WEB BASED NURSING HOME INFORMATION SYSTEM: NEEDS, BENEFITS,

AND SUCCESS IN PROVIDING EFFICIENT CARE AT LONG TERM CARE

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Master of Science

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by

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The undersigned, appointed by the dean of the Graduate School, have examined the thesis entitled

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADL	Activities of Daily Living
AHCA	American Health Care Association
AJAX	Asynchronous JavaScript and XML
CMS	Centers for Medicare and Medicaid Services
CSS	Cascaded Style Sheet
EBP	Evidence Based Practice
EHR	Electronic Health Record
EMR	Electronic Medical Record
ER	Emergency Room
HCFA	Health Care Financing Administration, now CMS
HIPAA	Health Insurance Portability and Accountability Act
HIT	Health Information Technology
HTML	HyperText Markup Language
HTTP	Hyper Text Transfer Protocol
IADL	Instrumental Activities of Daily Living
ICD9	International Statistical Classification of Diseases and Related Health Problems
IPO	Interim Physician Order
IRB	Institutional Review Board

IT	Information Technology
LDAP	Lightweight Directory Access Protocol
LPN	Licensed Practitioner Nurse
LTC	Long Term Care
MU	University of Missouri
NACNEP	National Advisory Council on Nurse Education and Practice
NHIS	Nursing Home Information System
PC	Personal Computer
PHP	Hypertext PreProcessor
RN	Registered Nurse
SF	Short Form
SQL	Structured Query Language
URL	Uniform Resource Locator
WWW	World Wide Web

WEB BASED NURSING HOME INFORMATION SYSTEM: NEEDS, BENEFITS, AND SUCCESS IN PROVIDING EFFICIENT CARE AT LONG TERM CARE FACILITIES

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ABSTRACT

Most of the nursing homes in the United States do not have clinical information systems at their facility due to which elderly people who reside in the facilities are not reaping the benefits that these systems are thought to have. Some Nursing homes that do have clinical information systems deployed are not primarily designed to support nursing care coordination. The purpose of this study is to explore the emerging need for Nursing Home Information Systems (NHIS) in long term care facilities and the promise they hold for increased efficiency, better accuracy, reduced cost, and improved outcomes. This study reports a pilot research done in development of a home-grown, web based, nursing home electronic health record (EHR) system for Aging in Place - TigerPlace; an independent housing with services facility, licensed assisted living facility, located in Columbia, Missouri. With Internet becoming an important topic in health care industry due to its capability for increased accessibility to information, a web based information system proves more beneficial to organizations. The emergence of World Wide Web technology constitutes one significant milestone on the road to efficient developments and deployment of clinically useful systems (Kittredge et al., 1996). Considering these benefits of web technology, this study first analyzes differences between traditional stand

alone clinical systems and web based clinical systems. Further study concentrates on the need for TigerPlace facility to develop and implement a web based clinical information system, the process adopted towards developing the required system, its implementation and use at the facility, success of the system, and future enhancement possibilities for the system.

CHAPTER 1

INTRODUCTION

1.1 Nursing Homes in the USA

Residential settings for older people with health problems, ranging from ordinary

boarding homes to philanthropically funded organizations often called homes for the aged

typically predated the 1965 enactment of Medicare and Medicaid, which shaped the

modern nursing facility (Wilson, 2007).

A facility that provides rehabilitative, restorative, and/or ongoing skilled nursing

care to patients or residents in need of assistance with activities of daily living is called a

Long-term care (LTC) facility. LTC facilities include nursing homes, rehabilitation

facilities, inpatient behavioral health facilities, and long-term chronic care hospitals.

Long Term Care (LTC) not only serves a very vulnerable population, many of

whom are unable to advocate on their own behalf, but also represents a tremendous

national public investment of $117.22 billion plus additional "state only" Medicaid

dollars. People have the right to expect good value from that expenditure (Koren, 2010).

The past decade has brought increasing attention to aging baby-boomers with regard to

both their current care giving responsibilities and their own future care needs (Scharlach,

2008). This has resulted in increases in the number of long term care facilities, increased

need for skilled staff members, and increases in cost and quality of care. According to the

2004 National Nursing Home Survey (NNHS), there were almost 1.5 million nursing

home residents in 16,100 facilities (CDC, 2009). Nursing facilities are a big industry in

the health care market that includes private as well as public owners, and majority of long

term care services in the United States are funded through Medicaid and Medicare.

