	<b>\$44,496</b>	<b>\$44,496</b>
Monthly charge to support each custom integration. Changes on either side are supported.	\$3600 x 12 = \$43,200			3% increase	
<b>Total</b>	<b>\$627,950</b>	<b>\$584,100</b>	<b>\$598,932</b>	<b>\$627,200</b>	<b>\$632,635</b>
<b>Cumulative</b>	<b>\$627,950</b>	<b>\$1,212,050</b>	<b>\$1,810,982</b>	<b>\$2,438,182</b>	<b>\$3,070,817</b>
<b>Assumptions:</b>					
Assume there is a clinical/billing system in place which requires an upgrade to implement EMR.					
Network infrastructure in place to support servers.					
Does not include ~\$200,000 for a more robust Helpdesk software application (if needed), only license expansion.					

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**Table 4 – Hosted Option**

<b>EMR*Care Central Costs - HOSTED OPTION (5-year run rate)</b>					
Major assumptions identified in EMR*Care Profile. Additional assumptions identified within and below cost table.					
<b>Central Costs</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Labor</b>	<b>\$220,000</b>	<b>\$226,600</b>	<b>\$233,398</b>	<b>\$240,400</b>	<b>\$247,612</b>
1X60 User Support (device delivery), 1X80 clinical IT Support, 1X80 BI (User and IT Infrastructure Support in hosting fees)		3% increase			
<b>Consulting</b>					
<b>Project Management</b>	<b>\$12,500</b>				
<b>Training Support</b>	<b>\$17,000</b>				
Corporate users only with 10% T&E included					
<b>Initial Configuration</b>	<b>\$18,750</b>				
	\$750/facility				
<b>Data Center</b>					
<b>Hardware - n/a</b>					
<b>Software License Fees - n/a</b>					
<b>Storage and Backup Costs - n/a</b>					
<b>Telecommunications - n/a</b>					
<b>Application Software &amp; Implementation</b>	<b>\$37,465</b>				
<b>Annual Maintenance Fees</b>	<b>\$157,500</b>	<b>\$157,500</b>	<b>\$157,500</b>	<b>\$162,225</b>	<b>\$162,225</b>
	\$6,300X25 facilities			3% increase	
<b>Hosting Fees</b>	<b>\$156,000</b>	<b>\$156,000</b>	<b>\$156,000</b>	<b>\$160,680</b>	<b>\$160,680</b>
\$340/facility/month hosting, \$180/facility/month Service Desk	\$6,240/facility			3% increase	
<b>Data Warehouse Costs</b>	<b>\$11,500</b>	<b>\$1,500</b>	<b>\$1,500</b>	<b>\$11,845</b>	<b>\$1,545</b>
\$10K for the local server and \$1,500 monthly fee for service (setup the replication, manage it, update SQL Views)				Tech Refresh & 3% increase	
<b>Integration Points (5)</b>	<b>\$37,500</b>			<b>\$37,500</b>	
	\$7500 x 5 = \$37,500			Technology Refresh	
<b>Total</b>	<b>\$668,215</b>	<b>\$541,600</b>	<b>\$548,398</b>	<b>\$612,650</b>	<b>\$572,062</b>
<b>Cumulative</b>	<b>\$668,215</b>	<b>\$1,209,815</b>	<b>\$1,758,213</b>	<b>\$2,370,863</b>	<b>\$2,942,925</b>
<b>Assumptions:</b>					
Assume there is a clinical/billing system in place which requires an upgrade to implement EMR.					
Network infrastructure in place to support servers.					

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**Table 5 – In-House Option Costs**

