

**2004 Centers of Excellence Report**  
**Using Electronic Medical Records in the Nursing Home**

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# 1. Introduction

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Texas Department of Human Services (DHS) Rider 35 of H.B. 1 (78<sup>th</sup> Texas Legislature, Regular Session) authorized a Centers of Excellence program in Long Term Care (LTC). This item required the successor agency, the Department of Aging and Disability Services (DADS), to report on its progress regarding the Centers of Excellence. This report is submitted in fulfillment of that requirement.

Through collaboration with Texas Tech University Health Science Center (TTUHSC) and others, the Department formed a Center of Excellence to conduct a one-year pilot and evaluation of the use of an electronic medical record (EMR) in a LTC facility. The purpose of this effort was to identify the opportunities, challenges, and potential impacts of EMR technology in the LTC setting.

## 1.1. The Center of Excellence Partnership

In December of 2003, the Department entered into an agreement with TTUHSC to conduct an evaluation of a web-based medical record and communication system. The Center of Excellence involved the collaboration of the following parties:

- Achieve Healthcare Technologies – a vendor of EMR software
- DADS
- Mildred & Shirley L Garrison Geriatric Education And Care Center (Garrison Center) – a teaching nursing facility operated and managed by the Sears Methodist Retirement System in Lubbock, Texas
- TTUHSC

The Garrison Center served as the setting for the evaluation of Achieve Healthcare Technologies' EMR software – Matrix®. The impact of the EMR on care processes, resident outcomes, staffing, and costs were evaluated by TTUHSC (Cherry and Owen, 2004). DADS staff provided overall project oversight and also examined the potential impact of the EMR on quality of care and on the conduct of activities such as external consultation and LTC regulation that are not nursing facility services but are nonetheless related to resident care.

## 1.2. The Literature

Information technology (IT) applications in healthcare include applications for medical imaging, telehealth, pharmacy automation, laboratory automation, EMR, and many others. Many healthcare and policy experts see IT as an essential strategy for improving the efficiency, effectiveness, and overall quality of healthcare (IOM, 2001).

The use of EMR systems in LTC is relatively recent. Thus, the majority of research related to EMR systems is based on studies in acute care settings such as hospitals, government institutions, and academic health care centers. That research serves to identify the major opportunities and challenges that EMR systems present.

### 1.2.1. Opportunities

Opportunities associated with EMR system use include the following:

- Improved care through relevant clinical reminders and alerts (Dexter, 2001)
- Reduced errors through the interception of erroneous decisions (Bates, 1999; Kaushal et al., 2003)
- Improved efficiency and effectiveness of care through using clinical knowledge and knowledge of the individual patient to help clinicians select the best diagnostic or treatment approach (Evans, 1998)

With the appropriate functionality, EMR systems can help eliminate needless reentry of known information, improve public health reporting, improve the coordination of care across clinical settings, and serve as a tool for continuous quality improvement. A functional model and standard for electronic health record systems (EHR-S DSTU) has recently been developed to guide the evolution of EMR systems (HL7, 2004).<sup>\*</sup> The model includes the EMR functionalities discussed in this report as well as many others.

### 1.2.2. Challenges and Barriers

The challenges to the use of EMR technology in LTC are technical, practical, and economic. The principal technical challenges are functionality and standardization. An EMR must have the functionality that creates the opportunities described in 1.2.1. In order to improve care, reduce errors, and improve efficiency, an EMR must be able to issue reminders and alerts, intercept errors, and provide clinical decision support. For healthcare IT systems to exchange information, there must be widely accepted standards for the representation and transmission of health information. Because essential standards for healthcare IT are still emerging, many EMR systems are unable to share

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<sup>\*</sup> Health Level 7 (HL7) is one of several organizations accredited by the American National Standards Institute to develop standards for healthcare IT.

information with other systems except through rudimentary mechanisms such as facsimile transmission.

The primary practical challenge is to integrate the use of the EMR into clinicians' routines. Despite a relatively high level of computer literacy, physicians tend to use only the simplest EMR features such as the ability to view patient data and sign dictations (Laerum et al., 2001). Thus, the opportunity to improve prescribing and ordering through computerized physician order entry and clinical decision support technologies is missed.