Total Nursing Home and Home Care Expenditures, 1998

- Private Insurance 8%
- All other 7%
- Medicaid 39%
- Medicare 20%
- Out of Pocket 26%
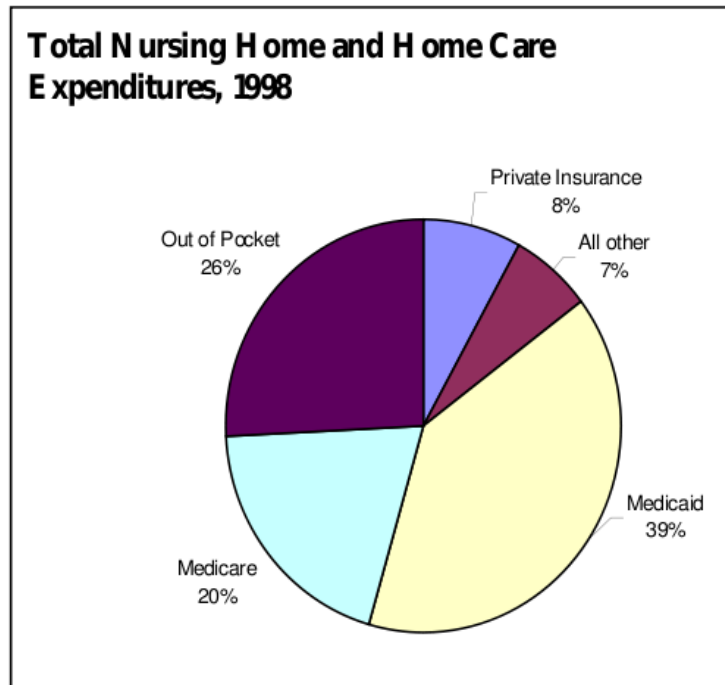
Fig. 1 Nursing Home and Home Care Expenditures (Lawler, 2001)

Assisted living facilities provides additional amenities with a vision of a different

way of bringing physical environments, care and service capacity, and philosophy

together to offer a more desirable product to older people is known as an assisted living

facility (Wilson, 2007). Assisted living facilities are therefore rapidly replacing the

traditional nursing home structure to provide medical care along with assistance in daily

living services to its residents.

1.2 Aging in Place – TigerPlace

Most seniors live in a house owned by them; however, as they grow old and their

bodies become frail, it is physically difficult for them to manage their homes.

Furthermore, with increased health concerns, medical bills increase and they find it difficult to afford household maintenance requirements. For example, when a senior's monthly pharmacy bill increases, there is less of a chance that he/she will spend money on maintaining the heating system of the house or repairing other basic required facilities. Such inadequate living conditions compound health concerns for the seniors. Therefore there is a direct relationship between health and housing for seniors.

Elderly Health and Housing

A health concern can compound a housing concern

A housing concern can compound a health concern
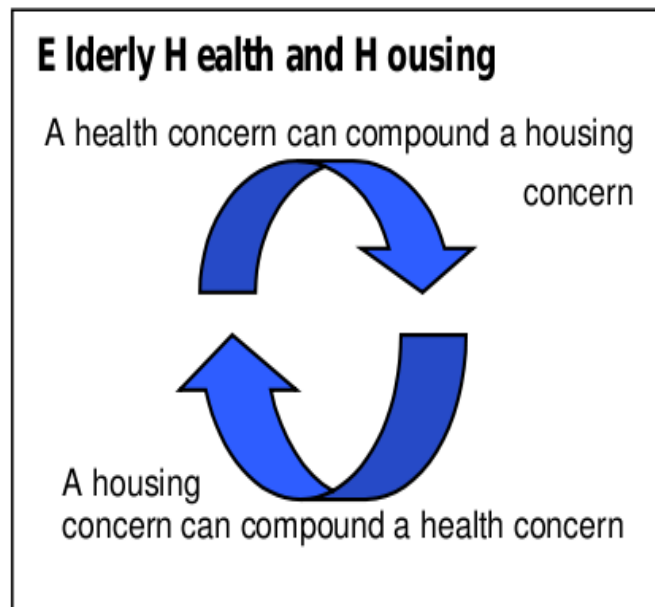
Fig. 2 Relation between Elderly Health and Housing (Lawler, 2001)

Public subsidies are designed to produce either health or housing services — but not both (Lawler, 2001). In this case, the senior has to either choose to live in an affordable and adequate housing facilities provided by the government public housing program, or use the public system of health services. The missions of public health and housing agencies were not only isolated but mutually exclusive (Lawler, 2001). Aging in Place is a LTC system solution that reflects this interrelatedness between health and housing. Such a facility avoids the inefficiencies of over-care and under-care by matching

services and facilities to an individual's need rather than matching an individual to an existing service or facility. Aging in place, as originally envisioned in the context of assisted living, meant that residents were not routinely required to relocate, either to another setting or to another location in the same setting, if they needed more care (Wilson, 2007). Aging in Place program is therefore designed to help its participants to live independently and stay in the home of their choice as long as possible. Participants receive care and services to prevent or postpone the need to move to a more restrictive living environment like a nursing home.