<b>EMR*Care Central Costs - IN-HOUSE OPTION (5-year run rate)</b>					
Major assumptions identified in EMR*Care Profile. Additional assumptions identified within and below cost table.					
<b>In-House Option</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Labor</b>	<b>\$760,000</b>	<b>\$782,800</b>	<b>\$806,284</b>	<b>\$830,473</b>	<b>\$855,387</b>
6X60 User Support, 3X80 IT Infrastructure Support, 1X80 clinical IT Support, 1X80 BI		3% annual increase			
<b>Consulting</b>					
<b>Project Management</b>	<b>\$12,500</b>				
<b>Training Support</b>	<b>\$17,000</b>				
Corporate users only with 10% T&E included					
<b>Initial Configuration</b>	<b>\$18,750</b>				
	\$750/facility				
<b>Data Center</b>					
<b>Hardware</b>	<b>\$110,000</b>			<b>\$110,000</b>	
(25) Virtualized Application servers, (5) VM host servers, (2) Clustered Database servers, (1) Reporting SQL server, and 150GB of Fiber attached data storage.				Technology Refresh	
<b>Software License Fees</b>	<b>\$37,200</b>	<b>\$37,200</b>	<b>\$37,200</b>	<b>\$38,316</b>	<b>\$38,316</b>
Windows Server, SQL, VMWare Licenses, Helpdesk software license expansion (10 @ 1500)				3% increase	
<b>Storage and Backup Costs</b>	<b>\$12,000</b>	<b>\$9,000</b>	<b>\$9,000</b>	<b>\$12,000</b>	<b>\$9,000</b>
SAN Data Storage and 360 Backup Tapes/year	Storage & Backup tapes	Backup tapes	Backup tapes	Technology Refresh	Backup tapes
<b>Telecommunications</b>	<b>\$1,200</b>	<b>\$1,200</b>	<b>\$1,200</b>	<b>\$1,236</b>	<b>\$1,236</b>
Current 10MB MPLS pipe expanded to 20MB				3% increase	
<b>Application Software &amp; Implementation</b>	<b>\$37,465</b>				
<b>Annual Maintenance Fees</b>	<b>\$157,500</b>	<b>\$157,500</b>	<b>\$157,500</b>	<b>\$157,500</b>	<b>\$157,500</b>
	\$6,300X25				
<b>Hosting Fees - n/a</b>					
<b>Data Warehouse Costs</b>	<b>\$11,500</b>	<b>\$1,500</b>	<b>\$1,500</b>	<b>\$11,845</b>	<b>\$1,545</b>
\$10K for the local server and \$1,500 monthly fee for service (setup the replication, manage it, update SQL Views)				Tech Refresh & 3% increase	
<b>Integration Points (5)</b>	<b>\$37,500</b>			<b>\$37,500</b>	
	\$7500 x 5 = \$37,500			\$7500 x 5 = \$37,500	
<b>Total</b>	<b>\$1,212,615</b>	<b>\$989,200</b>	<b>\$1,012,684</b>	<b>\$1,198,870</b>	<b>\$1,062,984</b>
<b>Cumulative</b>	<b>\$1,212,615</b>	<b>\$2,201,815</b>	<b>\$3,214,499</b>	<b>\$4,413,369</b>	<b>\$5,476,352</b>
<b>Assumptions:</b>					
Assume there is a clinical/billing system in place which requires an upgrade to implement EMR.					
Firm already has production Data Center including Backup/Recovery Environment, Shared Storage (SAN), Security Environment, VMWare.					
Network infrastructure in place to support servers.					
No Engineering costs included.					
Does not include ~\$200,000 for a more robust Helpdesk software application (if needed), only license expansion.					

