

**Long-Term Care Facilities Adoption of
Electronic Health Record Technology:
A Qualitative Assessment of Early Adopters' Experiences**

FINAL REPORT
Submitted to the
Texas Department of Aging and Disability Services
October 1, 2009



Barbara Cherry, DNSc, MBA, RN
TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER
Eric W. Ford, PhD, MPH
Lori T. Peterson, PhD
TEXAS TECH UNIVERSITY

TABLE OF CONTENTS

I.	EXECUTIVE SUMMARY	4
II.	INTRODUCTION.....	6
III.	REVIEW OF THE LITERATURE.....	6
	Benefits of EHR Adoption	7
	Barriers to EHR Adoption.....	8
IV.	METHODOLOGY	8
	Study Design.....	8
	Instruments	9
	Procedure	9
	Population	9
	Data Analysis	11
V.	FINDINGS AND DISCUSSION	11
	EHR Adoption Decision	11
	Systems in Use	13
	Achieve Matrix.....	13
	American Health Tech	14
	Features Common to All Vendors.....	14
	Drug Dispensing Technology	15
	Implementation Experiences	16
	Pre-Existing Organizational Environments	16
	EHR Implementation Strategies	16
	Role-Based Experiences	17
	Consumers (Family Members and Residents).....	17
	Administrators	18
	Supervisory Nurses: Directors of Nursing/Charge Nurses.....	19

	Direct Care Nurses	20
	Certified Nurse Aides	21
	Other Health Professionals	21
	Human-Computer Interface	22
	Point-of-Care Kiosks	22
	Standard PCs	22
	Education and Training Experiences and Opportunities	23
	Organizational Policy Changes Related to EHR Adoption	24
	EHR Business Models	25
	Remotely Hosted Business Models	25
	Locally Hosted Business Models	26
	Comparing the Two Strategies	26
	Disadoption Case	26
VI.	FUTURE RESEARCH	27
VII.	SUMMARY	28
VIII.	REFERENCES	30
IX.	APPENDICES	
	Appendix A: Data Collection Table	32
	Appendix B: Organizational Technology Readiness Assessment Tool	37
X.	TABLES	
	Table 1: Participant Facility Descriptions	10
	Table 2: Major Findings	12

EXECUTIVE SUMMARY

Long-term care (LTC) facilities that successfully implemented electronic health record (EHR) systems reported improved care quality, increased employee satisfaction, financial benefits in excess of system costs, and that they intend to continue using the technology – generally. The systems commercially available are able to meet most LTC facilities’ needs for both clinical and administrative purposes. Further, the EHRs in use were interoperable with the state’s data repositories.

Based on the site visits conducted, there are three potential benefits and two costs related to widespread EHR adoption in LTC facilities for the state of Texas.

Potential benefits of widespread EHR use for the state government are:

1. Decreased expenditures for LTC providers and state and federal payers through cost avoidance:
 - a. Reduced medication expenditures through waste avoidance;
 - b. Hospital admission reductions due to better care;
 - c. Increased quality and efficiency in care documentation;
2. Improved facility oversight;
 - a. EHRs provide more complete and uniform care documentation;
 - b. Information is immediately available in real time and remotely accessible;
3. The development of evidence-based practices;
 - a. EHRs will allow for the identification of best-practices;
 - b. Improved reporting will provide compelling population-level outcome and forecast data for appropriation requests.

Despite the advantages of EHR adoption for the LTC facilities using them and payers, the systems are not costless. For facilities operating in a low profitability mode, as most are in Texas, the costs of adopting an EHR system is prohibitive. The likelihood of widespread diffusion in the near term (3 to 5 years) without well-designed policy initiatives and programs is low.

Potential costs of widespread EHR adoption for the state government are:

1. A one-time expense to promote EHR adoption and implementation;
 - a. LTC facilities will need to purchase and install EHR-related hardware;
 - b. Caregivers (nurses and CNAs) will need to be trained in EHR use;
2. On-going expenses that will be passed through to payers include;
 - a. Software licensing (approximately \$1/day/patient) for on-line solutions;
 - b. Continual training for new caregivers;
 - c. Information Technology (IT) support and Internet access;
 - d. Hardware maintenance, repair and replacement.

Policy Issues:

Based on these findings, it is likely that widespread EHR adoption would potentially save the state money in the long run. One area the Texas Department Aging and Disability Services (DADS) should explore more fully is the use of computerized pharmacy administration (CPA). Facilities using the pharmacy ‘vending’ machines and remote support reported significant reductions in both medication errors and waste. One facility had fully documented a \$3,000 - \$4,000 monthly reduction in medication destruction after implementing the system (others reported similar experiences). Further, adopting the pharmacy application first gave both the administrators and clinicians a ‘low-impact / high-reward’ experience with EHR technology. The significant clinical and financial impacts of CPA for both government payers and LTC facilities

create win-win opportunities. Therefore, CPA warrants further investigation to determine the potential savings from widespread adoption and program parameters that facility administrators would desire.

Other policy issues DADS should consider to promote successful EHR and HIT adoption and implementation include:

1. Establishing a set of “best practice” implementation guidelines and a technology-adoption readiness assessment to assist facilities who are considering EHR adoption.
2. Providing guidelines for facilities to evaluate EHR business models and vendor contracts.
3. Offering continuing nursing education (CNE) programs to give supervisory and front-line nurses first-hand experiences with EHRs to help promote adoption.
4. Developing a set of sample policies to support and guide EHR adoption; such sample policies could be used as a guide to “best practices” with respect to key issues such as equipment maintenance, Internet access, protected health information (PHI) and system security, and on-going quality improvement regarding the effective use of EHR systems.
5. Establishing “best practice” guidelines for training LTC staff in the use of EHRs and HIT.
6. Encouraging facilities and vendors to collaborate to institute regular meetings with vendor representatives and user groups (i.e., directors of nursing and charge nurses) to identify potential system improvements, provide advanced training to the group, and provide an opportunity for the group members to network and learn from each other.
7. Designing programs to promote adoption that include financial incentives and scale and quality criteria as conditions of participation. Such an approach would help increase the likelihood of programmatic success and increase the pace of technology adoption.
8. Support further research to demonstrate the value of technology to improve resident outcomes and care quality, medication management (CPA Systems), organizational effectiveness and efficiency, evidence-based practices, and best practices in technology implementation and utilization in the long-term care setting.

INTRODUCTION

Health information technology (HIT) holds tremendous promise for improving health care quality and increasing patient safety, as well as, reducing the costs of providing care in long-term care (LTC) facilities. Numerous empirical studies conducted in other health settings support the view that HIT can assist healthcare providers to reduce errors, improve safety and quality, and decrease costs. President George W. Bush established a goal for most Americans to have electronic health records (EHR) by 2014. Professional organizations, including the Institute of Medicine, strongly support a system in which providers, patients and payers are connected through an interoperable system of EHRs. Three federal initiatives are underway to support the development and expansion of HIT and EHRs: 1) The U.S. Department of Health and Human Services (HHS) is guiding the development of universal standards for HIT systems; 2) The [American Health Information Community](#) (AHIC) was chartered as a federal advisory body to make recommendations to the Secretary of HHS on promoting the adoption of HIT; and 3) The [Office of the National Coordinator for Health Information Technology](#) (ONC) provides leadership to establish a nationwide HIT infrastructure that provides for secure and seamless exchange of data and records (HHS, 2008). Numerous benefits from a widely used system of EHRs have been identified and include (HHS, 2004, p. 1):

- *Making the patient's up-to-date medical record instantly available whenever and wherever it is needed and authorized;*
- *Avoiding costly duplicate tests and unnecessary hospitalizations;*
- *Providing health professionals with the best and latest treatment options for the patient's needs;*
- *Helping eliminate medical errors;*
- *Streamlining the reporting of public health information for early detection and response to disease outbreaks and potential bioterrorism;*
- *Creating opportunities to gather non-identifiable information about health outcomes for research to identify the most effective treatment options;*
- *Providing better, more current medical records at lower costs; and*
- *Protecting privacy.*

While acute care settings and physician practices are adopting electronic health record (EHR) systems at a brisk pace, LTC settings, specifically licensed nursing facilities, have been slower to embrace such technologies. Barriers to the implementation of EHRs in licensed nursing facilities include costs, training, complex implementation processes, and the lack of evidence that such systems can deliver the promised benefits (Cherry, Carter, Owen, & Lockhart, 2008). To further investigate the phenomenon of EHR adoption in LTC facilities, this study was conducted to provide a comprehensive description of the experiences, challenges and benefits of EHR adoption in Texas; identify the EHR functionalities currently being used in adopter facilities; and address policy implications related to EHR adoption and HIT in Texas LTC facilities.

REVIEW OF THE LITERATURE

There is extensive published literature about healthcare information technology (HIT) in general and EHRs specifically. However, the majority of the literature focused on the hospital, clinic and physician practice settings. Few articles and reports focused on or mentioned HIT and/or EHRs in LTC settings (American Geriatric Society, 2005; Derr, 2004; Dougherty, 2005; Dyck, 2002; Institute of Medicine, 2003). The LTC industry lags far behind other segments in the US

healthcare industry in EHR adoption; however there is strong support that EHRs hold the potential to significantly improve the quality of care for nursing home residents.

