

**Determining Factors of Organizational Readiness for  
Technology Adoption in Long-Term Care Facilities**

Final Report

Texas Tech University Health Sciences Center

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## EXECUTIVE SUMMARY

Background. The United States (U.S.) healthcare system is moving towards the widespread use of healthcare information technology (IT) to improve the efficiency, effectiveness and safety of healthcare. The literature overwhelmingly supports the idea that IT and electronic health records (EHR) hold tremendous value for the healthcare system. The long-term care (LTC) industry lags far behind other healthcare settings in EHR adoption yet there is strong support that EHRs hold the potential to significantly improve the quality of care for nursing home residents. While there is extensive research about the impact of EHRs in acute care and physician practice settings, there is limited research related to EHRs in LTC.

Project Goals. This project was undertaken in three phases with the following goals: 1) Phase I consisted of a systematic literature review to identify factors that hinder or facilitate implementation of EHRs in LTC facilities specifically and in healthcare facilities in general as reported in the literature. 2) Phase II consisted of a qualitative descriptive study to identify factors that hinder and factors that facilitate implementation of EHRs in LTC facilities specifically through the perspective on leaders working in the LTC industry. 3) Phase III consisted of development of an *ERH Organizational Readiness Tool for Licensed Nursing Facilities* to provide a mechanism for LTC leaders to assess factors of organizational readiness for technology adoption and to identify strategies to facilitate the diffusion of EHRs in long-term care.

Outcomes Phase I: The vast majority of the literature reviewed focused on hospital, clinic and physician practice settings. Few articles and reports focused on or mentioned IT and/or EHRs in LTC settings. However, most of the information gleaned from the literature review is applicable to most healthcare settings. The literature review focused on the following areas (The complete annotated bibliography for this phase was submitted to the Department of Aging and Disability Services [DADS] in January 2007):

- Benefits and core functionalities of IT and EHR systems: Overwhelmingly, the literature supports the idea that IT 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.
- Barriers to EHR implementation: 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.
  - Facilitators to EHR implementation and strategies for mitigating problems: Important facilitators to EHR implementation based on scientific studies and lessons learned are (a) strong support from administrative and clinical leaders; (b) understanding users' attitude and knowledge base prior to initiating an EHR implementation; (c) clear goals to be achieved by the EHR implementation with realistic expectations about what can be achieved; (d) thorough analysis of current work processes and how they will change with EHR implementation; (e) user involvement in system design and implementation plan development; and (f) individualized initial and ongoing training and support for users.
  - Criteria and quantitative measures of success for EHR implementation: Various criteria and quantitative measures were identified in the literature to document the success of the EHR implementation. Criteria indicative of success were: (a) acceptance by clinicians; (b) instant availability of charts; (c) improved communication; and (d) interoperability among systems. Important quantitative measures of success included (a) documentation time and quality; (b) adverse events related to medication administration; and (c) transcription and record storage space costs.
  - Costs and savings associated with EHR use: The literature was fairly rich with financial models and documentation of costs and savings associated with EHR use. Financial models addressed EMR related costs and savings from a nation-wide perspective and their impact on the U.S. healthcare system as a whole. There were also various studies and financial analyses conducted in individual organizations. Overwhelmingly, the literature supports the notion that significant costs savings can result from the use of EHRs. However, savings may not be realized for 1-3 years.
  - Conceptual models and indications of organizational readiness for change: Very few articles focused on conceptual models in relation to organizational readiness for

change and EMR systems. Three models identified were the technology acceptance model (Ammenworth et al, 2003); diffusion of innovation model (Ford et al, 2005); and complexity theory (Kouroubali, 2005).

- Policy initiatives to facilitate diffusion of EHRs: The literature strongly supported the notion that government intervention in the form of financial incentives and/or legislative mandates would be necessary to stimulate the diffusion of technology throughout healthcare organizations.

Outcomes Phase II: The Phase II study utilized a qualitative research design with a focus group methodology. Focus groups were conducted via conference calls with LTC directors of nursing, facility administrators, and corporate executives/owners for both EHR user and non-user facilities. A semi-structured interview guide was used to direct the conference call discussion. The primary barriers or challenges identified by participants were the culture change required to embrace technology, costs, and training. The primary facilitators were availability of training programs for initial and on-going training, well-defined implementation plans, government assistance with implementation costs, evidence that EHRs will improve efficiency and effectiveness of care, and support from the state regulatory agency for EHRs. This study provided insight into the issues that hinder and facilitate EHR adoption in LTC facilities and offered a framework for action for health policy makers, LTC industry leaders, and researchers.

Outcomes Phase III: The overarching goal of the technology readiness collaboration between Texas Tech University Health Sciences Center and DADS was to develop a tool to assess factors of organizational readiness to adopt technology in licensed nursing facilities; and serve as a guideline for assisting facilities to develop intervention strategies to facilitate the diffusion of electronic health records in long-term care. The *Electronic Health Record (EHR) Organizational Readiness Tool for Licensed Nursing Facilities* tool was developed and tested for content validity and internal reliability. Content validity was established through the extensive literature review done as Phase I with validation from the qualitative descriptive study. Internal reliability was tested through an Institutional Review Board approved study in which the readiness tool was mailed to licensed nursing facility administrators and directors of nursing with 93 completed tools returned. Statistical analysis showed a mean range from 2.7 to 5.07 and a Chronbach's alpha of 0.95, supporting internal reliability; however, some redundancy in questions is suggested by these results.

Summary: Phase I and II of this report (literature review and qualitative descriptive study) have provided insight into the issues that hinder and facilitate EHR adoption in LTC facilities and offers a framework for action by policy makers, LTC industry leaders, and health services researchers. Such action includes governmental assistance with EHR implementation costs, adaptations to allow the regulatory survey process to function in an electronic environment, resources for strong implementation planning, a stronger safety culture focus, and research to investigate the impact of EHRs on LTC facility operational efficiencies, financial outcomes, and resident care outcomes. Phase III of the report (Organizational Readiness Tool development) has provided a mechanism for LTC leaders to assess factors of organizational readiness for technology adoption and to identify strategies to facilitate the diffusion of EHRs in long-term care.

## BACKGROUND

The United States (U.S.) healthcare system is moving towards the widespread use of information technology (IT) to improve the efficiency, effectiveness and safety of care provided in healthcare facilities across the nation. In support of IT at the national level, the United States (U.S.) Department of Health and Human Services (HHS) has established the Office of the National Coordinator for Health Information Technology for the purpose of encouraging and facilitating the widespread use of modern IT. This national effort is in response to the growing recognition that a stronger IT infrastructure is integral to improving the safety, quality and efficiency of healthcare (Bates & Gawande, 2003; Institute of Medicine [IOM], 2003). The electronic health record (EHR) is an essential component of this IT infrastructure.

Studies in acute care and physician practice settings provide evidence that EHRs contribute to reduced adverse drug events (Hillestad et al., 2005); improved quality of documentation (HIMSS, 2003; Smith, Smith, Krugman, & Oman, 2005; Smith, 2003); reduced hospital lengths-of-stay (Hillestad et al., 2005); improved efficiency in time to complete nurses' documentation (Pizziferri et al., 2005; Poissant, Pereira, Tamblyn, & Kawasumi, 2005); increased capture of allowed billable expenses (HIMSS, 2003; Keshavjee, Troyan, Holbrook, & VanderMolen, 2001; Schmitt & Wofford, 2002; Soper, 2002; Wang et al., 2003); decreased chart pulls and lower transcription costs (Keshavjee et al. 2001; Miller & Sim, 2004; Smith, 2003; Wang et al., 2003; Schmitt & Wofford, 2002; Soper, 2002); more efficient use of nurses' administrative time (Deese & Stein, 2004; Hillestad et al., 2005); instant availability of charts (HIMSS, 2003; Smith, 2003; Laing, 2002; Keshavjee et al., 2001); improved communication among clinicians (Turpin, 2005); and elimination of physical storage space (Laing, 2002; Soper, 2002). A group from the Center for Information Technology Leadership at Harvard University developed a financial model which projected that a completely standardized, nationwide electronic health care information exchange and interoperability system could yield the U.S. healthcare system a net value of \$77.8 billion annually after a 10 year period (Walker et al., 2005).