The principal economic challenge is that the costs of EMR technology (e.g., acquisition, maintenance, operation, staff training, and clinician time) are borne by the purchaser of the EMR and the users of the system. The benefits of EMR technology generally accrue to the patient (e.g., improved effectiveness, safety, and quality of care) and third-party payers (e.g., improved efficiency and lower costs of care).

### 1.2.3. National Perspective

The goal of the National Health Information Infrastructure (NHII) initiative begun in 2004 is to hasten the adoption of health information technologies, standards, values, and laws that foster the development of health IT systems that are interoperable in order to fulfill the promise of highly integrated health information (NCVHS, 2001). The anticipated benefits of healthcare IT include the following:

- Better individual health through more effective use of individual health information and clinical knowledge
- Better health outcomes through improved disease management aided by clinical decision support systems that enable the effective use of guidelines and evidence-based practices
- Reduced healthcare costs through the elimination of unnecessary or redundant tests and the avoidance of unnecessary or ineffective therapies
- Improved patient safety through the reduction of preventable errors
- Improved public health through better communication among healthcare settings and public health agencies
- Improved accountability of all healthcare providers and agencies to the public they serve

NHII stakeholders have identified IT costs, connectivity, interoperability, standards for content and communication, acquisition of health information, data integrity, privacy, and system security as major challenges that must be addressed before the benefits of widespread EMR use can be achieved.

## 2. DADS Evaluation

The DADS evaluation focused on two aspects of the Center of Excellence project. The first was the ability of the EMR to improve LTC through features such as alerts, clinical decision support, and other capabilities that are not part of the traditional paper record. The second was the impact of the electronic medical record on the activities of third parties such as consultants and regulators.

### 2.1. Improvement

To assess the extent to which Matrix® supported the improvement of LTC, the Department examined the features of the EMR and interviewed Garrison Center staff to ascertain which features were used by which staff and for what purpose. Table 2 shows the major features of the EMR, the roles of care team members, and the tasks for which team members used Matrix®.

**Table 2. Features, Care Team Roles and EMR Tasks**

<b>Matrix® Feature   Clinical Role</b>	Nurse	Attending	Medical Director	Administrator	Pharm Consult	Activities Director	Nutritionist
Progress Notes	<b>V D M</b>	<b>V D</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V D</b>	<b>V D</b>
Ordering	<b>V D M</b>	<b>V D S</b>	<b>D S</b>		<b>V</b>	<b>V</b>	<b>V</b>
Problem List Maintenance	<b>V D</b>				<b>V</b>		
Laboratory Results							
Radiology Reports	<b>V</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V</b>
Vital Signs	<b>V D M</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V</b>		
H&P							
Assessments	<b>V D</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V</b>	<b>V D</b>	<b>V D</b>
Email/Messaging							
Case Mix and QI Reports	<b>V</b>						
Medicare Part A Cert/Recert							
OBRA/PPS Scheduling	<b>V D</b>						
MDS/MPAF with CMS Validation							
Online RAPs	<b>V D</b>						
Maintenance of Survey Reporting	<b>V</b>			<b>V</b>			
Care Planning	<b>V D</b>				<b>V</b>	<b>V D</b>	<b>V D</b>
Blood Glucose Documentation							
Point-of-Care Documentation							
Corporate Roll-up Reporting				<b>V</b>			

User Tasks: **V** = Viewing. **D** = Documenting. **M** = Messaging. **S** = Signing electronically.

This process led to three key findings related to the system's ability to improve the quality of care. The first finding was that the Matrix® users who entered information into the system were facility employees. And, these users reported a generally high level of

satisfaction with the system (Cherry and Owen, 2004). Clinicians such as the attending physicians, medical director, and the consultant pharmacist primarily used Matrix® to view information. The facility medical director signed orders, but did not enter them into the system. This pattern of EMR use is common under conditions of voluntary system use. Only when clinicians are required to use the EMR (e.g., Veterans Administration facilities) does universal use occur. In settings where EMR use is voluntary, clinicians may be reluctant to use technology that they (often correctly) believe will decrease their efficiency.

The second finding was that some system features were not used. Examples were the point-of-care documentation, physician documentation, and laboratory reports capability. These features were not used for different reasons. The Matrix® point-of-care documentation feature required the acquisition of additional hardware (e.g., devices for recording point-of-care events). Few physicians chose to enter their notes in the EMR. The Garrison Center's vendor of laboratory services maintained lab reports online and did not transmit these directly to Matrix®.