BENEFITS OF EHR ADOPTION

The literature supports the idea that HIT and EHRs hold tremendous value for the healthcare system especially in the areas of improved patient safety, operational efficiencies and reduced costs. The most often cited keys to gaining the full benefit of technology in healthcare are: (a) interoperability; (b) integration among clinical systems; (c) standardized language; (d) decision support; and (e) physician usage. The following are some key points from the literature review related to the functionality, benefits and development of HIT and EHRs:

- Successful EHR systems will improve patient safety, support delivery of effective patient care, facilitate management of chronic conditions, improve efficiency, and facilitate easy implementation (Institute of Medicine, 2003).
- Software standards need to be developed for both interoperability and interconnectivity between sectors of health care (Derr, 2004). The Office of the National Coordinator for Health Information Technology (ONC) and the Certification Commission for Health Information Technology (CCHIT) have been working to develop standards and certify EHR systems for interoperability. Standards for EHR systems designed for hospitals and physicians have been established and about 75% of the EHR systems are CCHIT certified (Lourde, 2009). However, no long term care EHRs are certified as the standards have yet to be established, but these standards are expected in 2010 (Lourde, 2009).
- Benefits to EHRs include: improved quality and patient safety, reduced lengths of stay (in acute care settings), increased efficiency and timeliness of care, avoidance of adverse events such as medical errors, improved treatment protocols, improved continuity of care, instant availability of charts, rapid and informed response to patients' telephone questions, refill requests, communication and education modules for enhanced patient understanding and satisfaction, accuracy and completeness of notes, and effective disease management by gathering extensive data quickly and efficiently on patient populations (Health Information Management Systems Society, 2003).
- HIT can improve workplace efficiency, particularly with less documentation time in three ways: reduce the number of employed nurses, increase time spent with individual patients, or increase the number of patients being attended to (Giroso, Meili, & Scoville, 2005).
- EMR systems must allow for authentication of information contained in the electronic entry; system back-up, availability and protection from disaster; contingency plans to allow access to patient information in the event of a system crash; and integrity of clinical records (Zuber, 2002).
- Improved document completeness has been demonstrated with the use of EHRs (Smith, Smith, Krugman, & Oman, 2005).
- Studies have demonstrated that HIT contributes to medical error prevention in the following categories: (a) improved communication; (b) more readily accessible knowledge; (c) requirement for key pieces of information (such as the dose of a drug); (d) assistance with calculations; (e) checks performed in real time; (f) assistance with monitoring; (g) decision support; and (h) rapid response to and tracking of adverse events (Bates & Gawande, 2003).
- Excellent commentary of "where we should be" with HIT and EMRs: *"We should strive to have a national system of EHRs that can share information on any patient in any health care setting. From the point of view of the patient, he or she should be able to enter any health care setting and see a clinician who has comprehensive access to information"*

about that patient. From the health care provider's perspective, this access should be fast, the information should be easy to find, and the process should help rather than hinder the workflow. Health care will be safer for the patient and more satisfying for the clinician, who would now be able to provide far better care and feel more secure in his or her decision making" (Ash & Bates, 2005, p. 9).

BARRIERS TO EHR ADOPTION

The primary barriers to EHR implementation identified in the literature are: (a) costs; (b) physician acceptance; (c) disruption of current clinical routine; and (d) lack of documentation standards. To summarize more specific points from the literature, EHR implementation barriers include:

- Funding and costs for implementation (Anderson, 2004; Ash, Stavri, & Kuperman, 2003; Bates & Gawande, 2003; Boudreau, Davis, Delery, Korbich, Lambert, Vogel, & et al., 2005; Ford, Menachemi, & Phillips, 2006; Hillestad, Bigelow, Bower, Girosi, Meili, Scoville, & et. al, 2005; Miller, Hillman, & Given, 2004; Valdes, Kibbe, Tolleson, Kunik, & Petersen, 2004)
- Lack of interoperability and the excessive number of commercially available EMR systems (i.e., Valdes identified 264 systems in use) (Valdes et al., 2004).
- Lack of standards adoption (Abbott, 2003; Brookstone, 2004; Dougherty, 2005; Hillestad et al., 2005; Middleton, Hammond, Brennan, & Cooper, 2005). CCHIT is working on establishing standards (Lourde, 2009)
- Increased time for documentation (Miller & Sims, 2004; Poissant, Pereira, Tamblyn, & Kawasumi, 2005).
- Perceptions that EMRs interfere with clinical workflow (Ash & Bates, 2005; Chambliss, Rasco, Clark, & Gardner, 2001).
- Physicians who view EHR decision support as "cookbook medicine" (Sprague, 2004).
- Confidentiality, privacy, safety of records, and HIPAA violations (Hillestad et al., 2005; HIMSS Leadership Survey, 2004; Soper, 2002; Valdes et al., 2004; Waegemann, 2002).
- Software issues such as lack of an efficient way to view the overall picture of patient progress and care, lack of automatic prompts, and poor system navigability (Smith et al., 2005).
- Vendor issues including vendor volatility and immaturity of software (Brookstone, 2004; Ford et al., 2006; Podichetty & Penn, 2004).
- Difficult implementation processes (Ash et al., 2003).
- Training concerns (Brookstone, 2004).
- Lack of EHR experts specializing in LTC [specifically a barrier for EHRs in LTC] (Dougherty, 2005).

METHODOLOGY

STUDY DESIGN

This study used a qualitative descriptive design with one-on-one interviews and group observations in licensed nursing facilities that have adopted electronic health record (EHR) systems and have been using them for a minimum of one-year ("adopters"). Because the literature review has given us extensive information about barriers and facilitators to EHR adoption in hospital and physician practice settings, the one-on-one interviews and group observations served to elicit new information about the experiences, challenges and benefits of EHR adoption and related policy implications for EHR and other types of HIT adoption in Texas

LTC facilities. Institutional Review Board (IRB) approval was obtained from Texas Tech University Health Sciences Center prior to initiation of the study.

INSTRUMENTS

The instrument used to conduct this study was a list of interview questions developed specifically for the study. Initially, a list of interview questions was developed by the research team in conjunction with the DADS quality improvement staff. The initial list was then pilot tested in a reflective focus group of five nursing home administrators and directors of nursing (DON). Based on results of the pilot test, the interview questions were refined; the final interview questions used in the study are presented in Appendix A.

PROCEDURE

The following steps summarize the procedure used to collect the qualitative data for this study:

1. Approval for the study was obtained from the Institutional Review Boards (IRB) for Texas Tech University Health Sciences Center (TTUHSC).
2. Licensed nursing facilities eligible to participate were obtained from the list of adopter facilities provided by the Texas Department of Aging and Disability Services (DADS).
3. Reflective focus group with 4-6 administrators and DONs from adopter facilities were conducted in summer 2008 to gain input about the interview questions and refine questions to be used in the study.
4. Administrators of adopter facilities were contacted by phone and e-mail to explain the study and seek permission for their facility to participate in the study. Administrators who agreed to participate provided a letter of support, which was then submitted to the TTUHSC IRB. After reviewing the letter of support, the IRB approved the facility as a participant in the study.
5. After agreeing to participate in the study, the administrator was provided with a copy of the interview questions and a time for the on-site visit was scheduled.
6. The on-site visits were scheduled for approximately 6 – 8 hours per visit with the following schedule for face-to-face interviews:
 - a. 60 minutes for introductions and facility tour
 - b. 45 minutes with facility administrator
 - c. 45 minutes with DON
 - d. 45 minutes with a group of ADONs and charge nurses (no administrator or DON present)
 - e. 45 minutes with a group of direct care staff (no administrator or DON present)
 - f. 45 minutes with residents and family members from the facility's Resident Council membership
 - g. One hour observation on the nursing unit during shift change
7. After obtaining informed consent, interviews were conducted and were hand-recorded and tape-recorded in duplicate. Two members of the research team participated in each of the interviews.
8. After completing the site visit, one researcher transcribed the data using hand-written records and tape recordings. The second researcher reviewed the transcribed data and compared to hand written records and tape recordings to verify accuracy of the transcribed data.

POPULATION

The population for the study consisted of the following groups from Texas "adopter" facilities: (a) facility owners; (b) facility employees including administrators, directors of nursing (DON), assistant directors of nursing (ADON), unit charge nurses and direct care staff; and (c) facility residents and their family members. There were 28 facilities on the original list of adopter

facilities provided by DADS. Five additional facilities were added through contacts and recommendations from other facilities for a total of 33 facilities on the contact list. Following is the breakdown of the 33 facilities on the list:

- Sixteen facilities did not meet criteria either because they did not use an EHR system or they were internal to a large health care systems with EHRs (i.e., a wing or floor within a hospital and classified as a skilled nursing facility [SNF])
- Four facilities did not respond to contacts via voice mails and e-mails. Facilities were eliminated after no response to 6 contact attempts.
- Three facilities responded to the initial contact but elected not to participate in the study.
- Ten facilities have participated in the study and their visits were completed.

To encourage participation, facility administrators were contacted by both e-mail and phone to explain the study and request that they participate. In four cases as noted above, there was no response to calls and e-mail messages; facilities were eliminated after six contact attempts. Of the 17 facilities who met criteria to participate, 10 facilities (59%) participated in the study.

The facilities that participated in this study were larger in size and several were Continuing Care Retirement Communities (CCRC). However, in the CCRCs, the EHR use was limited to the nursing units. The facilities visited were generally high quality and very willing to demonstrate their EHR to the research team. In particular, the CNAs expressed their appreciation for being included in the discussion and they were proud to demonstrate their competence with the technology. Some of the facilities had missions beyond providing long-term care. For example, due to its proximity to and affiliation with an academic medical center, Facility 1 has a research mission; Facility 3 and Facility 4 served a specific population. The population of these two facilities was very active in the management and oversight of the facility. Table 1 details characteristics of the participant facilities.