The healthcare settings most active in EHR adoption initiatives are hospitals and physician practices. It is currently estimated that between 20% and 30% of U.S. hospitals and 12% of physician practices have adopted EHRs with adoption rates growing annually for both



settings (Fonkych & Taylor, 2005). There were no estimates available for EHR adoption rates in long-term care (LTC) settings. It appears that the movement towards EHR adoption in LTC lags far behind acute and primary care settings.

Despite the minimal use of EHRs in LTC, there is strong support that such systems hold the potential to significantly improve the quality of care for nursing home residents (Dyck, 2002; IOM, 2001; 2003; 2004; Report to Congress, 2003). The professional organizations that support LTC providers agreed that developing and implementing EHRs is a top priority for the LTC industry (American Association of Homes and Services for the Aged, 2005; American Health Care Association, 2005; American Medical Directors Association, 2005).

Further, the American Health Information Management Association (AHIMA) (2005) suggests that LTC organizations, vendors, and government agencies increase their interest and awareness of healthcare IT issues and become involved in the national agenda to advance IT and EHRs. However, there is very limited research specifically related to EHRs in LTC to guide the industry in advancing this IT agenda. An area of research yet to be reported is related to factors that can impact EHR adoption in LTC facilities. Therefore, determining the barriers and facilitators to EHR implementation in LTC facilities is the first step to advancing their use in LTC.

## **PURPOSE AND METHODOLOGY**

The purpose of this study was to identify factors that hinder and factors that facilitate implementation of EHRs in LTC facilities. The results of the study will provide policy makers and LTC leaders with information to develop strategies to support and promote the diffusion of EHRs in LTC with the ultimate goal of improving resident care.

### **Definitions**

The definitions necessary to clarify the study are “electronic health record,” “long-term care,” “barriers,” and “facilitators.” The conceptual definitions and operational definitions for these terms follow.

*Electronic health record (EHR).* The use of the term EHR for this study deserves explanation prior to presenting its conceptual and operational definitions. A wide variety of terms are used in the medical and health informatics literature to refer to various types of

electronic health information management systems. Some of the more common terms are electronic health records (EHR), electronic medical records (EMR), electronic patient record (EPR), and computerized patient record (CPR). Depending on the usage, these terms can connote a simple system to record patient encounters or an entire healthcare information management system with a full range of dynamic functions like decision support, order entry and interoperability with other systems. Experts in health informatics “have variously defined electronic health record systems . . . however, some of the terms used refer only to the patient record itself, whereas others include the entire system that supports the delivery of high-quality, integrated patient care across multiple providers” (Bower, 2005, p. 9).

In an attempt to identify the most often used terminology in the marketplace, the authors reviewed 44 websites of commercially available electronic health information management systems and found that 73% used EMR (electronic medical record) to describe their products and 20% used EHR (electronic health record). Cerner Corporation, one of the largest providers of electronic health information management systems in the U.S., uses the term EPR (electronic patient record) to refer to its products. General Electric, another one of the largest providers of health information systems in the U.S., uses the term EMR. Achieve Healthcare Technologies, specializing in information management systems for the LTC industry, uses the term EHR.

The IOM (2003) uses the term EHR (electronic health record) to describe the ideal health information management system necessary to achieve improved safety, quality and efficiencies. Because of the inconsistent use of the terms elsewhere in the literature and the comprehensive definition provided by the IOM, EHR will be used for the purposes of this study.

The EHR is conceptually and operationally defined for this study as the non-redundant, longitudinal electronic health information maintained by providers (e.g., hospitals, nursing homes, ambulatory settings) pertaining to the health of an individual and/or to the health care provided to that individual; the EHR provides functions for results management (e.g., diagnostic test results), order entry and management, decision support, administrative processes, quality improvement, and population health management (IOM, 2003). Additionally, the EHR serves as a replacement for the paper medical record as the primary source of information and documentation for health care, meeting all clinical, legal and administrative requirements (Nicoll, 2005).

*Long-term care (LTC).* LTC is conceptually defined as an “array of health care, personal care, and social service generally provided over a sustained period of time to persons with chronic conditions and with functional limitations....long-term care is generally distinguished from acute and primary care because of its greater emphasis on personal care and social services” (IOM, 2001, p. 27). LTC for the purposes of this study is operationally defined as care provided in a licensed nursing facility that offers 24-hour nursing supervision and a range of a comprehensive medical, personal, and social services developed and coordinated to meet the physical, social, and emotional needs of chronically ill or disabled individuals. Individuals who are admitted to a LTC facility generally reside in the facility for several months to several years and are referred to as “residents” of the facility; the LTC facility becomes their permanent home and they most often live out their remaining life span in the facility.

*Barrier.* Barrier is conceptually defined as something material that blocks or impedes progress or achievement (Merriam-Webster, 2005). For the purpose of this study, barrier is operationally defined as something that impedes the ability of organizations to implement or adopt EHRs.

*Facilitator.* Facilitator is conceptually defined as something that makes progress or achievement easier or helps bring about results (Merriam-Webster, 2005). For the purpose of this study, facilitator is operationally defined as something that helps to bring about successful implementation or adoption of EHRs.

### **Assumptions**

1. Implementation of EHRs in LTC facilities will improve clinical, financial and/or human resource outcomes for the facilities.
2. Professionals who work in LTC facilities including nurses, physicians, healthcare administrators, and LTC corporate executives will have some general knowledge about EHRs.
3. Information reported in the literature about EHRs in healthcare in general will be applicable to LTC settings.

## **Study Design**

The study utilized a qualitative descriptive design with a focus-group methodology. Focus groups serve as a valid qualitative research methodology by (a) helping to identify a range of ideas, feelings or perceptions that people have about a topic; and (b) allowing ideas to emerge from the group rather than be driven by the investigator (Burns & Grove, 2005; Krueger & Casey, 2000). Because the literature review has given us extensive information about barriers and facilitators to EHR adoption in hospital and physician practice settings, the focus groups served to elicit new information about such barriers and facilitators in LTC settings as well as to compare and contrast information from the literature. Institutional Review Board (IRB) approval was obtained from Texas Tech University Health Sciences Center prior to initiation of the study.

## **Instruments**

Two instruments were used to conduct this study. The first instrument is a demographic data collection worksheet on which focus group participants recorded demographic data (included in Appendix A). The second instrument is a semi-structured interview guide designed specifically for use in conducting the focus groups (included in Appendix B)

## **Participants**

The population for the study consisted of directors of nursing (DON), administrators, and corporate executives/owners who were employed by companies that own and operate LTC facilities. An IRB-approved flyer describing the research study was used to recruit participants. The flyer, directed to the attention of DONs, administrators, and corporate executives/owners was faxed and mailed to 600 facilities using facility names and addresses from the Texas Department of Aging and Disability Services Directory of Licensed Nursing Facilities. The facility directory consisted of approximately 1200 facilities; every other facility in the directory was selected for a total of approximately 600 facilities.

Facilities that use EHRs were specifically targeted for participant recruitment. EHR user facilities were identified by searching the websites of vendors who offer EHR products specific for LTC. Three user facilities were identified in Texas and recruitment flyers were mailed and faxed to these facilities.