The third key finding was that Matrix® did not yet have the features most associated with improved quality of care. Relying on facsimile transmission and lacking HL7-based communication, the system was not capable of sending and receiving clinical information in a form that permitted automated analysis and clinical decision support. Medication ordering did not include detailed checks for allergies, drug interactions, or medication dosages appropriate for the resident (e.g., dosage adjustments that might be necessary for individuals with impaired kidney function). These shortcomings may be addressed through future software development.

Ultimately, the most important barrier to harnessing the potential of EMR systems to improve the quality of LTC may be the limited use of these systems by clinicians. Even when decision support features are available, clinicians' use of written and verbal orders can effectively bypass those features. Requiring a nurse to transcribe and enter orders into an EMR simply recreates the potential for miscommunication that computerized physician order entry is meant to prevent.

## **2.2. Third-party Impact**

EMR systems also have the potential to improve the efficiency and effectiveness of healthcare functions performed by third parties (Hurdle, 2004; Wellen et al., 1998). Examples of third party functions include clinical consultation, public health reporting, and regulation. For instance, during the 2004 influenza vaccine shortage, public health agencies were challenged to determine how best to allocate and distribute limited supplies of vaccine. If all LTC facilities had had EMR technology that tracked resident vaccinations, public health agencies could have had immediate access to information needed for vaccine allocation and distribution decisions. EMR data could have revealed the number of residents already vaccinated and the number that still needed vaccination.

To examine the impact of Matrix® on third party activities, DADS staff debriefed a team of five DADS surveyors who had conducted a recertification survey of the Garrison Center during the third quarter of the pilot. The debriefing was conducted using nominal group process to elicit surveyor perceptions concerning the impact of Matrix®.

Focus group participants were asked to respond to each of the following probes:

1. What were the three most important impacts of the Garrison's electronic medical record system on your conduct of the survey?
2. If there were other important impacts that have not already been mentioned, which three were most noticeable?
3. During the survey, what were your three greatest concerns about the electronic record?
4. If you had other concerns that have not already been mentioned, which three were of greatest concern?

The first and second probes were neutral and invited both positive and negative responses. The third and fourth probes were designed to elicit concerns.

All responses to each probe were first recorded, and then each was discussed with the participants. Participants collaborated to group their responses into themes, and each participant was then asked to rank the importance of each theme. In order of decreasing importance, the themes were:

1. Difficulty in finding information in the clinical record: The Garrison Center's implementation of Matrix® did not create an electronic clinical record that was complete. Some types of information were maintained only in paper form. Even when a particular type of document was kept electronically, some instances were available only on paper. This fragmentation of records increased the amount of time required to compare and reconcile related data (e.g. medication orders in the computer and medication administration records on paper) in order to conduct the survey. Because facility staff would be faced with the same challenge daily, the surveyors expressed concern that resident care could be compromised.
2. Effective staff use of residents' clinical information: The fragmented record was less comprehensible than a traditional paper record. Surveyors felt challenged to gather and understand data that revealed the resident's clinical course. For example, laboratory results were stored on the laboratory vendor's computer system rather than in Matrix® itself. Thus, the facility did not have control over the archiving and retrieval of laboratory data, and some older laboratory data was inaccessible. Surveyors expressed concern that under these circumstances facility staff would be similarly challenged to provide adequate continuity of care. Surveyors were also concerned that fragmentation of the record made longitudinal



evaluation of a resident's condition more difficult and more prone to error. Both concerns were augmented by a brief period of computer system failure that occurred during the Garrison Center survey and rendered all records inaccessible.

3. Security and privacy: Surveyors had little confidence that tampering with electronic medical records would be as evident as it is in paper records, that their review of electronic records could not be monitored from another location, or that the system was adequately protected from unauthorized use. With no assurance of data integrity, information privacy, and system security other than that provided by the EMR vendor and the facility itself, surveyors were skeptical that the integrity of the EMR, the survey process, and resident care were not all at risk.

No positive themes concerning the EMR emerged from the structured, nominal group process. When engaged in an unstructured discussion concerning the prospect of widespread EMR use in LTC facilities, surveyors expressed concern that faced with diverse EMR systems, surveyors would be challenged to conduct the survey process in a manner that was efficient, thorough, and effective for ensuring the health and safety of LTC residents.