TABLE 1: PARTICIPANT FACILITY DESCRIPTIONS

Facility #	Location	Profit Status	Chain?	CCRC?	EHR System	CNA System	Pharmacy System
1	Lubbock	Non Profit	Yes	No	AchieveMatrix	CareTracker	n/a
2	Waco	Non Profit	Yes	Yes	Achieve Matrix	Point of Care	n/a
3	San Antonio	Non Profit	Yes	Yes	Achieve Matrix	Point of Care	n/a
4	San Antonio	Non Profit	Yes	Yes	Achieve Matrix	Point of Care	n/a
5	Lufkin	Non Profit	Yes	Yes	Achieve Matrix	Point of Care	n/a
6	Wichita Falls	Non Profit	Yes	No	Achieve Matrix	Point of Care	OnSite Rx
7	Texarkana	Non Profit	Yes	Yes	Achieve Matrix	Point of Care	n/a
8	Mesquite	Non Profit	Yes	Yes	Achieve Matrix	Care Tracker	OnSite Rx
9	Georgetown	Non Profit	Yes	No	American HealthTech	American HealthTech	American Pharmacy
10	Bedford	For Profit	Yes	No	(disadopted)	n/a	n/a

DATA ANALYSIS

Data was analyzed by identifying and organizing recurring themes and patterns in the data transcripts. Data was analyzed by question and also across user groups to identify a detailed pattern of recurring themes. The following major themes emerged from data analysis: a) EHR adoption decision; b) systems in use; c) system design; d) implementation experiences; e) role-based experiences; f) human-computer interface; g) education and training experiences and opportunities; h) organizational policy and procedure changes related to EHR adoption; and i) business models for EHR adoption. Details for each of these major themes are summarized in the following sections of this report. Policy considerations are a key component of this study and were included at the end of each major section. Because of the extensive data obtained in this study, major findings were prioritized in Table 2 along with the quality, cost and policy implications.

FINDINGS and DISCUSSION

EHR ADOPTION DECISION

Three primary themes emerged about factors that drove the decision to adopt EHRs. First, administrators identified a desire to be forward thinking leaders in the industry with state-of-the-art technology. Two participants cited the federal initiative requiring healthcare facilities to have electronic health records by 2014. Second, administrators identified a desire to improve the quality, efficiency and effectiveness of care provided in their facilities. The third theme was a desire to improve the quality of documentation while reducing the burden of documentation on care providers.

Administrators identified financial reasons for adopting EHRs, but financial drivers seemed to be secondary to the altruistic adoption drivers mentioned previously. Financial drivers included the opportunity for higher reimbursement rates and revenue capture through improved documentation of residents' level of care and risk reduction through more consistent and thorough documentation. The EHR also made the inclusion of a higher percentage of Medicare beds – and thus a higher reimbursement rate – more feasible by streamlining the required documentation for Medicare residents. No administrators mentioned reducing direct-care staff as an adoption driver; however, one administrator did mention the possibility of being able to reduce support staff.

Deliberations on whether or not to adopt an EHR generally originated at the upper levels of the facilities' organizations with either the President or CEO asking for a feasibility study. In about half the facilities, a key leader in the organization had experience with EHR systems from a previous employment setting. In several of the facilities, the Director of Nursing (DON) was involved from near the beginning of the decision process. In one facility, the Director of Nursing was responsible for driving the adoption decision. Only one facility mentioned that their physician medical director actively supported and helped drive the adoption decision.

Several of the administrators stated that in addition to gathering information from system vendors, they made site visits to facilities already using an EHR as part of their assessment. The exposure to facilities that had successfully implemented an EHR was a factor that facility employees at every level indicated had a positive impact on their perceptions of the technology's potential value.

Potential Policy Options: 1) Establish a set of “best practice” implementation guidelines and a technology-adoption readiness assessment to assist facilities who are considering EHR

TABLE 2: MAJOR FINDINGS

Finding	Care Quality Implication	Cost Control Implications	Policy Recommendations
1. LTC facilities have successfully adopted a variety of EHR technologies and several facilities are almost completely electronic.	<p>Nurses' reports varied with respect to EHR's impact on care quality from neutral (no change) to generally positive. Among the positive aspects reported were more time in direct care, improved documentation and care planning, improved monitoring of CNA activities, easier work processes such as completing physicians' orders, and the ability to track and trend quality data.</p> <p>CNAs were adept at using the icon-driven kiosks for entering ADL data and expressed a strong sense of pride in using a computer to do their work.</p>	<p>LTC facilities generally report that EHR adoption has resulted in a positive return on investment although no facilities could provide financial data to support the positive ROI.</p> <p>From the DADS's perspective, improved documentation may lead to better care quality and reductions in hospitalizations. The trade-off may be slight increases in the reimbursement rates from the Medicare and Medicaid programs to the facilities as they elevate their RUG scores.</p> <p>For the facilities, increased efficiency among nurses and CNAs may result.</p>	<ol style="list-style-type: none"> 1. DADS should study the impact of EHR adoption on facilities' operational outcomes (i.e., staff retention, hospitalization costs, level and reimbursement rate). 2. DADS should study the impact of EHR technology on quality outcomes, adverse outcomes (e.g., pressure ulcers), and the ability to use the data to support evidence-based practice. 3. Given the minimal financial impact on the agency and significant upside for care quality, the DADS should systematically promote the widespread adoption of EHR technology; particularly among larger facilities.
2. The use of computerized pharmacy administration (CPA) using vending technologies resulted in significant operational improvements with no discernable downsides.	<p>The CPA helped ensure the accuracy and timeliness of medication delivery and promoted accountability among caregivers through automated time and identification stamping.</p> <p>The CPA facilitated medication reconciliation among facilities, physicians and pharmacists – reducing incorrect medication regimes being administered.</p>	<p>The CPA systems were estimated to reduce pharmacy waste by \$3,000 - \$4,000 per month by facility administrators. How this might, in turn, impact the expenses DADS or the state incurs is unclear.</p> <p>Improved medication delivery management may lead to a reduction in the incidence of adverse drug events and the resulting costs.</p>	<ol style="list-style-type: none"> 1. The DADS should study the potential economic and care quality impacts of widespread CPA technology adoption by LTC facilities. 2. The DADS should conduct an analysis of current rules and regulations for CPA and pharmacy vending technology.
3. The dominant EHR business model is to purchase hardware and contract for software licenses on a patient-per-day rate. The typical rate is \$1/patient/day.	<p>The on-line model promotes system consistency, interoperability and accessibility. All these features have been linked to better coordination of care leading to better quality.</p>	<p>Improved care coordination and quality leads to lower overall costs to the health system with insurers being the primary beneficiary. Better care documentation leads to improved claims recovery by facilities.</p>	<ol style="list-style-type: none"> 1. There are policy issues revolving around data storage, ownership and use related to the on-line model for systems. The software contracting commonly used and state laws and regulations should be systematically evaluated.
4. EHRs facilitate MDS reporting and DADS site survey.	<p>Using the remote capabilities of the EHR systems, state inspectors can pre-screen facilities and follow-up site visits with greater regularity.</p>	<p>The cost of oversight may be reduced as the time spent on site can be streamlined. Alternatively, sites can be visited more regularly.</p>	<ol style="list-style-type: none"> 1. The tools and forms used to survey facilities should be evaluated to assess their utility in EHR enabled sites.

Adoption (recommended Readiness Assessment Tool is included in Appendix B). 2) Offer Continuing Nursing Education (CNE) programs to give supervisory and front-line nurses first-hand experiences with EHRs to help promote adoption.

SYSTEMS IN USE

The Achieve Matrix (AM) product is the most widely adopted system identified in the study sample. The AM product is described first followed by the other system (American Health Tech) observed in use. The research team learned about a third system during the course of the study, but the facility had disadopted the system prior to the research team interview, therefore it will not be described.

Achieve Matrix (AM)

System description: The product is web-based which reduced the demand on the facility to maintain paper record back-ups. As part of the AM service, electronic backups were maintained off-site or the facility had implemented a backup procedure in case of emergency. The web-based product also reduced demand on the facility's power grid assurance. Most facility's current capability was adequate to cover the additional system requirement. Several facilities reported running additional computer cables or "backbone" to enhance their increased computer needs. Other equipment (servers, racks, etc) may have also been installed as necessary. All of the additional equipment was planned as part of the implementation plan and no facility commented on the need to install additional equipment above and beyond the initial installation estimates.

Care providers (charge nurses and facility managers) are able to access the system remotely. The remote capability is also available to physicians and pharmacists but not widely used. Some facilities encouraged the use of remote access while other facilities had specific data use policies prohibiting off-site access.

The product is relatively easy to use, with minimal training. Initial training for nurses at the time of implementation lasted between four and twelve hours, while new hires received between 4 and 8 hours of computer training. CNAs received about half the training that nurses received, ranging from two to four hours. The product has interfaces that can be tailored to different roles, administrative or level of care. The product uses both personal computer (PC) and touch screen solutions. In general, the touch screens were utilized more by the CNAs and the PCs were utilized more by the nurses and nurse managers. Several facilities provided basic computer training or typing tutor programs to increase the comfort level of the staff with the new computer technology.

Positive aspects of this single provider system: 1) Makes achieving interoperability potentially easier; 2) Makes widespread workforce training potentially easier. Negative aspects of this single provider system: 1) Less competition may lead to higher costs; 2) Less competition may lead to slower innovation.

In general, administrators, nurses and CNAs were positive about their experience in using the AM product. Although workflow changes were necessary and there was initial concern and fear over the computer, the end users overwhelmingly reported they were not interested in giving up the system and going back to paper records.

American Health Tech (AHT)

System description: The AHT product is locally hosted and not web-based. This system was observed in one facility and this facility was not a CCRC. The facility is responsible for maintaining the system, backups, and all equipment. The Administrator of the facility also acted as the IT/Technical Support point person and reported that he spent approximately eight hours a week on IT issues. This facility provided a wireless network throughout the facility, laptops for the physicians to use while on site, and handheld units for the CNAs to use. Training time was reported similar to that heard at other facilities using AM with approximately eight hours for nurses and somewhat less for CNAs. Since the system is locally hosted, it is not available for access by individuals outside the facility.