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## Facility Costs

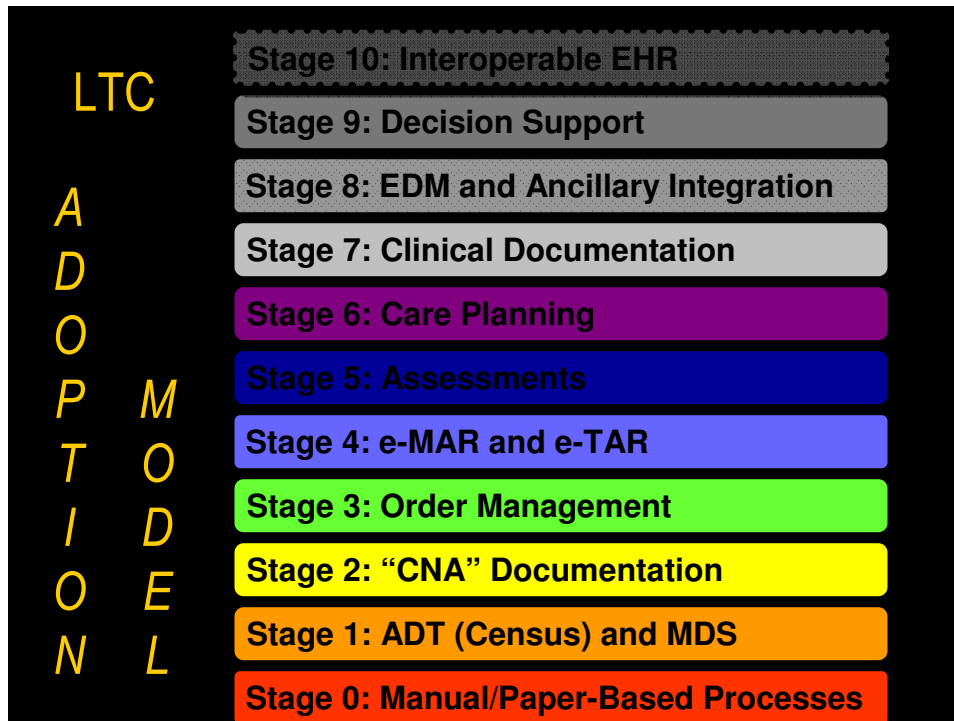
Table 6 – Facility Costs

<b>Average EMR*Care Facility Costs (5-year run rate)</b>					
Major assumptions identified in EMR*Care Profile. Additional assumptions identified within and below cost table.					
<b>Facility Costs</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
<b>Network Expense</b>					
<b>Wide Area Network (WAN)</b>	\$7,500	\$7,500	\$7,500	\$7,725	\$7,725
\$25/facility/month for assumed increased bandwidth	\$300/facility			3% increase	
<b>Backup Network - Upfront</b>	\$45,101				
\$1800/facility expense (with router & 3 yr mtnce/installn)					
<b>Backup Network - Ongoing</b>	\$31,007	\$31,937	\$32,895	\$33,882	\$34,898
\$100/facility/month broadband w/mgmt service		3% increase			
<b>Facility Wireless Upfront</b>	\$499,867				
\$20k/facility - Cisco (12 access points, full wiring, 5-yr life)					
<b>Application Expense</b>					
<b>Application Training - Upfront</b>	\$124,967				
\$5k per facility rollout training					
<b>Application Training - Ongoing</b>		\$50,738	\$52,261	\$53,828	\$55,443
\$2k per facility per year (after first year rollout).		3% increase			
<b>Hardware Expense</b>					
<b>Full/Thin Client Avg - EMR Increase Over Current</b>	\$906,714				
29 @ \$1,250 each (\$36,250/facility - includes software expense)					
<b>Full/Thin Client Avg - Hardware Refresh All in Year 4</b>				\$1,409,400	
45 @ \$1,250 each (\$56,250/facility - includes software expense)					
<b>Cameras</b>					
1 @ \$250 each (\$250/facility - replace all cameras in Year 4)	\$6,577			\$6,577	
<b>Total</b>	\$1,621,733	\$90,175	\$92,656	\$1,511,413	\$98,067
<b>Cumulative</b>	\$1,621,733	\$1,711,908	\$1,804,564	\$3,315,976	\$3,414,043
<b>Assumptions:</b>					
Existing primary wide area network installed to facility has MPLS bandwidth expanded to support full EMR traffic					
No current backup network in place					
Assumes current client devices in place can be re-used and have remaining useful life of three years					
Average rate used for new client devices assumes allowance for break-fix over three-year useful life and varying levels of device sophistication					

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## Appendix

### Savage-Gutkind EMR Implementation Model



#### BACKGROUND AND OVERVIEW OF THE ADOPTION MODEL

This adoption model was developed by partners in EMR implementation: a long term care provider and an EMR vendor. It was developed as a result of their collaboration in implementing an EMR together and based on their experience in adopting evidence-based practice through the use of technology.

The development of this adoption model for long term care was based on the concept of HIMSS Analytics' 8-stage adoption model for acute care. It was identified by the partners that long term care providers lacked both a "roadmap" to EMR adoption and a way to measure progress against their peers in the industry, since no such model existed for long term care.

This adoption model is based on the "ideal" implementation sequence in steps or stages. The adoption sequence for a provider will depend on a number of factors, including what has already been implemented and what is working successfully, as well as the organization's priorities, culture and resources. Full implementation of each stage is recommended before moving on to the next stage.

The long term care software industry currently allows us to reach Stage 7. Stage 8 requires other health care provider and ancillary supplier participation to integrate data from other health care settings and those suppliers. Stage 9 is expected to be developed by long term care software vendors when Stage 7 has been reached by a significant majority of the industry. Stage 10 is five to seven years away and requires significant advancements in interoperability standards within health information technology.

We believe that leading-edge long term care providers must pioneer EMR adoption, and that those who lead the way will set the standard for the industry. We further believe that EMR adoption leads to improved resident outcomes and will realize a return on investment.

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## **DESCRIPTION OF THE STAGES**

### **Stage 1: ADT (Census) and MDS**

#### *Description:*

Electronic capture of resident data (demographic and financial) and census transactions (admissions, temporary transfers/absences, discharges). Automatic notification of census transactions to care team members via email/text. Electronic repository of MDS assessment and Resident Assessment Protocols (RAP) data.

#### *Leading-Edge Implementation Examples:*

Entry of resident data at point of collection. Real-time entry of census changes at the time of occurrence. Entry of MDS data by the interdisciplinary team members at the time of assessment.