The initial mailing and fax resulted in only two individuals responding; thus, approval for a follow-up letter was obtained from the IRB. The follow-up letter, accompanied by the original flyer, was resent to approximate 600 facilities via mail and fax. The second contact resulted in eleven individuals contacting the investigator and expressing their willingness to participate. In order to reach more potential participants, IRB approval was obtained to distribute recruitment flyers at the annual conference for the American Health Care Association held in San Antonio, Texas in October, 2006. The American Health Care Association is a non-profit professional organization representing the long-term care industry. This recruitment initiative resulted in a response of 21 individuals who contacted the investigator and expressed a willingness to participate in the study. All individuals who expressed a willingness to participate met the inclusion criteria of having a minimum of 1 year experience in LTC and being in the position of DON, administrator, or corporate executive/owner. In some cases, two participants were from the same facility/organization but represented a different position in the facility such as administrator and director of nursing. Six of the participants were from facilities that use EHRs while 28 were from facilities that do not use EHRs. All participants were employed by facilities in Texas.

Individuals who contacted the principal investigator and agreed to participate were mailed or faxed a packet that contained a letter providing details about the conference call, the statement of research (in lieu of informed consent as approved by the IRB), the list of focus group questions, and the demographic data sheet with a stamped, addressed envelop and/or fax number to facilitate return. Table 1 provides summary information about participants' position, EHR user or non-user status, and number of organizations represented by participants.

**Table 1: Summary Information about Focus Group Participants**

Participant Positions	EHR Users	EHR Non-users
Director of Nursing	0	11
Administrator	3	10
Corporate Executive/Owner	3	7
Total Participants	6	28
Total Organizations Represented	6	18

Table 2 provides participant demographic information as collected from the demographic data sheets. Participants were scheduled for focus-group conference calls based on times that were convenient for the participant. Focus groups consisted of two to three participants per group. In some cases, because of the difficulty in scheduling multiple participants for a group call, participants were interviewed in a one-on-one phone call by the principal investigator.

**Table 2: Participant Demographic Summary**

Combined results for user and non-user groups (from 24 returned demographic data sheets)	Average (n = 24)	Range
Time in current position	3.2 years	4 months - 10 years
Time in long-term care	15.3 years	2 – 34 years
Average number of beds per facility	130	30 – 250
Ethnicity	96% Caucasian 4% African American	
Gender	46% Male 54% Female	
Education	17% Associate Degree 37% Bachelors degree 29% Masters degree 4% Doctorate 13% Other	
Ownership Status	87.5% not-for-profit organizations 12.5% for-profit organizations	

### Data Collection and Analysis

Focus groups were conducted via telephone conference call and facilitated by the principal investigator using the semi-structured interview guide. Focus groups via telephone offer the advantage of allowing participants across distant locations to participate without the time commitment or expense of travel to a central location (Krueger and Casey, 2000). The interview guide was structured in such a way that ideas would emerge from the group and were not driven by the investigator's knowledge of barriers and facilitators.

Focus groups were categorized by (a) users: participants from LTC facilities that currently use EHRs and have used them for a minimum of six months, or (b) non-users:

participants from LTC facilities that do not use EHRs. All conference call dialog was hand-recorded on paper and tape-recorded in duplicate. Tape recordings were transcribed verbatim within 14 days and transcriptions were compared against tape recordings and hand-recordings to verify accuracy and completeness of data.

Focus group data was analyzed using the following qualitative method: identify and organize themes and patterns; identify the frequency of occurrence of themes and patterns; identify any connections; compare themes and patterns to data gathered from the literature review; and finally, interpret the data to answer the research question (University of Texas at Austin, 2005). Themes, patterns and frequencies were identified separately for the nonuser and user groups and then comparisons were made between the two groups. Themes or patterns that corroborate or contradict information gleaned from the literature were noted. Saturation was achieved by the sample population as no new themes or patterns emerged from either the user or non-user groups during the last five to six interviews.

## **STUDY RESULTS**

Common themes for both non-user and user groups emerged directly related to the key research questions: (a) aspects of resident care affected by EHR use; (b) barriers or challenges to implementation; (c) factors to promote implementation; (d) information necessary for EHRs to be of benefit; (e) tasks the EHR should perform to be of benefit; (f) top three challenges to EHR implementation; and (g) top three facilitators to EHR implementation. Patterns within each major theme were categorized by the investigator with a summary table provided in Appendix C.

### **Aspects of Resident Care Affected by EHR Use**

Participants in the non-user group largely agreed that more efficient documentation would be realized; also the quality and accuracy of documentation would improve resulting in evidence of higher levels of care followed by higher reimbursement levels. Other aspects of resident care identified by non-user participants included easier access to charts and medical information, improved quality-of-care outcomes because staff would spend less time in documentation tasks and more time in resident care, and improved staff retention because of a sense of pride and empowerment associated with using computers in the work setting.

Similar to the non-user group, participants in the user group also identified more efficient documentation, easier access to charts and medical information, and improved quality of documentation with associated higher levels of reimbursement. A new theme identified by the user group was that supervisors were able to more easily monitor documentation of resident care activities and thus more quickly identify resident care needs, address quality of care issues, regulatory compliance issues, or staff education needs.

Findings in the literature related to hospital and physician practice settings are consistent with those themes affecting resident care identified by both non-user and user participants. Studies support that the use of EHR systems result in improved efficiency in time to complete nurses' documentation (Pizziferri et al., 2005; Poissant, Pereira, Tamblyn, & Kawasumi, 2005); improved quality and completeness of documentation (HIMSS, 2003; Smith, Smith, Krugman, & Oman, 2005; Smith, 2003); increased capture of allowed billable expenses (HIMSS, 2003; Keshavjee, Troyan, Holbrook, & VanderMolen, 2001; Schmitt & Wofford, 2002; Soper, 2002; Wang et al., 2003); and instant availability of charts (HIMSS, 2003; Smith, 2003; Laing, 2002; Keshavjee et al., 2001). The use of EHRs has also been strongly associated with increased patient safety and reduction of adverse drug events (IOM, 2003; Hillestad et al., 2005) yet participants in neither the user nor the non-user groups identified these as potential areas affected by EHR use.

### **Barriers or Challenges to EHR Implementation**

Cost was the barrier to EHR implementation identified most frequently by non-user participants. Cost was also one of the most frequently mentioned barriers for the user group. This finding is consistent with numerous studies and reports that identify implementation costs as the number one barrier to EHR adoption (Anderson, 2004; Ash et al., 2003; Bates & Gawande, 2003; Ford, Menachemi, & Phillips, 2005; Hillestad et al., 2005; HIMSS, 2004; Medical Records Institute, 2005; Miller & Sim, 2004; Valdes et al., 2004).

The user group's most frequently mentioned barrier was categorized as human factors and included issues such as staff resistance to change, unfamiliarity with computers, fear of computers, and lower education levels of the certified nurse aides. Human factors ranked as the third barrier for the non-user group.



The non-user group's second most frequently mentioned barrier was staff training, which included issues such as cost and time involved for training, quality of training programs, training temporary and on-call staff, on-going training, and training for outside entities such as consultants to use the system. Staff training also ranked as one of the top barriers for the user group. One user participant discussed the problem of "mislearning" in which staff, even after training, developed methods of entering data that were not in line with correct system protocols.

Another challenge discussed by non-user participants was implementation processes. Concerns about implementation processes included choosing the right system, finding systems that were non-complex and user-friendly, and converting from paper to electronic data. Likewise, the user group identified the conversion of the paper chart to electronic data as a challenge. Both groups discussed challenges with the state survey process including general acceptance of EHRs and preparation of surveyors to conduct facility inspections using computers instead of paper. Both groups also identified compatibility of EHR systems with other systems within the facility as a challenge. Examples of electronic systems currently present in facilities included corporate accounting systems and systems used by contracted providers such as therapy services. Finally, a small group of non-users discussed challenges related to back-up systems to ensure the integrity of the data, HIPPA compliance, confidentiality and privacy of records, and physical space for hardware and wiring for connectivity.