Features Common to all Vendors

EHR Functionalities. In terms of EHR functionalities, both AM and AHT were observed to have a similar set of features relating to resident demographics, treatment/care plans, nurses notes, activities of daily living (ADL) documentation, and reporting capabilities. The AHT had a nicer demographic interface that allowed for a picture of the resident and also highlighted specific end of life instructions (for example, if the resident had a Do Not Resuscitate (DNR) instruction in place). This feature was accessible by CNAs.

Reimbursement Documentation. Due to the completeness of the EHR, documentation required for reimbursement purposes was relatively easy to submit. The administrators mentioned how the EHR and completeness of ADL documentation has helped to increase the RUG rates for the residents – and thus improve revenue capture.

Records for Resident Transfer. The ease of use for the EHR allows nurses and others the ability to easily produce necessary records for use by other professionals. For example, when a resident leaves for the hospital, a packet of papers containing recent lab, progress notes, current medications, and advanced directives can be quickly printed and sent with the resident. None of the facilities we interviewed were able to electronically transfer documents to the hospital in an interoperable manner.

When a resident left the facility for a physician visit, most of the facilities specifically mentioned printing specific medical records for the physician. Included in this packet are resident demographic information, current medications, progress notes, and a page for physicians to make notes on the visit. While some facilities mentioned greater success in getting the physician to return visit notes, the additional information from the physician visit was added to the resident's record, creating a more complete picture of care received outside and inside the facility. Additionally, when the resident returned from a visit to an outside physician, there was an opportunity for drug reconciliation. This was particularly important if a medication had been discontinued during an offsite visit, the nurses were able to make the appropriate notes in the medication record.

When a resident returned as a re-admission to a facility, either from the hospital or from another location, the EHR facilitated the re-admission process. Since many of the resident's demographics and health history were contained in the existing record, the process was simplified. Since none of the facilities were able to receive hospital records electronically, hospital treatment documentation had to be added to the records manually, via fax, or as a .pdf scan.

Data for Required Reports. Facilities mentioned how the Minimum Data Set (MDS) process had been simplified by the EHR and the improved quality of ADL documentation. Instead of looking

in several locations for the information, the MDS coordinators were able to have completed MDS data faster and were able to keep the information up to date more easily. Nurses also reported greater confidence in the accuracy of the data.

State Survey Experience. While DADS site survey teams were not interviewed, participants discussed the facility's experiences with the survey team post implementation. Some facilities reported a difficult time with the survey team, in part, because the team arrived soon after implementation and the facility was not able to locate information in the records easily. After a facility was comfortable with the EHR, and the facility was able to train the site survey team on the EHR, the site survey team was able to locate the information they needed more easily and fewer complaints were heard. Facilities reported receiving zero deficiencies in part because of the completeness of their EHR documentation.

Drug Dispensing Technology

Two facilities were observed utilizing a computerized pharmacy administration (CPA) system. Both systems were integrated to the EHR in use at the particular facility. Both systems provided on-site distribution of medications in pill form and reduced burdens on the staff in terms of medication distribution, narcotic control and drug destruction. Administrators at both facilities reported substantial facility-wide savings in drug destruction costs and admitted that residents on insurance plans or who self-pay for medications incur additional savings for unexpended medication costs. One benefit of both systems was a reduction in the number of "blister" medication packages and a tremendous reduction in prescribed but not distributed medication in the blister packages (which leads to the reduction on medication destruction). A side benefit of the CPA was that it was more ergonomically sound than requiring the nurse to use her/his thumbs to repeatedly pop the medications out of the blister packages.

Onsite RX. Onsite RX was observed at a facility utilizing the AM EHR product. The facility has an on-site pharmacy license and the CPA machine is in a locked room with video camera surveillance. The CPA system creates a plastic package for each resident listing the name and description of each medication to be distributed during the medication delivery event. Plastic packages are easy for the staff to open for distribution and can be generated for an immediate one-use basis. An unexpected benefit to the facility was an increase in patient satisfaction as a result of medication delivery, specifically pain medication delivery, within fifteen minutes of admission. The facility was responsible for purchasing or leasing the machine from the vendor (Onsite RX). Onsite RX provided daily medication delivery, including medications in a non-pill form (ointments and liquids, etc). Medications in the CPA system were in standard sized marked containers. A chip imbedded in the container identified the type and quantity of the medication.

American Pharmacy. American Pharmacy was observed at a facility utilizing the AHT EHR product. The facility received the machine free of charge and had all CPA related medications fulfilled through American Pharmacy, so there was no on-site pharmacy license. There were two machines in use at the facility and both rooms were open during the research visit, although the medications were secured within the locked machine. The rooms were wired for video surveillance. This CPA creates a paper package with the medications and a printed description for medication distribution. Additionally, a color printout is provided for the medication aide containing a photograph and description of the medication for verification prior to distribution. The medication aide had a laptop on a cart to facilitate the medication distribution process and to notate delivery at the time of distribution.

IMPLEMENTATION EXPERIENCES

Three common factors were identified among LTC facilities successfully adopting EHR technology. First, they were generally high-quality caregivers already and were motivated by a philosophy of continuous improvement – in both the quality and financial arenas. Second, the leadership was fully committed to the adoption decision and had some first-hand observation of systems in use. Lastly, the organizations had thorough implementation plans and training completed prior to ‘going live’. While all the facilities that successfully implemented the EHR had these characteristics in common, there were substantive differences in their implementation strategies that impacted the employees. Each factor is discussed and a recommendation for how LTC facilities’ considering an EHR adoption should proceed is provided.

Pre-existing Organizational Environments

There were two environmental conditions that existed in the facilities that successfully implemented EHR technologies prior to the adoption decision. First, they were generally larger organizations delivering high quality care. Second, the facilities’ leadership had a clear vision of how the system would work often attained by visiting institutions that had already implemented an EHR. Both factors contributed to making a positive adoption decision and facilitated the EHR implementation.

Potential Policy Options: While the Texas DADS cannot change facilities’ sizes or relative quality levels per se, it can design programs to promote adoption that include scale and quality criteria as conditions of participation. Such an approach would help increase the likelihood of programmatic success and increase the pace of technology adoption.

EHR Implementation Strategies

Facilities used a variety of different strategies for implementing their EHRs. All of the facilities except the one that abandoned the technology had successfully implemented the technology. Most facilities chose to implement the EHR in its entirety at the outset. However, the facilities using a phased implementation strategy exhibited several desirable features from policy, financial and practical perspectives.

The most commonly employed approach was the full-implementation at the outset. Using this strategy, nurses, CNAs, MDS coders and other health professionals all went live simultaneously (The ‘Big Bang’ or ‘Slam’). The major challenge with this strategy revolved around the transition from the paper records to a paperless environment. Some facilities ran in parallel, using both paper and the EHR for a period; while others made a concerted effort to get the paper-based data into the system prior to going live. All of the facilities visited had been using the EHR for a sufficient period of time that they had fully transitioned to a largely paperless environment when reviewed.

The phased approach to EHR implementation had many benefits and no discernable downsides. The LTC environment’s existing organizational design allows each phase to be both provider and module specific. For example, the module related to ADLs primarily impacted the CNAs. Because the EHR systems have a high degree of alignment between functionality and the provider using them, it is only necessary to modify one provider group’s workflow without adversely impacting other caregivers.

The best example of a phased implementation began with the installation of the computerized pharmacy administration and vending technology. Administrators in facilities using the pharmacy technology were able to identify substantial and immediate cost savings through waste in reduction. Further, the nursing staff uniformly stated that the medication packaging

from the vending machines allowed for a significant timesaving through improved workflows. The pharmacy system adoption was even more effective when the facility used CNAs with drug dispensing training and responsibilities as part of the care teams. In this instance, the introduction of EHR technology reduced the cognitive and real burdens on workers while saving money. Having used the pharmacy technology facilitated the adoption of future EHR modules.

The second phase of the most successful EHR implementation focused on the CNAs' documentation of ADLs. Similar to the pharmacy application, improved ADL documentation led to enhanced revenue capture for some types of residents (e.g., Medicare). The CNAs did have to transition from handwritten notebooks to icon-driven kiosk interfaces. While this change did create some initial discomfort among the CNAs, the training prior to implementation and the user-friendly interface mitigated most problems. The nurses' experience mirrored that of the pharmacy technology – they gained a benefit while not having to make a significant adjustment personally.

The third phase of the implementation focused on the nursing staff. The notes and care plans used by the nurses are the most complex aspect of the medical record in most LTC facilities. However, having benefited from the two previous phases, the nurses were already using the computers and were able to populate their notes with the data from the other applications. Therefore, the resistance to and anxiety of EHR adoption had by in large been replaced by a desire to complete the transition.

From a policy perspective, the phased adoption has several potential benefits. First, following the pattern outlined above is consistent with the potential for savings and the ability to demonstrate programmatic success. Administrators estimated their reduction in pharmaceutical expenditures ranged from \$3,000 - \$4,000 per month. Further, one of the vendors had a start-up model where the facility incurred no initial expense; rather they subscribed to the service. Under this model, it is possible to launch programs that are potentially budget-neutral at the outset and generate savings in the long-run.

Potential Policy Options: Promoting computerized pharmacy administration technology represents a potential win-win-win scenario (for payers, facilities, and consumers).

ROLE-BASED EXPERIENCES

Common themes that emerged for each of the groups interviewed – consumers (residents and family members), administrators, supervisory nurses including the DON and assistant DONs, direct care nurses, CNAs, and other facility employees – are summarized here. This review is a cross-section of all questions and topics discussed during the interviews.