### **Stage 2: “CNA” Documentation**

#### *Description:*

Electronic capture of resident care delivered and resident observations (ADL assistance, bowel and bladder activity, restorative nursing interventions, mood and behavior indicators, pain, vital signs, height/weight, skin inspection, intake and output, activity participation, etc.). Direct care may be completed by other members of the care team in addition to CNAs.

#### *Leading-Edge Implementation Examples:*

Entry of data as close to the time of care or observation as possible by the clinical care provider performing the service or observation.

### **Stage 3: Order Management**

#### *Description:*

Electronic capture of all clinical care interventions planned/ordered by the care team (including but not limited to physician orders) using standard order sets and evidence-based practice.

#### *Leading-Edge Implementation Examples:*

E-prescription using structured and codified SIG (RXNorm, SCRIPT). Point-of-prescribing first-level decision support for error checking (formulary, drug-drug interaction, drug-food interaction, allergies). Physicians enter orders at point of care.

### **Stage 4: e-MAR and e-TAR (Order Completion)**

#### *Description:*

Electronic capture of orders completed (clinical care interventions administered and omitted).

#### *Leading-Edge Implementation Examples:*

Entry of data as close to the time of service/care as possible by all clinical care providers (such as rehabilitation modalities and outcomes, medications including required assessments for administration parameters, treatments, consultations completed, etc.).

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## **Stage 5: Assessments**

### *Description:*

Electronic completion of assessments by clinicians using structured templates based on current standards of practice that determine care needs and interventions and the development of a comprehensive interdisciplinary plan of care.

### *Leading-Edge Implementation Examples:*

Entry of data by the clinician/assessor at point of resident assessment. Care plan-driven directions are electronically accessible to all members of the care team within their scope of responsibility. Answers on assessments “trigger” the creation of care plan problems/interventions and orders.

## **Stage 6: Care Planning**

### *Description:*

Electronic resident-centered, individualized care plans with problem statements based on current professional standards and consistent with Resident Assessment Instrument (RAI) language, resident-driven/realistic goals, resident strengths to help define realistic and meaningful goals, and interventions consistent with current evidence-based professional standards of practice.

### *Leading-Edge Implementation Examples:*

Resident-centered, individualized care plans focused on quality, not quantity, of content. Goals are established with a focus of improvement, maintenance, palliation or prevention of complications. Standards of care (written protocols with a defined resident population, goals and approaches) are implemented and considered part of the resident’s plan of care without repeating every intervention at the resident level to avoid duplication and redundancy and truly individualize care plans.

## **Stage 7: Clinical Documentation**

### *Description:*

Electronic capture of all internal clinical documentation (progress notes, wound assessment, tuberculosis testing, immunizations, clinical flow sheets, etc.).

### *Leading-Edge Implementation Examples:*

Structured progress note templates that incorporate current best practice standards and American Medical Director Association (AMDA) change in condition protocols. Wound assessment based on current published evidence-based standards, such as the Bates-Jensen Wound Assessment Tool (BWAT). Tuberculosis testing and immunization structure that supports current ACIP and CDC guidelines.

## **Stage 8: EDM and Ancillary Integration**

### *Description:*

Electronic document management. Standard-based electronic communication with ancillary providers (lab, radiology, pharmacy, etc.) and image viewing capability.

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## *Leading-Edge Implementation Examples:*

Point-of-prescribing communication of pharmacy orders to the pharmacy and communication of status from the pharmacy. Also covers communication of orders to lab and radiology providers and vice-versa, with integration into the EMR. Three-way communication between prescriber-nurse-ancillary provider.

## **Stage 9: Decision Support**

### *Description:*

Interactive tools to assist health care professionals with decision-making tasks, supporting evidence-based practice and consisting of three parts: the knowledge base, inference engine and mechanism to communicate.

[Working definition proposed by Dr. Robert Hayward of the Centre for Health Evidence (Canada): "Clinical decision support systems link health observations with health knowledge to influence health choices by clinicians for improved health care."]

### *Leading-Edge Implementation Examples:*

Change in condition triggers from the clinical record with assessment protocols; integrated critical pathways; care plan approach suggestions based on problem statements and prognostic indicators.

## **Stage 10: Interoperable EHR**

### *Description:*

Completely paperless facility EMR. Clinical information can be readily exchanged via CCD electronic transactions with all entities within health information exchange networks.

### *Leading-Edge Implementation Examples:*

This will not be possible until interoperability standards are consistently accepted and implemented by all EMR vendors across all health care settings.

### **DEVELOPED BY:**

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*June 2009*

*Revised February 2010*

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***The CIO Consortium—Growing Effective Utilization of  
Technology in the Long Term Care Continuum***