With the exception of cost as the number one barrier identified in this study by non-users, studies from hospital and physician practice settings provide a slightly different perspective on other major barriers and challenges to EHR implementation. Following costs, clinician acceptance of EHRs along with perceived disruption of clinical workflow and increased time for physicians to complete documentation were identified as major barriers (Ash & Bates, 2005; Chambliss, Rasco, Clark, & Gardner, 2001; Ford et al., 2005; Hillestad et al., 2005; Waegemann, 2002; Wang et al., 2003; Sprague, 2004; Miller & Sim, 2004; Poissant et al., 2005). A second major barrier was lack of documentation standards and insufficient methods for data coding, collection, storage and retrieval (Bates & Gawande, 2003; Dougherty, 2005; Hillestad et al., 2005; Middleton, Hammond, Brennan, & Cooper, 2005; Brookstone, 2004; Abbott, 2003).

Interoperability among systems with the ability to extract multi-site relevant data and share information among clinicians across organizations is also widely recognized as a major challenge to gain the full benefit of technology in healthcare (Brookstone, 2004; Dougherty,

2005; IOM, 2003; Waagemann, 2002; Walker et al., 2005). While participants in both groups discuss interoperability of different systems used within a facility, only one participant mentioned the issue of interoperability across healthcare organizations.

Other barriers identified in the literature that are consistent with findings from this study include training concerns (Brookstone, 2004); complex systems that are difficult to navigate either because of hardware or software problems (Smith et al., 2005; Chambliss et al., 2001; Poissant et al., 2005); maintaining HIPAA compliance with confidentiality, privacy and safety of records (Bates & Gawande, 2003; Hillestad et al., 2005; HIMSS, 2004; Soper, 2002; Valdes et al., 2004; Waagemann, 2002); and difficult implementation processes (Ash et al., 2003). One report suggests that the lack of EHR experts specializing in LTC is a barrier for advancing EHRs in LTC (Dougherty, 2005).

### **Factors to Promote EHR Implementation**

Participants in both user and non-user groups suggested that strong implementation planning was a primary facilitator for EHR implementation. For the non-user group, implementation planning included system selection, staged implementation processes, learning from facilities that have implemented EHR systems, and gaining staff buy-in early in the process. Non-users also suggested that the state should establish basic system requirements for EHRs to aid facilities in system selection. Users suggested that vendor support for implementation planning and staff training along with staff buy-in early in the process are essential. One user suggested “grass roots” efforts to increase comfort level with computers such as allowing staff to play computer games during breaks and developing staff “cheerleaders” to encourage acceptance.

The importance of comprehensive planning prior to implementation was also frequently cited in the literature. Planning steps included setting realistic goals and expectations (Ash et al., 2003; Smith, 2003); involving users early in the planning process (McLane, 2005; Schmitt & Wofford; Smith, 2003; 2002; Souther, 2001); determining how current workflows will be redefined with EHRs (Ammenwerth, Mansmann, Iller, & Eichstadter, 2003; Ash et al., 2003; Deese & Stein, 2004; Poissant et al., 2005); and entering historical data into the system (Smith, 2003).

Strong initial and follow-up training programs ranked high as a facilitator for the user group including vendor support for training, 24-hour on-call technical support, and educational seminars by the LTC state agency and professional organizations. The literature also supports the notion that initial training with live help “at the elbow” during implementation is critically important (Ash et al., 2003) as is on-going support through such strategies as "super users" who serve as resources for other users (Laing, 2002).

Another important facilitator suggested by both non-user and user groups was government assistance to cover implementation costs. A variety of payment mechanisms were suggested including temporary rate increases, grants or one-time payments for infrastructure and hardware costs, or reimbursement incentives. Experts also agree that some form of government incentives will be required to move EHR adoption forward (Giroso, Meili, & Schville, 2005; Middleton et al. 2005; Taylor et al., 2005).

The user group participants suggested that raising awareness among providers about the benefits of EHRs including quality of care and financial outcomes would serve as an important facilitator. This issue of awareness among providers ties directly to studies and case reports that have identified strong leadership and support from clinical leaders as the major facilitator to EHR adoption (Ash et al., 2003; Poissant, 2005; Podichetty & Penn, 2004; Smith, 2003).

### **Information Necessary for EHRs**

All participants in both non-user and user groups agreed that the entire current paper system needs to become electronic to provide the necessary information for quality care and operational efficiencies. Specific sections of the current paper system mentioned were nurses’ notes, medication administration record, treatment administration record, acute condition change reports, care plans, physicians’ orders, do-not-resuscitate records, risk assessments, social work and dietary assessments, CNA flow sheets, resident photo, and lab and radiology reports. Non-users also suggested that the EHR should provide easy access to non-current resident information as well as access to the residents’ hospital records.

These study findings about information that should be contained in the LTC EHR correspond with one of the eight core functionalities for EHRs as recommended by the IOM (2003): health information to make sound clinical decisions including past medical history, laboratory tests, allergies, current medications, and consent forms. The other seven core

functionalities recommended by the IOM address functions or tasks the EHR can perform rather than just information included in the record. These tasks are addressed in the following section.

### **Tasks the EHR Should Perform**

The EHR task most frequently identified as important by both non-user and user groups was the ability to provide automatic alerts for various elements of resident care. The non-user group proposed alerts for out-of-range elements of residents' vital signs and lab results; alerts for critical elements of medication administration and incomplete documentation; alerts for new physician orders; and due-date alerts for routine labs, scheduled appointments, and immunizations. The user group suggested alerts to notify supervisors of care needs and assessments due. Participants in both groups suggested that alerts be customizable to meet facility needs.

Both groups also suggested the following tasks: data entered into the system should automatically be pulled to the Minimum Data Set (MDS); automatic updates to the medication administration record (MAR) to facilitate improved medication administration; an easy-to-use query system that provides individualized reports based on facility need; and daily task lists for the CNA assignments. The non-user group proposed several additional tasks to facilitate resident care and documentation including:

- Automatic updates to care plans and treatment administration records (TARs);
- Bowel, bladder and weight tracking;
- Care for specific diagnosis guided by protocols;
- Accident/incident follow-up;
- Bedside or point-of-care documentation;
- Supply management and charge capture;
- Methods for supervisors to monitor staff documentation;
- Interdepartmental exchange of information/electronic communication between nursing staff;
- Automatic updates to payer source information; and
- Interface with hospital and physician office systems.

The tasks suggested by this study are essentially consistent with five of the eight core functionalities for EHRs as recommended by the IOM (2003): 1) electronic communication between healthcare team members with connectivity to the patient record across multiple care

settings; 2) electronic reports of laboratory results and radiology procedures with automated display of previous results; 3) reminders about preventive practices such as immunizations, drug alerts for dosing and interactions, and clinical decision making; 4) administrative functions such as scheduling systems, billing and claims management, insurance eligibility, and inventory management; and 5) public and private sector reporting (i.e. MDS reporting requirement) and internal quality improvement initiatives.

The remaining two of the eight core functionalities for EHRs not suggested or discussed by participants were: 1) computerized provider order entry (CPOE) with or without decision support to eliminate lost orders and illegible handwriting, generate related orders automatically, monitor for duplicate or contradictory orders, and reduce time to fill orders; and 2) patient support through computer-based patient education and home monitoring where applicable. CPOE is defined as the “process by which a clinician with order writing authority sits at a computer to directly enter patient care orders” (Ash et al., 2003, p. 229). The omission of CPOE as an essential function for EHRs in LTC is an important consideration since this process has been associated with improved patient safety (Ash et al., 2003; IOM, 2003) and medical error prevention (Bates & Gawande, 2003).