Consumer (Family Members and Residents)

Residents' and family members' reaction to the EHR systems varied from positive and supportive to more negative. Their observations as consumers provide an interesting perspective on EHR adoption. On the positive side, residents were consistently supportive of computerized medical records by acknowledging this trend as a "wave of the future", "much more efficient", and "necessary". Residents and family members generally acknowledged that staff can find and track medical information more easily and provide answers to questions more quickly. One participant described the situation of getting information "out of the computer" that allowed her to change from a name-brand to a generic medication and saving almost \$700 per month. In most participating facilities, at least one resident commented on the convenience and quality of printed medical records that are provided when they go for a medical appointment

outside the facility. Another positive perspective from residents and family members is that the staff is overburden with paperwork and the computer allows them to more easily do their work.

On the negative side, many residents suggested that there was a trade-off in care because staff are working on the computer and not tending to resident care. Some residents commented on less personal contact since the implementation of the computer system and observations that “there is always someone with their face in the computer” not paying attention to residents’ needs. Residents and family members also expressed concern with the accuracy of their medical record information. However, there was no concern about the privacy and security of records. From a healthcare system perspective, one resident remarked that “there are still holes in the system” because his information is in the computer at the nursing facility but when he goes to an outside appointment, he still has to spend a lot of time filling out forms with the same information that is already in the computer. Despite the negative perspective described here, residents and family members were generally very positive about the overall care they received in the facility.

Administrators

Facility administrators consistently reported advantages in three distinct areas. First, immediate access to medical records allowed both nursing and non-nursing staff (administrator, pharmacist, dietitian, social worker, etc.) to access resident records without wasting valuable time looking for paper charts. Medical record security and HIPAA compliance were maintained by system features that allowed for defined levels of password-protected access to resident data for different staff categories. Administrators reported that staff were able to provide better information to resident families and better care to residents because of immediate access to computerized records.

Second, the EHR system provided for improved consistency, accuracy and quality of documentation. Nurses document resident health assessments and event monitoring (i.e., falls, fever, etc.) on computerized templates based on standard guidelines. Administrators viewed the assessment and event documentation templates as a mechanism to guide nurses to more thorough documentation as well as serving as a continuing education feature to help nurses become more adept at physical assessments and event monitoring. Another significant result of improved documentation was providing evidence to support higher RUG levels for increased reimbursement.

Third, administrators reported that the EHR system contributed to improved employee satisfaction and staff retention. Administrators reported that nurses had an elevated perception of working in a long-term care facility because of the advanced use of technology and preferred working in a facility with an EHR system. According to administrators’ observations, nurse aides also adapted quickly to the use of technology and had an improved sense of job-importance because of new skills using computerized technology to document resident care. Administrators themselves also exhibited pride in their accomplishments as an EHR leader – one administrator commented that he was “more proud of being a nursing home administrator than any time in the last 15 years”.

The primary disadvantages reported by administrators were related to technology problems and maintenance issues. Internet outages, system “down-time,” and computer glitches were reported as creating frustration for staff who depend on 24/7 access to computerized documentation systems. In some facilities, the administrator served as the “IT” support for the facility, which was reported as time-consuming and frustrating. Overall, administrators agreed

that advantages strongly outweighed disadvantages and that it was absolutely a good decision to implement the EHR system.

Supervisory Nurses: Directors of Nursing and Charge Nurses

Nurses in supervisory positions who participated in the interviews were overwhelmingly positive about the EHR system and would be very opposed to going back to “pre-computer” days. The primary advantages consistently reported by nurses in supervisory positions were:

- Immediate access to records for any staff member with an authorized need to access the record;
- More consistent and legible documentation; assessments are more thorough with assessment templates that guide nurses through body systems for documentation and help nurses improve observations skills;
- Streamlined method for processing physician orders with fewer steps and fewer opportunities to make an error;
- Ability to monitor residents’ changing conditions on an on-going, real-time basis because supervisors receive alerts regarding out-of-range vital signs and new resident events (i.e., infection, fall, etc...);
- Ability to track and trend quality indicators such as weight changes, infections and falls and use the data as part of the facility’s on-going quality improvement program;
- Ability to monitor staff performance and complete chart audits in very timely manner; and
- Ability to easily monitor nurse aide activities with the nurse aides being more responsible and accountable for their work because of the computerized ADL documentation.

Nurse supervisors generally believed that the EHR system allowed direct-care staff to spend more time with residents and less time in documentation. Some supervisors also reported a decrease in overtime that they believed to be related to less time spent in documentation activities. In contrast, some direct-care staff reported that they had less time with residents because of the amount of time computerized documentation required. Nurse supervisors reported that the EHR system helped with nurse recruitment and retention but they could not support the claim with data. One nurse supervisor reported that the EHR system helped to attract younger and more qualified nurses.

Reports regarding the time required to admit a new resident was mixed with some nurses reporting that new admissions were much easier and quicker and some reporting that admissions took much longer because of the EHR system. Nurse supervisors also had mixed reports about time to complete resident care plans with some reporting improvement and some reporting longer time to complete care plans using the EHR system.

The one disadvantage the nurse supervisors consistently reported was the difficulties encountered when the system was “down” due to technical problems. While all facilities had plans in place to use paper-charting during system down times, nurses reported that “when the system goes down, all work stops – everyone seems lost without the computer”.

Finally, one consistent message heard from the nursing supervisors was the desire to have regular meetings with the system designers and/or vendor representatives. The nurses believe they have much to offer in regards to potential improvements to the system; they also believe they may not be using the system to its fullest potential and would appreciate additional training from system experts.

Potential Policy Options: Institute regular meetings with vendor representatives and user groups (i.e., directors of nursing and charge nurses) to identify potential system improvements, provide advanced training to the group, and provide an opportunity for the group members to network and learn from each other.

Direct Care Nurses

In every facility visited, direct care nurses consistently expressed a positive experience with the EHR system and described the following benefits:

- Information on residents including diagnosis and demographics is more readily available.
- Alerts regarding specific resident events such as weight change or out-of-range vital signs allow nurses to respond more quickly to a change in the resident's condition. In one nurse's words, "we are able to be more proactive to address residents' problems."
- Nurses notes and notes by other disciplines are much easier to read.
- Information on falls, infections, and other resident events is more readily available.
- Records required to transfer residents out of the facility (i.e., to the hospital or physician's office) can be prepared with just a few clicks on the computer.
- Physician orders are easier to process because the order is written only once and is automatically sent to the pharmacy and to the medication administration record or the treatment administration record.

Interviews with direct care nurses revealed inconsistencies in four areas – time with residents, care plans, new admissions, and resident and family response – as described below:

- About half the nurses reported they had more time to spend with residents because of less time charting and about half reported no change or an increase in time required for charting.
- About half the nurses reported care plans were easier to originate and maintain; about half reported care plans were more difficult to complete and maintain
- About half the nurses reported the admission process was quicker and easier with the EHR system and about half reported that the admission process took longer than using paper records.
- About half the nurses reported residents and family members did not notice the change to computers and about half reported that residents and family members sometimes have a misconception that the staff members are "always on the computer" or "playing on the computer."

Direct care nurses were consistent in their reports regarding negative aspects of EHR usage and described the following challenges:

- New nurses are often overwhelmed with learning the new EHR system and some new staff leave the facility within the first week. Nurses also reported that after 2 – 4 weeks, most new staff became comfortable with the system.
- When the system goes "down," work almost completely stops or is much more difficult.
- Learning to use the keyboard and type was very difficult for some nurses.

Some facilities provided Internet access to the nursing staff so that they could research patient conditions and drug interactions. At one facility, nurses were observed researching interactions in the Prescription Drug Reference book and the nurses commented how Internet access would be appreciated. However, the nurses also mentioned how Internet access creates an opportunity for abuse in spending time on Internet activities unrelated to direct patient care or other work activities.

Certified Nurse Aides

Certified Nurse Aides (CNA) who participated in the interviews almost exclusively used a point-of-care system with touch screen technology to document residents' activities of daily living (ADLs) and intake and output. Computer kiosks were located in unit hallways in close proximity to resident rooms, allowing CNAs to chart immediately after, or very close to, the time care is given. As seen in previous user groups, the CNAs consistently reported a positive experience with the EHR system. Benefits to computer documentation described by CNAs included:

- More legible documentation ((i.e., the paper records got “really messy”).
- More accurate and thorough documentation (“The managers can tell if you’re just hitting buttons so you have to read carefully and answer all the questions”).

Perhaps the most interesting feeling expressed by most CNAs was that they believed managers had a greater respect for CNAs because the managers cared enough to give them computers for their work – and their work was important enough to be documented in the computer.

A second important issue discussed by CNAs was the need for more information about the residents they care for. Generally, kiosks provide only very limited information about the resident such as the resident’s diagnoses. CNAs indicated that they would value more complete information about the residents, particularly if the information was accompanied with additional explanations (i.e., more explanation about the resident’s illness).

The challenges and negative aspects of using EHRs systems discussed by CNAs included difficulty in learning to use the computer; however, most CNAs reported that they began to feel comfortable using the computer after about 1 – 2 weeks. Over half the CNAs reported that computer documentation took more time, leaving them less time to spend with residents; just under half reported that computer documentation saved them time, allowing them to spend more time with residents. Most CNAs mentioned that resident and family member sometimes made comments about them “playing” on the computer instead of working.

Other Health Professionals

During the process of visiting participating facilities, the investigators had the opportunity in some facilities to interview additional team members including one social worker, one consultant pharmacist, one office manager, and one medical records supervisor. Interviews with these long-term care team members revealed a very positive experience with the EHR system, similar to the experience reported by the administrator and nursing groups. Benefits reported by this group included:

- Very easy to find and access to information, increased efficiency and reduced duplication (“information is right at your fingertips”, “no hunting for charts”).
- Can easily see what is happening to the resident in real time and all team members can be working on the same goal.
- Records are legible and easy to follow.
- Resident information is entered in only one place and then gets “picked up” in many other places (i.e., the name is entered once and then populates every screen requiring name).
- Readmits to the facility (i.e., residents returning from a hospitalization) are simplified.
- More efficient than managing the paper record.
- Availability of accurate and detailed reports.
- More oversight for what is happening with the resident leading to improved quality of care.