When given a hypothetical scenario in which the EMR addressed all of their concerns, the participants acknowledged that EMR systems might help to bring about improvements in LTC. However, there was a persistent concern that a diversity of EMR systems with proprietary variations would create a substantial burden for anyone who had to work at multiple and unrelated facilities (e.g., an attending physician, a consultant pharmacist or a surveyor).

### 3. Summary

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The Center of Excellence pilot and evaluation of a single EMR system in a single nursing facility represents a microcosm of the NHII effort. Not surprisingly, this project encountered many of the challenges that have been identified by the NHII. The project also identified practical challenges such as training staff, making a complete transition from paper to electronic records, and retrieving archived records. In addition, the project demonstrated that EMR systems could have significant impact on third-party activities such as the regulatory process.

The principal benefit of this project was that it identified a set of conditions that must exist in order to obtain the potential benefits of EMR technology. These conditions include the following:

*EMR systems must make good business sense to those who acquire them and to those who must use them.*

The cost of acquiring and maintaining EMR technology, the cost of training staff, and the cost of clinicians' time must be offset by financial benefits. Benefits for the patient and third party payers are insufficient incentives for providers to adopt costly technology. The accrual of benefits such as lower liability risk, lower staffing costs, and improved productivity to EMR users remains to be shown.

Given the lack of direct benefits for physicians, it was not surprising that physicians at the Garrison Center used only the rudimentary features of the Matrix® EMR. It is likely that the perceptions of DADS survey staff parallel those of other external users such as physicians. Third parties are likely to perceive EMR systems, in their current state, as a hindrance rather than as an aid to the efficiency, effectiveness, and quality of LTC.

*EMR systems must be based on standardized technologies, controlled vocabularies, and standards for data representation and information transport.*

Standardization is necessary in order to achieve interoperability among healthcare systems (LTC EMR and the systems of hospitals, pharmacies, laboratories, and other healthcare partners). The Matrix® EMR did not yet support standards such as HL7-based communication. Instead, it relied on facsimile transmission technology to communicate with external systems such as the pharmacy.

Major opportunities for improving Matrix® included adding support for HL7-based communications, using standardized vocabularies for drug names, and receiving and storing laboratory reports in a manner that permits analysis, trending, and clinical decision support. These limitations were inherent in the EMR rather than being artifacts of its implementation at the Garrison Center.

*EMR systems must include a common core of clinical functionality and a core of standardized information presentation formats.*

Needless proprietary variation in the EMR-user experience will probably discourage the use of EMR by third parties such as physicians and surveyors who will face the complexity of mastering the use of many different EMR systems. While clinicians at the Garrison Center did not verbalize this concern, it was a significant issue for the members of the DADS survey team.

*EMR systems must be sufficiently robust to permit recording all clinical information recorded in traditional paper records.*

The EMR must serve as the single authoritative clinical record because fragmentation of the record (e.g., nurses' notes in the EMR and physicians notes and medication administration records on paper) hampers not only automated data analysis and decision support but also human analysis and comprehension of the same information. LTC survey team members noted that this kind of fragmentation hampered their ability to ascertain whether the care that was being provided was consistent with physician orders, and they expressed concern that facility staff would be similarly challenged with a consequent potential for preventable errors.

*EMR systems must have the ability to archive and retrieve all information entered.*

EMR systems that do not meet this requirement force the fragmentation of the historical clinical record. Fragmentation undermines the users' ability to identify significant longitudinal changes in a resident's condition. DADS survey team members noted that this was a significant resident care issue. Specifically, laboratory data were maintained on another vendor's computer system. Access to the laboratory system from Matrix® was not transparent, and the facility had no control over the archiving and retrieval of past laboratory results. Without laboratory history in the EMR itself, there would have been no ability to assist clinicians to visualize important changes in laboratory values across time or to render decision-support based on laboratory findings even if Matrix® had had such capabilities.

*EMR systems must ensure data integrity, privacy of information, and system security.*

No organization currently tests and certifies EMR systems to ensure that they meet these requirements. While staff at the Garrison Center appeared comfortable with these aspects of the Matrix® EMR, the LTC survey team members were concerned that records could be altered (accidentally or intentionally), that user authentication might not be sufficiently strong to prevent unauthorized access, that records were vulnerable to violations of privacy, and that the records were at risk for malicious tampering.

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