### **Top Three Challenges to EHR Implementation**

To summarize and clarify the focus group discussions, each participant was asked to identify what they viewed to be the top three challenges or barriers to EHR implementation in LTC facilities. The top three challenges for non-user participants were 1) culture change; 2) costs; and 3) staff training. The top challenges for user participants were 1) costs; 2) staff training; and 3) culture change and compatibility with existing systems. As previously discussed, costs have been identified in numerous studies and expert reports as the number one challenge to EHR adoption. Other top barriers and challenges identified in the literature are clinician acceptance, interoperability among systems, and difficult implementation processes.

### **Top Three Facilitators to EHR Implementation**

To summarize and clarify the focus group discussions, each participant was also asked to identify what they viewed to be the top three facilitators to EHR implementation in LTC facilities. The top three facilitators for the non-user participants were 1) excellent initial training

and on-going support; 2) financial assistance in the form of government grants or other reimbursement incentives; and 3) evidence that EHRs will improve operational efficiencies, provide a return on investment and lead to improved care. The top three facilitators for the user participants were 1) well-defined implementation plans; 2) government assistance with implementation costs; and 3) support from the state regulatory agency in the form of general support for EHR adoption and preparation of state surveyor teams to accept and use EHR systems. The top facilitators identified in the literature review were strong leadership, comprehensive implementation plans, effective training and on-going support, and governmental assistance to cover implementation costs.

## **DISCUSSION**

The literature overwhelmingly supports the idea that health information technology and EHRs hold tremendous value for the healthcare system. The IOM (2003) asserts that successful EHR systems will improve patient safety, support delivery of effective patient care, facilitate management of chronic conditions, and improve operational efficiencies. Hospitals and physician practice settings are beginning to embrace EHRs (Fonkych & Taylor, 2005). However, adoption of EHRs in long-term care facilities are not documented and are probably much slower. This study provides insight into the issues that hinder and facilitate EHR adoption in LTC facilities and offers a framework for action by policy makers, LTC industry leaders, and health services researchers.

### **Health Policy Initiatives**

Policy initiatives will be required to address the number one barrier to EHR implementation – cost. State and federal governments are the primary financial source of payment for LTC facilities through the Medicare and Medicaid system; thus, policy makers have direct responsibility for enacting policies to accelerate EHR adoption and maximize the financial and productivity benefits resulting from EHR use (Taylor et al., 2005). Policy options to promote EHR adoption that would apply to LTC include (a) reducing the costs for EHR system adoption with financial or non-financial incentives; (b) providing direct subsidies for EHR acquisitions; and (c) providing direct subsidies for network development to promote adoption of

systems with common networking standards and infrastructures that enable information sharing and provider linking (Taylor et al., 2005).

As LTC EHR adoption rates grow, state agency leaders responsible for LTC regulatory oversight will need to develop comprehensive plans to prepare state surveyors to adapt the survey process to an electronic format. State surveyors will also have to learn to manage various types of EHR systems, since different facilities will have different systems. Just as facilities have discovered greater supervisory capabilities utilizing the electronic record, perhaps EHR systems can lead state surveyors to discover innovative survey methods to increase both the efficiency and effectiveness of the survey process.

### **LTC Industry Initiates**

Strong leadership has been suggested as the primary facilitator to EHR implementation (Ash et al., 2003; Poissant, 2005; Podichetty & Penn, 2004; Smith, 2003). Leaders in the LTC industry's professional organizations have already begun to take an active role to promote EHR implementation by raising awareness of its benefits among member organizations and encouraging them to incorporate IT adoption into their strategic plans (Derr, 2004). LTC leaders can also play an important role in collaborating with state policy makers to promote policy initiatives to assist with implementation costs as well as to develop EHR product specifications that are congruent with specific LTC needs such as MDS reporting requirements and regulatory survey processes.

Additionally, LTC leaders can work with vendors to develop robust systems that meet interoperability standards to enable information sharing among healthcare settings as well as to provide user-friendly products that are acceptable to the LTC workforce. Comprehensive implementation planning can be advanced by industry leaders willing to share lessons learned and other implementation resources with their colleagues who are embarking on the EHR journey.

One interesting finding in this study was the absence of discussion about patient safety in general or CPOE systems in particular. Both of these issues top the list of concerns for acute care settings since the release of the IOM's landmark study, *To Err is Human* (1999) and the recognition that EHRs with CPOE can significantly improve patient safety related to adverse drug events (Hillestad et al., 2005; Ash et al., 2003; IOM, 2003). A recent study about the

perceptions of a patient safety culture in nursing homes concluded that interventions to change the safety culture in nursing homes are warranted (Hughes & Lapane, 2006). As LTC leaders face the future with greater opportunities to use technology to improve operational efficiencies and quality of care outcomes, they should also begin focusing on the concepts of a safety culture and using IT to promote improvements in safety for their residents.

### **Research Initiatives**

One of the top facilitators for EHR implementation identified in this study was evidence that EHRs will improve operational efficiencies and improve care. With the exception of one unpublished evaluation study (Cherry & Owen, 2004), this investigator found no empirical studies to document the effect of EHRs on LTC facility operational efficiencies, financial outcomes, or resident care outcomes. LTC facilities present a unique opportunity for research to validate the value of EHRs as seen in the acute care setting. Research questions might include: How does the paraprofessional workforce (i.e., CNAs) react to and utilize computerized documentation? What is the relationship between EHRs and staff retention?; quality indicators?; medication safety?; financial outcomes?; staff overtime?; level of care documentation for Medicaid reimbursement?; inventory/supply management? Another important research area would relate to effectively using electronic data for advanced patient safety and quality improvement initiatives in facilities.

### **Limitations**

Several factors limit the ability to generalize the study results to a larger population. First, random sampling was not used to obtain participants. Second, the type of person who agreed to participate in a focus group most likely had some particular interest in EHRs and thus may be different from those who did not choose to participate. Finally, focus groups conducted via telephone conference call lose the advantage of face-to-face interaction among participants. Despite these limitations, the study provided good information related to LTC which was strongly supported by reports and studies related to hospital and physician practice settings.



## **DEVELOPMENT OF THE ELECTRONIC HEALTH RECORD (EHR) ORGANIZATIONAL READINESS TOOL FOR LICENSED NURSING FACILITIES**

The overarching goal of the technology readiness collaboration between Texas Tech University Health Sciences Center and the Texas Department of Aging and Disability Services (DADS) was to develop a tool to 1) assess factors of organizational readiness to adopt technology in licensed nursing facilities and 2) serve as a guideline for assisting facilities to develop intervention strategies to facilitate the diffusion of electronic health records in long-term care. The two primary objectives of the readiness tool development phase of this project were to design the tool and establish content validity and internal reliability; these processes are described in the following sections. The final *Electronic Health Record (EHR) Organizational Readiness Tool for Licensed Nursing Facilities* is presented in Appendix D.

### **Readiness Tool Design**

The readiness tool was designed using a seven-point scale ranging from “1” for strongly disagree to “7” for strongly agree with one option for “no opinion.” This design was modeled on the work of Snyder and Fields (2006), who developed and tested the “Organizational Information Technology Innovation Readiness Scale,” to assess hospital readiness for information technology innovation. The presentation of the tool content is based on the principles of survey design recommended by Dillman (2007), which include a) survey questions/statements are written in such a way that every potential respondent will interpret it in the same way; b) simple words are chosen over specialized words and as few words as possible are used; c) complete sentences are used; and d) questions/statements are grouped according to generally related topics or groupings.

### **Content Validity**

Content validity indicates the “degree to which items on the instrument are representative of the knowledge being tested or the characteristic being investigated” (Dawson & Trapp, 2004, p. 289) and is primarily assessed by experts agreeing to the appropriateness of the content. The extensive literature review done as Phase I of this project provided a framework for the content of the readiness tool. The qualitative descriptive study, Phase II of this project, utilized a focus-group methodology to interview experts experienced in the operation and management of

licensed nursing facilities and supplied further data for readiness tool content. Data from the qualitative descriptive study substantiated information gleaned from the literature review and also provided additional content areas specific to long-term care.