- Increase in reimbursement related to increased quality of documentation.

The medical records director reported that nurses have more time for resident care and that there has been a significant improvement in business office efficiencies. The consultant pharmacist reported being able to do chart audits and quality reviews much quicker, this saving the facility consultant-time expense.

HUMAN COMPUTER INTERFACE (HCI)

For the purposes of this project, human computer interface (HCI) is simply defined as how people interact with and use computers to accomplish work. The goal for addressing the HCI is to improve the interaction between the user and the computer to make it easier for users to accomplish their work using the computer. The two primary types of computer interfaces seen in the facilities were point-of-care kiosks and standard personal computers (PC).

Point-of-Care Kiosks

The kiosks are generally placed in the hallways in close proximity to resident rooms and are primarily used by the CNAs. Kiosks appeared to be user-friendly with touch-screen technology and data entry guided by simple icons and simple yes-no questions. After about one week of use, most CNAs master the navigation necessary to accurately complete the required documentation. Kiosks are visible in public areas but despite their location, no one reported concerns regarding disclosure of personal health information (PHI). If the CNA makes a data entry error, the error must be corrected by nurses. This operating procedure is an issue in some facilities and not in others depending on the relationship among the caregivers. Another potential concern is that there may be reinforcement of role separation since CNAs are the only group in the facility to use kiosks and they have to ask a nurse to correct entry errors. Various other issues related to the HCI between the CNA and the kiosk were identified as follows:

- In several facilities the CNAs reported having to stand to use the kiosk and this was often tiring.
- Some CNAs complained about too many “touches” to complete the required documentation.
- Very difficult to do the job when the computer is “down.”
- Sometimes there are not enough kiosks available and CNAs have to wait to do their charting.

Standard PCs

Nurses worked at nurses’ stations using standard PCs to enter data and manage resident records. In addition to the computerized record, most facilities also maintained a shadow paper chart that was less complete than the computer record. Other health professionals in the facility including pharmacists, social workers and dietitians also used the PC for documenting in the residents’ records. In virtually all facilities visited, physicians did not use the PC. Issues related to the HCI between nurses and the PC that were identified as *beneficial* are as follows:

- Most nurses reported that assessments (i.e., fall risk assessment, skin assessment, etc...) are very fast to complete with click buttons, although nursing knowledge is required for accurate completion; some nurses reported that the assessments were too long and asked too many questions.
- Managers have a “universal eye” and can view residents’ condition at any time and follow-up when necessary.
- Many staff members can work on one chart at the same time.
- On-line tutorials in the AM system are very helpful.

- Completing the Medicare Minimum Data Set (MDS) can be done in just a few clicks.
- Documents can be printed from the resident record with just a few clicks.

Issues related to the HCI between nurses and the PC that were identified as *opportunities for improvement* are as follows:

- Nurses are tied to the nurses' station to work on the computers.
- In several facilities there are not enough computers and nurses are waiting to use the computer.
- An assessment of computer skills would be helpful prior to training new staff; learning to use the mouse and keyboard was mentioned frequently as a significant challenge.
- Assessments do not "share" information, requiring the nurse to enter the same data in several places.
- One system does not manage the entire resident record. For example, in many facilities, laboratory reports were accessed through a separate system.
- Some nurses mentioned that a mouse with a wheel for scrolling would make the work easier.
- The AM system uses event titles such as "Fall Event" or "Fever Event" and sometimes the event title does not always fit the event; "Other" event is needed.
- Nurses are greatly disadvantaged when the system is "down".
- Nurses need the ability to generate graphs for quality improvement data.
- In one facility, nurses were required to have five different passwords for the various systems they used.
- Provide a feature to track resident appointments outside the facility.
- One nurse reported that staying at the computer too long makes her eyes hot and heavy.

EDUCATION AND TRAINING EXPERIENCES AND OPPORTUNITIES

Investigators gleaned several important pieces of information regarding experiences related to education and training. Training was reported to be an essential component of successful EHR implementations and for promoting staff retention. There was general agreement that systems are relatively easy to use after training – but good training is essential. The following account is offered from a nurse in a facility with a one week orientation for new staff: "it is very difficult for new staff to learn the floor, the residents and the system all in one week of orientation – after the third day, they freak." One facility reported that new nurses do not get training but learn from what someone shows them. In contrast, one facility that provides a month-long orientation reported low turnover and high retention among staff.

Most nurses reported an average of 4 – 8 hours of training directly related to the EHR system prior to actually using the system for the first time on-the-job. Staff members reported that opportunities to have "hands-on" training were most beneficial. Several administrators discussed the problem of low computer literacy among CNAs and the importance of appropriate training programs for this user group.

Suggestions offered by study participants to improve training experiences included the following:

- Provide a tour of the facility and overview of the system during interviews.
- Conduct pre-training assessments to determine the new person's level of computer skill and then implement training to fit individual needs.

- Offer new staff the opportunity for an end-of-day debrief with the Director to get informal feedback and guidance during the early employment period.
- Provide follow-up training on a regular basis; managers reported that staff can often demonstrate accurate use of the system during training, but may encounter more difficulties when using the system in real work situations.
- Partner with local nursing schools in a special program to train nursing students to use the system; one facility reported great success with this strategy and attracted 10 new graduates to join the permanent staff.
- Use “superusers” to train new staff and provide on-going training for current staff.
- Encourage nurse supervisors to use errors as “teaching moments” rather than as “gottcha moments” to criticize.
- Phase in different parts of the training over several weeks.

Policy Options: Establish “best practice” guidelines for training LTC staff in the use of EHRs and HIT.

ORGANIZATIONAL POLICY CHANGES RELATED TO EHR ADOPTION

Facilities varied in their reports of new policy implementation as a result of EHR adoption with three specific policy areas common to most facilities. First, facilities reported new policies related to using the Internet during work hours. Some facilities established policies to block access to all Internet sites other than the EHR entry portal while other facilities allowed open access to the Internet. Second, facilities reported new policies related to accessing the web-based EHR system from home. In most facilities, staff members – regardless of role – are not allowed to access the web-based EHR system from home. In contrast, some facilities allow supervisors to access the EHR system from home during non-work hours, most often in situations where the supervisor is on-call and may need to view resident records from home.

Finally, facilities commonly reported new policies related to establishing security systems to protect the integrity of the electronic medical record. Passwords must be changed on a routine basis and staff members are not allowed to share passwords. Also, the level of access in the EHR system is defined by the job description. For example, CNAs are only allowed to access certain areas to document activities of daily living while the director of nursing would be allowed access to the entire electronic record. One facility has implemented policies to address EHR security during disaster drills and pandemic planning. One facility reported that they are about to implement a new policy requiring physicians to enter their own orders.

When discussing policy issues, participants offered several suggestions for policies that would be useful to support EHR adoption. Based on participant comments, facility leaders should consider establishing policies to:

- Allow nurses, direct-care staff and other user groups to meet routinely with EHR vendor representatives to discuss ideas for improvements in the system and to learn about better ways to use the system.
- Provide for specific hardware maintenance and replacement schedules (i.e., some facilities reported difficulties in working with equipment that was “wearing out”).
- Ensure a consistent and timely process to address computer malfunctions/disrepair.
- Ensure a timely process to set-up new users and allow for new users to be adequately trained.
- Provide for internal quality indicator surveys to mirror quality indicator surveys that will be conducted by the state; such a policy would allow facility staff to be more proactive in responding to quality issues.

- Provide a venue for user groups (i.e., Directors of Nursing, CNAs, Social Workers, etc...) to meet on a regular basis to share ERH experiences and learn from each other.

Potential Policy Options: The DADS should consider developing a set of sample policies to support and guide EHR adoption; such sample policies could be used as a guide to “best practices” with respect to key issues such as equipment maintenance, Internet access, PHI and system security, and on-going quality improvement regarding the effective use of EHR systems.

EHR BUSINESS MODELS

Among the sites visited, there were two models used to finance the EHR adoption – remotely versus locally hosted. The most common approach used by the facilities visited was the ‘remotely hosted’ strategy and the AM product dominated the market. The pros and cons of each approach are considered.

Remotely Hosted Business Models

Remotely hosted systems are attractive to LTC facility administrators because of their low start-up cost, ease of use and instant access to software updates. The cost of the remotely hosted EHRs in use was generally related to the patient-day rather than the number of providers, as is sometimes the case in medical practices. The expense most frequently mentioned was \$1/patient/day.

Facilities that use remotely hosted EHRs avoid the expense of buying, installing and maintaining a server where the application resides. Therefore, facilities need to be wired for Internet services. Facilities also incur the cost of computers, printers and other peripherals associate with normal office functions, which are substantial. In addition, most administrators were cognizant the hardware and equipment would need to be replaced over time and represented an ongoing expense.

The other major attraction for using remotely hosted services related to human resources. Facility administrators indicated that the human resources present prior to EHR adoption were capable of serving as the information technology support staff using the hosted model. Nevertheless, some administrators did indicate that their role in this domain was an additional responsibility that could prove challenging.

Remotely hosted EHRs generally offer more system redundancy and backup than many smaller organizations could afford to install on their own. Administrators of facilities that use remotely hosted EHRs say the model greatly simplifies their lives. “I get expanded functionality this way. And I don’t have to purchase it, don’t have to have the hardware to support it and don’t have to have the IT expertise to maintain it nor the expertise in process management.”

LTC facilities that have chosen remotely hosted systems cited some concerns that include the unreliability of Internet connections. Among the sites visited, most stated they had experienced some Internet downtime, but it was relatively rare and did not adversely impact operations.

None of the sites visited expressed concern over data ownership or the contingency of the host going out of business.

Another issue that facilities were considering was the remote access to records by staff outside the facility. Generally, administrators had adopted unwritten policies that this practice was to be

avoided except under exceptional circumstances and only then by the DON or other supervisory nursing staff.

Locally Hosted Business Models

Client-server systems installed locally require upfront licensing fees that can run in the tens to hundreds of thousands of dollars per facility, plus an investment in a server and related technologies. One location visited indicated that the license cost in excess of \$100,000. Servers also require related technologies, which might include an air conditioned data center, power loss protection, backup provisions and enhanced security, among other factors. In addition, local hosting still requires work-station hardware and wiring capacity comparable to the remotely hosted model. Lastly, local hosting requires significant information technology management capabilities be available within the facility. This role generally falls to the facility administrator and can take up to twenty percent of his/her effort.

The primary benefits of the locally-hosted model is the control over security and data. The facility can isolate its records from Internet access if it so desires. The facility that used the system did allow remote access for the Administrator or DON's use. This was in part because it had been wired into the video surveillance systems. The video system allowed the administrator to link specific time-stamped EHR notes to the delivery of services. Such a capability is particularly useful for documenting sentinel events and other lapses in care. The administrator indicated they had also used the video system intermittently to reassure family members that residents were being attended to at regular intervals. The facility employing the locally-hosted strategy had the most extensive and well integrated system among those surveyed.

Comparing the Two Strategies

Some analysts say that the long-term costs of locally hosted versus remotely hosted software may prove to be about the same. But some facilities that lack capital for upfront investment in technology - and lack IT staff as well - find the remotely hosted option appealing. For the vast majority of LTC facilities, adopting the locally-hosted model would prove to be both a financial and managerial challenge.

Potential Policy Options: The DADS might offer some guidance to the facilities on 'Best Practices' for evaluating EHR business models and contracting with vendors for IT products.

DISADOPTION CASE

Investigators identified one facility that adopted an EHR and then removed the system and went back to the paper chart. The facility is a small (66 beds) nursing and rehabilitation facility and was the only for-profit facility willing to participate in the interview. Although the facility did not meet study inclusion since it was not currently using an EHR system, investigators believed it was important to understand the disadoption decision and elected to interview the administrator of the facility. The EHR system was in place in this facility for approximately 24 - 30 months and was discontinued approximately 6 months prior to this interview. No other employees were interviewed because the administrator was the only current employee who had been employed in the facility when the EHR system was in use.

The administrator reported that the system was difficult to use and did not meet expectations. The adoption decision was made to increase Medicare reimbursement but this outcome was not realized. CNAs did not use the systems; only nurses charted in the system and they answered "yes/no" questions but did not have space for free text to add comments. Administrators were not able to obtain reports or information from the system. However, the administrator

acknowledged that lack of training may have contributed to their failure with the system. One of the major issues with the system was that the computerized MAR did not consistently present the medications in the right format. Problems with the MAR led to a problem on the facility's state survey and a recommendation from the survey team that the system be discontinued.

The administrator identified several other problems with the system as follows:

- The administrator had to spend almost 50% of his time acting as technical support for the system and for computer maintenance.
- The facility had problems maintaining Internet access throughout the building.
- The system did not have a feature for making care plans and there were other features that were needed and were either not available or the staff did not know how to use them.
- The system saved some paper, but not as much as expected.
- The nurses like the system and believed it saved them time but the administrator believed it was because they answered yes/no questions and did not have to add any narrative about their residents.

After this difficult experience, the administrator reported that he has no desire to go back to electronic charting. He believes that because nurses at the facility are older, they do not want to use the computer and that corporate has no plans to roll out an EHR system to other facilities.

FUTURE RESEARCH

In the process of conducting this study, the research team identified multiple areas of future study to demonstrate the value of technology to improve resident outcomes and organizational effectiveness and efficiency in the long-term care setting. The following areas are listed as considerations for future research:

1. Computerized Pharmacy Administration (CPA): The use of CPA should be fully explored as facilities currently using the pharmacy dispensing machines report significant reductions in both medication errors and waste. One facility fully documented a \$3,000 – \$4,000 monthly reduction in medication destruction after implementing the system (other facilities reported similar experiences). The significant clinical and financial impacts of CPA for both Medicaid and LTC facilities create a win-win opportunity. Questions that need to be explored include the impact of CPA on safety and accuracy of medication administration, staff efficiencies, and medication costs.
2. Status of Technology Adoption in Texas LTC facilities: Detail the status of technology adoption intentions and timeframes among Texas LTC facilities by developing an annual survey for all Texas LTC facilities.
3. Evidence-Based Practice: Explore how the EHR database combined with the MDS data can be used as a rich data repository for research around evidence-based practices in the LTC setting.
4. Organizational Effectiveness and Efficiency: The impact of EHR systems on organizational effectiveness and efficiencies in adopter facilities should be considered for further study. The following quantitative data could be used in either a pre-post study design to compare data before and after EHR adoption or a matched-pair design to compare data among matched-pair adopter and non-adopter facilities.
 - Nursing staff turn-over and retention rates
 - Resident and family satisfaction scores
 - Average daily census

- Overtime costs
 - Aggregate hospitalization rate
 - Aggregate death rate
 - Average TILE and RUG scores
 - TILE and RUG reversals
 - Overall costs of providing services
5. Quality Care and Resident Outcomes: The impact of EHR systems on LTC quality indicators should be considered for further study. Primary disadvantages with a quality indicator study are that the early adopters are already high-quality providers and the sample size is relatively small. However, despite these challenges, one of the following study designs could be considered: a) quantitative analysis of LTC quality indicators for adopter facilities utilizing a pre-post study design to determine if there is a difference in quality indicators before and after EHR adoption; or b) quantitative analysis of LTC quality indicators utilizing a matched-pair design to determine if there is a difference in LTC quality indicators by comparing outcomes among matched-pair adopter and non-adopter facilities.

Of these five areas identified for future research, the investigators believe that exploration for the CPA is the most relevant at this stage of technology adoption in LTC facilities because of its potential for significantly improving medication safety and delivery efficiencies as well as reducing medication costs for facilities, residents and their families, and payers. This would be a cutting-edge study because there are no published studies about the use of CPA in LTC. The second priority area is the annual survey to determine the status of technology adoption in Texas LTC facilities. Little is known about the status of technology adoption in LTC facilities across the state and nation; such a survey could become a model for other states to begin to study and promote ERH adoption in their LTC system.

SUMMARY

Long-term care facility employees who work with EHR systems on a daily basis and participated in this study were overwhelmingly positive about their experience with the EHR and reported many more benefits than challenges. In summary, the most frequently reported benefits of EHR adoption include:

- Immediate access to the residents' records.
- Improved administrative oversight allowing for ease of monitoring residents' changing condition and proactive response to residents' problems.
- Improved quality, consistency and accuracy of documentation.
- Reduced costs for medications through waste avoidance (in facilities with the computerized pharmacy application).
- Improved staff satisfaction and retention, especially among CNAs who feel more valued because of having computers to use in their work.
- Easier work processes such as completing physicians' orders and preparing records for resident transfers outside the facility.
- Ability to track and trend quality data and complete quality audits in a timely manner.

The challenges reported by participants were primarily related to the technology and new employee training. Participants reported that work was difficult to accomplish when the computers and/or Internet were "down" and the cost of maintaining and upgrading computer

hardware was an issue. Participants also reported that good training and on-going support is essential for new employees plus allowing them time to adjust to computer charting. Despite these challenges, the participants agreed that they would not want to return to paper charting or “pre-computer days.”

Based on the results of this study, the research team identified several important policy issues that should be considered to promote the successful adoption of EHR and other types of HIT in Texas LTC facilities. Recommended policy issues relate to promoting best practices for adoption and implementation processes, negotiating contracts with IT vendors, establishing sound organizational policies related to EHR use, employee training, and on-going support to address ERH system improvements and human-computer interface improvements.

The research team has also suggested priority areas for continued research to help Texas promote EHR and HIT adoption in its LTC facilities, with the top priorities being to further explore computerized pharmacy applications and to develop a survey to determine the extent of EHR and HIT adoption in the state. With ongoing research and appropriate policy support as recommended in this study, Texas can become a nationally leader in technology promotion to improve the quality of care for residents living in LTC facilities.