The final readiness tool content was established based on the following areas identified in the literature review and through the qualitative descriptive study:

- Organizational culture/human factors
  - Leadership support
  - Congruence with organizational mission and strategic goals
  - Employee attitude and engagement
- Financial aspects
  - Financial resources for start-up, training and on-going costs
- Implementation processes/staff training
  - EHR products that meet specific needs
  - Leadership and expertise for project implementation
  - Implementation planning with cross-departmental representation and processes related to paper record conversion, staff buy-in, and training
- Evidence that systems will improve care
  - Outcome evaluation plan
- Technical requirements
  - Technical support
  - Physical space and physical plant requirements
- State regulatory support
  - State regulatory survey team support

These areas were used to construct statements for which subjects could respond as to the extent they agreed, disagreed or had no opinion about the statement.

### **Internal Reliability**

The internal reliability of a survey determines how reproducible the findings would be in repeated applications and is measured through statistical analysis using Cronbach's alpha (Dawson & Trapp, 2004). After obtaining Institutional Review Board approval, the readiness tool was mailed to the attention of the administrator or director of nursing at the same list of 600

facilities that was used to recruit participants in the focus group interviews. These facility names and addresses were retrieved from the Texas Department of Aging and Disability Services Directory of Licensed Nursing Facilities. The mailing included an introductory letter explaining the purpose of the readiness tool, the tool, and a stamped, addressed envelope for returning the completed survey.

Ninety-three completed tools were returned, which represents a 15% return rate and more than sufficient numbers for testing internal reliability. Item analysis was conducted using NCSS (Number Crunching Statistical System). Item means ranged from 2.7 to 5.07. Findings supported internal reliability with a Chronbach's alpha of 0.95. Experts recommend that a Chronbach's alpha of at least 0.8 be achieved to demonstrate internal reliability (Dawson & Trapp, 2004). This high Chronbach's alpha may represent some redundancy in the questions with the R2 values supporting that items #5 and #7 may be combined to reduce redundancy.

### **CONCLUSION**

As LTC leaders struggle with rapidly rising costs, low reimbursement rates, nursing shortages, high staff turnover, widespread inefficiencies, and a growing elderly population requiring increasingly complex care, EHRs hold promise for improvements in many of these areas. However, EHR implementation in LTC is slow. Phase I and II of this report (literature review and qualitative descriptive study) have provided insight into the issues that hinder and facilitate EHR adoption in LTC facilities and offers a framework for action by policy makers, LTC industry leaders, and health services researchers. Such action includes governmental assistance with EHR implementation costs, adaptations to allow the regulatory survey process to function in an electronic environment, resources for strong implementation planning, a stronger safety culture focus, and research to investigate the impact of EHRs on LTC facility operational efficiencies, financial outcomes, and resident care outcomes. Phase III of the report (ERH Organizational Readiness Tool Development) has provided a mechanism for LTC leaders to assess factors of organizational readiness for technology adoption and to identify strategies to facilitate the diffusion of EHRs in long-term care.

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**Appendix A**

**Demographic Data Collection Worksheet**

1. What is your ethnicity?
  - Caucasian
  - African American
  - Hispanic/Latino(a)
  - Asian
  - Native Hawaiian/Asian Pacific Islander
  - American Indian/Alaskan Native
  - Other (Please specify.) \_\_\_\_\_
2. What is your gender?
  - Male
  - Female
3. What is your position in your long-term care facility? (Check the appropriate response.)
  - Administrator
  - Director of Nursing
  - Charge Nurse
  - Medical Director
  - Corporate Executive
  - Other (Please specify.) \_\_\_\_\_
4. How long have you been worked in your current position? Months \_\_\_\_\_ Years \_\_\_\_\_
5. What is your highest level of education? (Check the appropriate response.)
  - Associates
  - Bachelors
  - Masters
  - Doctoral
  - Other (Please specify.) \_\_\_\_\_
6. What are your credentials? \_\_\_\_\_
7. How long have you worked in long-term care? Months \_\_\_\_\_ Years \_\_\_\_\_
8. Do you have experience with electronic health records?
  - Yes
  - No

Please describe. \_\_\_\_\_

9. LTC Facility information:

What is the total number of beds in your facility? \_\_\_\_\_

Is your facility currently owned by a:

- Profit entity
- Nonprofit entity

What is the location (city and state) or your organization? \_\_\_\_\_

What services does your facility currently offer? (Circle all those that apply.)

- Skilled Nursing
- Residential Nursing Care
- Certified Dementia Care
- Other (Please specify.) \_\_\_\_\_

What is the average annual occupancy of your facility? \_\_\_\_\_

## Appendix B

### Semi-Structured Interview Guide for Focus Groups

The focus group begins with introductions of all individuals present on the conference call followed by a short description of the study. Participants will also be reminded that the call should last approximately 60 minutes and that it is being hand and tape recorded but no individual identifying data will be used in the study write-up. The focus group will then move into questions as follows:

1. Opening question (to get participants talking and to help them feel comfortable)
  - Tell us about your experience in long-term care.
2. Transition questions (to move into the key questions)
  - Tell us about your experience with electronic health records.
  - What aspects of resident care might be [or are] affected by the use of electronic health records?
3. Key questions (to elicit information about barriers and facilitators to EHRs)
  - What are [were] the barriers or challenges to implementing electronic health records in your facility?
  - What factors would help [helped] promote implementation of electronic health records in your facility?
  - What other factors would contribute [contributed] to successful implementation of electronic health records in your facility?
  - What kinds of information should the electronic health record include to be of benefit?

- What tasks should the electronic health record perform to be of benefit to the facility?
4. Probe or follow-up questions (to elicit more information during the discussion)
- Tell me more about that.....
  - Would you explain further.....
  - Has anyone else had a different experience...?
5. Ending questions (to summarize information and bring closure to the discussion)
- After considering today's discussion, please summarize the top three challenges for implementing electronic health records in long-term care facilities.
  - After considering today's the discussion, please summarize the top three factors that would be most helpful to implementing electronic health records in long-term care facilities.

**Appendix C**  
**Summary of Focus Group Common Themes and Patterns**

<i>Aspects of Resident Care Affected by EHR Use</i>	
EHR Non-Users: 28 Participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ More efficient documentation (23)                             <ul style="list-style-type: none"> <li>- Faster input will increase staff time with residents</li> <li>- Reduced time to file, copy papers, handle “mechanics of it all”</li> <li>- Decreased redundancy as compared to paper systems</li> </ul> </li> <li>▪ Improved quality and accuracy of documentation (18)                             <ul style="list-style-type: none"> <li>- Increased reimbursement w/increased profit to care for residents</li> <li>- Reduced errors and omissions in documentation</li> <li>- Improved legibility of documentation</li> <li>- Improved medication administration accuracy and documentation</li> </ul> </li> <li>▪ Easier access to charts and medical information (8)                             <ul style="list-style-type: none"> <li>- Easier access to charts w/info in one central location</li> <li>- Improved communication among disciplines</li> <li>- Access to residents’ past medical history</li> <li>- Easier access for physicians to sign orders</li> </ul> </li> <li>▪ Improved resident outcomes related to improved quality and efficiency in documentation (8)                             <ul style="list-style-type: none"> <li>- Allow for more time to be spend in resident care</li> <li>- Improved outcomes for pain, toileting, behaviors, and falls</li> <li>- Inputs into the system integrate into the care plan</li> <li>- Systematic approach to documentation to improve communication among care providers</li> <li>- Improved ability to match staffing needs with resident needs</li> </ul> </li> <li>▪ Improved staff retention/satisfaction (4)                             <ul style="list-style-type: none"> <li>- Involve and empower CNAs and nursing staff</li> <li>- Increased staff satisfaction because of being able to do their job better and have more information about job expectations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ More efficient documentation (4)                             <ul style="list-style-type: none"> <li>- Caregivers experience time savings in documentation</li> <li>- Increased caregiver time with resident</li> <li>- Reduced redundant and duplicative data entry</li> </ul> </li> <li>▪ Improved quality and accuracy of documentation (3)                             <ul style="list-style-type: none"> <li>- Better documentation of activities of daily living and care provided result in higher level of reimbursement</li> </ul> </li> <li>▪ Easier access to charts and medical and resident care information (4)                             <ul style="list-style-type: none"> <li>- Provides accurate information to all care providers</li> <li>- Universal access to chart by all care providers</li> </ul> </li> <li>▪ Higher level of monitoring resident care by supervisor (2)                             <ul style="list-style-type: none"> <li>- More “eyes” looking at resident care in real time</li> <li>- Easier tracking for regulatory compliance issues</li> <li>- Earlier identification of staff education needs</li> </ul> </li> <li>▪ Improved resident outcomes related to improved quality of documentation (2)                             <ul style="list-style-type: none"> <li>- Improved recognition of resident needs</li> <li>- CNAs provided w/task lists and updated care plans</li> </ul> </li> <li>▪ Improved employee satisfaction related to use of technology (1)</li> <li>▪ Improved accuracy and efficiency of medication administration process (1)</li> <li>▪ More aggressive quality improvement program because of availability of data (1)</li> </ul>