REFERENCES

- Abbott, P. A. (2003). Nursing informatics: A foundation for nursing professionalism. *AACN Clinical Issues*. Retrieved October 14, 2005, from <http://www.aacn.org/AACN/jrn/nci.nsf/GetArticle/ArticleTwo143?OpenDocument>
- American Geriatric Society. (2005). Caring for older americans: The future of geriatric medicine. *Journal of the American Geriatrics Society*, 53(s6), s245-256.
- Anderson, G. K. (2004). Preventive medicine and the electronic health record. *Medscape Public Health & Prevention*, 2(2).
- Ash, J. S., & Bates, D. W. (2005). Factors and forces affecting ehr system adoption: Report of a 2004 acmi discussion. *Journal of American Medical Informatics Association*, 12(1), 8-12.
- Ash, J. S., Stavri, P. Z., & Kuperman, G. J. (2003). A consensus statement on considerations for a successful cpoe implementation. *Journal of the American Medical Informatics Association*, 10(3), 229-234.
- Bates, D. W., & Gawande, A. A. (2003). Patient safety: Improving safety with information technology. *New England Journal of Medicine*, 348(25), 2526-2534.
- Boudreau, T., Davis, M., Delery, L., Korbich, J., Lambert, S., Vogel, E., et al. (2005, November 22, 2005). *Electronic medical records: A multidimensional analysis*. Paper presented at the Paper presented at IEEE Systems and Information Engineering Design Symposium, Charlottesville, VI.
- Brookstone, A. (2004). Electronic medical records: Creating the environment for change. *BC Medical Journal*, 46(5), 233-235.
- Chambliss, M. L., Rasco, T., Clark, R. D., & Gardner, J. P. (2001). The mini electronic medical record: A low-cost, low-risk partial solution. *Journal of Family Practice*, 50(1), 1063-1065.
- Cherry, B., Carter, M., Owen, D. and Lockhart, C. (2008). Barriers and facilitators to adoption of electronic health records in long-term care facilities. *Journal of Healthcare Quality*, 30(2), 37-47.
- Derr, J. (2004). A call to action on technology. *Provider*, 31-35.
- Dougherty, M. (2005). Ehr development steps in long-term care. *Journal of AHIMA*, 59(1), 54-55.
- Dyck, M. J. (2002). Nursing informatics: Applications for long-term care. *Journal of Gerontological Nursing*, 28(10), 30-39.
- Ford, E. W., Menachemi, N., & Phillips, M. T. (2006). Predicting the adoption of electronic health records by physicians: When will health care be paperless? *Journal of the American Medical Informatics Association*, 13(1), 106-112.
- Giroso, F., Meili, R., & Scoville, R. (2005). *Extrapolating evidence of health information technology savings and costs*. Santa Monica, CA: RAND Corporation.
- Health Information Management Systems Society. (2003). Ehr and the return on investment. Retrieved October 21, 2005, from <http://www.himss.org/content/files/EHR-ROI.pdf>
- Hillestad, R., Bigelow, J., Bower, A., Giroso, F., Meili, R., Scoville, R., et al. (2005). Can electronic medical record systems transform health care? Potential health benefits, savings, and costs. *Health Affairs*, 24(5), 1103-1117.
- HIMSS Leadership Survey. (2004). *Healthcare cio results: Final report*. Chicago, IL: Healthcare Information and Management Systems Society.
- Institute of Medicine. (2003). *Key capabilities of an electronic health record system: Letter report*. Washington, D.C: Institute of Medicine of the National Academies.
- Lourde, K. (2009). Long term care health information technology inevitable. *Provider*, 35(3), 20-32.
- Middleton, B., Hammond, W. E., Brennan, P. F., & Cooper, G. F. (2005). Accelerating u.S. Ehr adoption: How to get there from here. Recommendations based on the 2004 acmi retreat. *J Am Med Inform Assoc*, 12(1), 13-19.

- Miller, R. H., Hillman, J. M., & Given, R. S. (2004). Physician use of it: Results from the deloitte research survey. *Journal of Healthcare Information Management*, 18(1), 72-80.
- Miller, R. H., & Sims, I. (2004). Physicians' use of electronic medical records: Barriers and solutions. *Health Affairs*, 23(2), 116-126.
- Podichetty, V., & Penn, D. (2004). The progressive roles of electronic medicine: Benefits, concerns, and costs. *American Journal of the Medical Sciences*, 328(2), 94-99.
- Poissant, L., Pereira, J., Tamblyn, R., & Kawasumi, Y. (2005). The impact of electronic health records on time efficiency of physicians and nurses: A systematic review. *Journal of the American Medical Informatics Association*, 12(5), 505-516.
- Smith, K., Smith, V., Krugman, M., & Oman, K. (2005). Evaluating the impact of computerized clinical documentation. *CIN: Computers, Informatics, Nursing*, 23, 3.
- Soper, W. D. (2002). Why i love my emr. *Family Practice Management*, 9(9), 35-38.
- Sprague, L. (2004). Electronic health records. *NHPR Brief*, 800, 1-17.
- U.S. Department of Health and Human Services. (2004). Fact sheet: Harnessing information technology to improve health care. Retrieved January 20, 2008 from <http://www.hhs.gov/news/press/2004pres/20040427a.html>
- U.S. Department of Health and Human Services (2008). HealthIT: Federal efforts. Retrieved January 20, 2008 from <http://www.hhs.gov/healthinformationtechnology/federalEfforts.html>
- Valdes, I., Kibbe, D. C., Tolleson, G., Kunik, M. E., & Petersen, L. A. (2004). Barriers to proliferation of electronic medical records. *Informatics in Primary Care*, 12(1), 3-9.
- Waegemann, P. C. (2002). The vision of electronic health records. *Journal of Medical Practice Management*, 18(2), 63-65.
- Zuber, R. (2002). Electronic clinical records: What do regulators want. *Home Healthcare Nurse*, 20(1), 14-17.

APPENDIX A: DATA COLLECTION TOOL

Clinical Information Technology (IT) Adoption in Texas Long-Term Care Facilities
Barbara Cherry, DNSc, MBA, RN; Eric Ford, PhD, MPH; Lori Peterson, PhD
Texas Tech University Health Sciences Center - Texas Tech University

Interview questions for facility employee groups:

1. What factors helped drive the decision to adopt EHRs? (corporate, providing more safe and efficient care, multiple resident incidents that indicated significant risk?)

2. Describe the functions currently being used in your EHR system (i.e., nursing documentation, assessments, provider order entry, eMARs and eTARS, etc...)

3. What barriers/challenges were encountered during and after EHR adoption? What steps were taken to overcome them (both long and short term remedies)?

4. What advantages were realized after EHR adoption?

5. What disadvantages were realized after EHR adoption?

6. What functions or tasks didn't change after EHR adoption?

7. After all was considered/evaluated, was it a good idea to move to EHR?

8. Are tasks easier for staff? If so, which tasks are easier?

9. Which parts or functions of the new system were most helpful to direct care staff?
Administrators? DONs? Charge Nurses?

10. What quality assurance or testing was completed prior to “go live” to ensure stability,
accuracy and security of the system?

11. What security measures were implemented?

12. What do you think of the change to EHRs? (prefer at least part of the interview be 1:1 to
ensure frank discussion)

13. What do family members/residents think of the change to EHRs?

14. Did the adoption of EHRs address or provide resolution to the issues/reasons initially identified to adopt EHRs?

15. Have any cost efficiencies been realized?

16. Has the use of an EHR impacted your site survey?

17. Have you altered the licensure mix on the beds in your facility (Most facilities add more Medicare beds to mix)?

18. Did altering this mix influence your decision to adopt the EHR?

19. How long did it take for the system to pay for itself?

20. Has the adoption of the system impacted staff hiring and retention?

21. Have you implemented a new Drug Dispensing Policy or Technology since adopting the EHR? If so, what has been the impact on care?

22. What has been the impact of the new Drug Dispensing Policy or Technology on waste associated with discarded drugs? (Ask respondent to identify classes of drugs, percentage of drugs no longer discarded, and cost savings)

23. Has the implementation of the EHR led to increased transmission of electronic records between your organization and others? (Explore the entire supply chain – referrals from hospitals, use of contract providers such as rehabilitation and discharge to home care).

24. How many hospitals refer patients to your organizations?

25. Does your primary referral source use an EHR that is interoperable with yours?

26. What changes occurred in nursing care processes after implementation of the clinical IT system? Consider the following potential processes:

- a. Transcribing and implementing physicians' orders
- b. Processing new admissions
- c. Transferring residents to acute care settings
- d. Completing required medical record documentation
- e. Completing required billing function documentation
- f. Physician order-entry and signature process
- g. Creating residents' care plan

Interview questions for facility residents and family members

1. How do you feel about the nurses and other staff using computers to document the care provided in this facility?

2. In general, how do you feel about the use of computers to document your medical care?

3. Have you noticed a difference in the care provided since the nurses and other staff have been using computers to document the care provided?

APPENDIX B
Electronic Health Record (EHR) Organizational Readiness Tool
for Licensed Nursing Facilities*

Directions: Please circle the extent to which you agree or do not agree with the statement with a range from strongly agree to strongly disagree.

KEY: SD = Strongly Disagree SA = Strongly Agree NO = No Opinion

In this nursing facility:	SD					SA		No Opinion
1. Top leadership is strongly supportive of EHR implementation	1	2	3	4	5	6	7	0
2. Mission and strategic plan support the move to EHRs	1	2	3	4	5	6	7	0
3. Employees are willing to engage in the process of EHR implementation	1	2	3	4	5	6	7	0
4. Employees have a positive attitude toward EHR implementation	1	2	3	4	5	6	7	0
5. Financial resources to support EHR start-up costs are adequate	1	2	3	4	5	6	7	0
6. Financial resources to support on-going EHR costs are adequate	1	2	3	4	5	6	7	0
7. Financial resources for initial and on-going EHR training are adequate	1	2	3	4	5	6	7	0
8. EHR products that meet specific needs of licensed nursing facilities are available	1	2	3	4	5	6	7	0
9. Employees with knowledge and willingness to lead project implementation are available	1	2	3	4	5	6	7	0
10. Well-defined implementation plan has been developed	1	2	3	4	5	6	7	0

In this nursing facility:	SD					SA		No Opinion
11. Project implementation leaders have expertise in system selection	1	2	3	4	5	6	7	0
12. Representatives from across departments and levels will be involved in EHR implementation	1	2	3	4	5	6	7	0
13. Implementation plans include a method to convert paper records to electronic data	1	2	3	4	5	6	7	0
14. Implementation plans include approaches to gain buy-in from the staff	1	2	3	4	5	6	7	0
15. Implementation plans detail initial and on-going training programs	1	2	3	4	5	6	7	0
16. Implementation plan includes an evaluation component	1	2	3	4	5	6	7	0
17. Technical support to maintain the EHR system is available	1	2	3	4	5	6	7	0
18. Physical space for the required hardware (computers, monitors, etc.) is adequate	1	2	3	4	5	6	7	0
19. Physical plant can be retrofitted for Internet connectivity	1	2	3	4	5	6	7	0
20. State regulatory survey team supports the transition to EHRs	1	2	3	4	5	6	7	0

*The Tool was developed by Dr. Barbara Cherry, Texas Tech University Health Sciences Center, with funding support from the Texas Department of Aging and Disability Services.