***Barriers or Challenges to Implementation***

EHR Non-Users: 28 Participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ Cost for hardware and infrastructure (21)</li> <li>▪ Staff training (19)               <ul style="list-style-type: none"> <li>- Cost and time involved for training</li> <li>- Quality of training programs</li> <li>- Use by temporary and on-call staff</li> <li>- Use by multiple entities other than staff (i.e., consultants)</li> </ul> </li> <li>▪ Human factors (15)               <ul style="list-style-type: none"> <li>- Staff resistance to change</li> <li>- Unfamiliarity with computers/fear of computers</li> <li>- Lower education level of CNAs</li> </ul> </li> <li>▪ Implementation (6)               <ul style="list-style-type: none"> <li>- Choosing the right system</li> <li>- Running two systems (paper and electronic) during conversion</li> <li>- Tying all the documentation pieces together into one system</li> </ul> </li> <li>▪ State surveyor issues (5)               <ul style="list-style-type: none"> <li>- EHR acceptance by state surveyors</li> <li>- Access to computerized record for surveyors</li> <li>- State requirement for original signatures</li> </ul> </li> <li>▪ Compatibility of different systems within facilities (3)               <ul style="list-style-type: none"> <li>- Therapy documentation system, dietary assessment system, etc.</li> <li>- Financial and clinical systems not compatible</li> </ul> </li> <li>▪ Consistency in understanding terminology used in electronic documentation (1)</li> <li>▪ Integrity of the system (3)               <ul style="list-style-type: none"> <li>- Back-up plan for power failures or system failures</li> </ul> </li> <li>▪ Maintaining confidentiality and privacy (3)</li> <li>▪ Physical space and wiring (4)               <ul style="list-style-type: none"> <li>- Old facilities with limited space for equipment</li> </ul> </li> <li>▪ Maintenance Issues (2)               <ul style="list-style-type: none"> <li>- Maintenance costs/securing equipment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Human factors (5)               <ul style="list-style-type: none"> <li>- Organizational culture of resistance to change</li> <li>- Users not familiar with computers</li> <li>- Staff feeling threatened by change</li> </ul> </li> <li>▪ Cost of hardware and on-going licensing fees (3)</li> <li>▪ Staff training (3)               <ul style="list-style-type: none"> <li>- Identify areas of mis-learning and provide on-going training/retraining</li> </ul> </li> <li>▪ Converting current paper chart to electronic data (1)</li> <li>▪ Customization of software (when applicable) to meet facility needs (1)</li> <li>▪ Compatibility of different systems within the facility (1)</li> <li>▪ Establishing and maintaining on-line connectivity (1)</li> </ul>

***Factors to Promote Implementation***

EHR Non-Users: 28 Participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ Strong implementation planning (20)               <ul style="list-style-type: none"> <li>- Recommendations from TX DADS related to system characteristics to aid in system selection</li> <li>- Well-written implementation plan/staged implementation processes; plan over time for success</li> <li>- Learn from facilities that have implemented EHRs</li> <li>- Gain staff buy-in early in the process (i.e., early education for staff on computer use); involve nursing director</li> </ul> </li> <li>▪ Strong initial and follow-up training programs (19)               <ul style="list-style-type: none"> <li>- Vendor support for training</li> <li>- High quality, easy-to-use EHR product specific to LTC</li> <li>- 24-hour availability for technical problems</li> <li>- Educational seminars by LTC state agency and professional organizations</li> </ul> </li> <li>▪ Assistance from government entities to cover costs (10)               <ul style="list-style-type: none"> <li>- Temporary rate increase or one-time payment for infrastructure development and hardware purchases</li> <li>- Grants to help cover implementation costs</li> <li>- Additional reimbursement or rate increase</li> </ul> </li> <li>▪ Evidence of the benefits of EHRs (5)</li> <li>▪ Cooperation with state survey agency (4)               <ul style="list-style-type: none"> <li>- Increase efficiency and consistency of the survey process with cooperation from CMS and state regulatory agencies</li> <li>- Change in state survey requirements to support EHRs</li> </ul> </li> <li>▪ Culture change to accept a new way of operating and willingness to work though the challenges over time (3)</li> <li>▪ Software system that allows for easy input of data (3)               <ul style="list-style-type: none"> <li>- Reduce amount of typing required w/check boxes</li> </ul> </li> <li>▪ Leadership support from upper management for EHRs (3)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strong implementation planning (6)               <ul style="list-style-type: none"> <li>- Gain staff buy-in early in the process</li> <li>- Start staff education programs one year in advance of implementation</li> <li>- “Grass roots” efforts to increase comfort level with computers (i.e., allow staff to play solitaire on the computer during breaks, kick-off parties to build excitement)</li> <li>- Vendor support with training and implementation plans</li> <li>- Develop clinical champions and “cheerleaders” as internal resources for training and to gain staff buy-in</li> </ul> </li> <li>▪ Raise awareness among providers about benefits (4)               <ul style="list-style-type: none"> <li>- Quality of care outcomes</li> <li>- Financial outcomes</li> <li>- Decreased error rates in RUGs; increased case mix; increased reimbursement</li> <li>- Improved documentation leads to improved state surveys</li> <li>- Improved documentation leads to improved responses related to litigation</li> </ul> </li> <li>▪ Assistance from government entities to cover costs (2)               <ul style="list-style-type: none"> <li>- Reimbursement incentives or other mechanisms to assist facilities with technology related costs</li> </ul> </li> <li>▪ Lower product costs as number of facilities using EHRs increase (2)               <ul style="list-style-type: none"> <li>- Greater number of competing products will help to lower overall costs</li> </ul> </li> <li>▪ Strong support from vendors for product development and follow-up support (1)</li> </ul>



***Information Necessary for EHRs to be of Benefit***

EHR Non-Users: 28 Participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ Entire current paper system becomes electronic and maintained as paperless (22)                             <ul style="list-style-type: none"> <li>- Nurses' notes, medication administration record, treatment administration record, acute condition change reports</li> <li>- Physicians' orders; do-not-resuscitate records</li> <li>- Risk assessments; all assessments and dietary records</li> <li>- ADL documentation</li> <li>- Photo of the resident</li> <li>- CNA Flow sheets</li> <li>- Resident demographics</li> </ul> </li> <li>▪ Data from ancillary services is accessible (2)                             <ul style="list-style-type: none"> <li>- Easy follow-up for labs/radiology; interface w/off-site labs</li> </ul> </li> <li>▪ Non-current resident information is available (1)</li> <li>▪ Hospital records are readily accessible (1)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Entire current paper system becomes electronic (6)                             <ul style="list-style-type: none"> <li>- Electronic chart parallels paper chart system</li> <li>- Ability to scan in lab and radiology reports from outside vendors</li> </ul> </li> </ul>

***Tasks the EHR Should Perform to be of Benefit***

EHR Non-Users: 28 Participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ Provide automatic alerts (20)                             <ul style="list-style-type: none"> <li>- Out-of-range data elements (i.e., lab, vital signs)</li> <li>- Change in condition; new orders and/or care needs</li> <li>- Potential errors</li> <li>- Due date alerts: routine labs, appointments scheduled, immunizations, MDS schedule</li> <li>- Incomplete documentation</li> <li>- Documentation to support TILE/RUG levels</li> <li>- Critical elements of medication administration</li> </ul> </li> <li>▪ Facilitate resident care and documentation (17)                             <ul style="list-style-type: none"> <li>- Task list for resident assignments</li> <li>- Automatic updates to care plans/real-time care plans</li> <li>- Automatic updates to MARs and TARs</li> <li>- Point of care/bedside documentation</li> <li>- Easily accessible photos of each resident</li> <li>- Bowel, bladder, weight tracking</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide automatic alerts (5)                             <ul style="list-style-type: none"> <li>- Customizable to meet facility needs</li> <li>- Notify supervisors of care needs, assessments due, etc.</li> <li>- Alerts for items to include on daily report</li> </ul> </li> <li>▪ Improve medication administration (3)                             <ul style="list-style-type: none"> <li>- Automatically updated electronic medication administration record that is always current</li> </ul> </li> <li>▪ Provide task lists for CNAs (2)</li> <li>▪ Provide a robust query system (2)                             <ul style="list-style-type: none"> <li>- Customizable reports to meet facility needs</li> </ul> </li> <li>▪ All documentation ties to the MDS to support a higher level of reimbursement (1)</li> <li>▪ Consistency between clinical documentation and billing is validated (1)</li> <li>Eliminate separate tasks for completing physician orders (1)</li> </ul>

*Tasks the EHR Should Perform to be of Benefit (continued)*

EHR Non-Users: 28 Participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>- Electronic signatures</li> <li>- Care for specific diagnoses guided by protocols</li> <li>- Consistent documentation between disciplines</li> <li>- Accident/incident report follow-up</li> <li>▪ Support ancillary tasks (9)               <ul style="list-style-type: none"> <li>- Manages interdepartmental exchanges of information</li> <li>- Integrates w/other systems used in the facility</li> <li>- Prints records for transfers</li> <li>- Data is automatically pulled to the MDS</li> <li>- Reduce redundancy of current paper system</li> <li>- Manage payer source information efficiently</li> </ul> </li> <li>▪ Provide a robust query system (8)               <ul style="list-style-type: none"> <li>- Customizable reports to meet facility need</li> <li>- Provide graphs for resident variables such as labs and weights</li> <li>- Facilitate quality improvement program with data and reports</li> <li>- Non-technical reports for communication with families</li> </ul> </li> <li>▪ Allow for staff monitoring by supervisor (7)               <ul style="list-style-type: none"> <li>- Allow supervisor to monitor staff charting/activities</li> <li>- Notify supervisor about work not documented</li> <li>- Automatic chart audits</li> </ul> </li> <li>▪ Improve medication administration and documentation (6)               <ul style="list-style-type: none"> <li>- Eliminate holes in documentation</li> <li>- Electronic MAR immediately updated/always correct</li> <li>- Automatically reorder meds</li> </ul> </li> <li>▪ Allow for supply management and charge capture (3)               <ul style="list-style-type: none"> <li>- Populate the accounts receivable systems w/charges &amp; supplies</li> </ul> </li> <li>▪ Facilitate communication (5)               <ul style="list-style-type: none"> <li>- Communication among nursing staff and CNAs</li> <li>- Communication with families; interoffice communication</li> </ul> </li> <li>▪ Interface with hospital &amp; physician office systems (2)</li> <li>▪ Provide back-up for power failures (1)</li> <li>▪ Ensure HIPAA compliance (1)</li> <li>▪ Maintain integrity of chart w/electronic data storage and retrieval</li> </ul>	

***Top Three Challenges or Barriers***

EHR Non-Users: 28 participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ Culture change/gaining staff buy-in (28)</li> <li>▪ Costs (27)</li> <li>▪ Staff training (25)</li> <li>▪ Implementation: finding the right system (7)</li> <li>▪ Acceptance by CMS and state regulatory agency (4)</li> <li>▪ Space and wiring issues (2)</li> <li>▪ Gaining support from corporate leaders (2)</li> <li>▪ Maintaining HIPAA standards/confidentiality (2)</li> <li>▪ Power failures/back-up systems (1)</li> <li>▪ Interoperability between systems (1)</li> <li>▪ Management of data for policy changes (1)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Costs (4)</li> <li>▪ Staff training (3)                             <ul style="list-style-type: none"> <li>- Comfort levels with computers</li> <li>- Basic skill sets of users</li> </ul> </li> <li>▪ Culture change/gaining staff buy-in (2)</li> <li>▪ Compatibility with existing systems (2)</li> <li>▪ Acceptance/support by state surveyors (2)</li> <li>▪ Vendor selection (1)</li> <li>▪ Patience to manage product evolution (1)</li> </ul>

***Top Three Facilitators***

EHR Non-Users: 28 participants (# of times mentioned)	EHR Users: 6 Participants (# of times mentioned)
<ul style="list-style-type: none"> <li>▪ Excellent initial training and ongoing support (16)                             <ul style="list-style-type: none"> <li>- Strong vendor support</li> <li>- User-friendly, non-complex systems</li> </ul> </li> <li>▪ Financial assistance for implementation costs (13)                             <ul style="list-style-type: none"> <li>- State grants or reimbursement increases</li> <li>- Cost sharing between facilities</li> </ul> </li> <li>▪ Evidence that systems will improve operational efficiencies, provide a return-on-investment and lead to improved care (11)</li> <li>▪ Support from state LTC regulatory agency (9)                             <ul style="list-style-type: none"> <li>- EHR system requirements established by the state</li> <li>- EHR systems are accepted by state LTC regulatory agency</li> <li>- Training programs for state surveyors</li> </ul> </li> <li>▪ Good implementation plans (7)                             <ul style="list-style-type: none"> <li>- Visit user facilities with “success stories”</li> <li>- Gain experience with system before purchase</li> </ul> </li> <li>▪ Mechanisms to address physical and technology infrastructure requirements (1)</li> <li>▪ Equipment maintenance plan (1)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Well-defined implementation plan (5)                             <ul style="list-style-type: none"> <li>- Early involvement of all staff levels in the facility</li> <li>- Plan to accurately/efficiently convert paper to electronic</li> <li>- Strong internal training programs with support from vendor</li> </ul> </li> <li>▪ Financial assistance for implementation costs (4)</li> <li>▪ Support from state LTC regulatory agency (3)                             <ul style="list-style-type: none"> <li>- General support for EHR adoption</li> <li>- Prepare survey teams to accept and use EHR systems</li> </ul> </li> <li>▪ Evidence that systems will improve efficiency and care (2)                             <ul style="list-style-type: none"> <li>- Get education by increasing involvement with professional organizations</li> </ul> </li> <li>▪ Leadership support from corporate office (2)</li> </ul>

**Appendix D**

**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

<b>In this nursing facility:</b>	<b>SD</b>							<b>SA</b>	<b>No Opinion</b>
1. Top leadership is strongly supportive of EHR implementation.	1	2	3	4	5	6	7	0	
2. The organization’s 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	

TTUHSC LTC Technology Readiness Project

<b>In this nursing facility:</b>	<b>SD</b>					<b>SA</b>		<b>No Opinion</b>
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