Aging in Place - TigerPlace is a for-profit facility for seniors (age 65 and above), located in Columbia, Missouri, that provides residents with health care services as well as housing. Senior citizens who move to TigerPlace to live in one of the 54 apartments do not need to move again regardless of any change in their care needs. TigerPlace provides patient-centered long term and equitable health care delivery to all residents and help them to stay active, healthier and independent. TigerPlace employs 27 staff (clinical and non-clinical) to accommodate the needs of seniors and make TigerPlace an attractive and comfortable place to live. The clinical staff includes Registered Nurses (RN), Licensed Practical Nurses (LPN), Nursing Aids, and Para- professionals. About 90% of the residents at the facility suffer from various chronic diseases like diabetes, cardiovascular disease, Alzheimer's, and many other health problems. The clinical staff is responsible for providing care to all residents whenever needed (24 hours a day and 7 days a week). The primary goal of TigerPlace is to maximize resident's freedom and capability for self-care, maintain their relations with the community, and at the same time manage their health related issues.

1.3 Statement of the Problem

As the health care industry advanced towards providing efficient care to its

consumers, it also greatly advanced in adopting various clinical and non-clinical

information systems at its facilities. The Office of the National Coordinator for Health

Information Technology has estimated that health care will save $140 billion per year if

HIT is adopted, according to the American Health Care Association (AHCA) (Lourde,

2009). This suggests that HIT can play a major role in getting rid of excess and

unnecessary costs incurred by health care organizations, which in turn can be directed

towards improving patient care and service quality. The Institute of Medicine is calling

for nursing homes to implement and use clinical information systems to support clinical

practice (Alexander & Wakefield, 2009). According to Lourde (2009), information

systems have emerged as a significant part of the nursing home and long term care

delivery systems as they improve the flexibility in patient care and also save working cost

for facilities. This ability of systems is anticipated to spur rapid growth of the electronic

patient record for these facilities. Long term care and nursing home information systems

market value are currently at $225.8 million in 2009, and are anticipated to reach $674.9

million by 2016 (Curtiss and Eustis, 2010).

The aim of this research is to discuss the development of web based clinical

information system, its implementation at TigerPlace, description of the meaningful use

of the system, and its potential benefits to the facility. Also discussed in this paper is a

description of how the web based information system works, its technical requirements,

interaction with other clinical information systems used at the facility, and future possible

development of the system.

CHAPTER 2

Background And Literature Review

2.1 Literature Review Methodology

The literature review section is comprised of the six subsections: cost and benefits of health information systems, factors influencing use of systems in nursing home, current state of clinical systems in nursing homes, improving administrative and clinical decision making, information technology helps in overcoming staff shortage, compliance and security, maximizing revenue and profitability.

Google, Ovid database, PubMed, MEDLINE, Compendex and CINAHL were searched using keywords and phrases of health information systems, information systems in long term care facility, compliance, security, information technology, staff shortage, administrative and clinical decision making, elderly, and seniors. Keywords and phrases were used in combination to identify additional results relevant to the topic. Appropriate databases were used for searching the queries and generate results. Google search is used to get basic information about the current status of the use of information systems in long term care facilities. Using the information retrieved from Google, searches were performed in Compendex and CINAHL, which resulted in more precise results. Compendex was used as it contains literature on information systems and technology used in long term care facilities. CINAHL was used because its vast literature database on nursing and allied health provided relevant literature about long term care, use of information technology, cost and benefit of information technology, compliance, security,

and current status of information technology in such facilities. PubMed, Ovid and MEDLINE provided literature on decision making, clinical and administrative decision making, compliance and security issues, and use of information technology in health care. The articles that were chosen from the literature review were those that were most relevant to our topic, and that would help to look at existing information relevant to the topic.

2.2 Cost and Benefits of Health Information Systems

Long term care facilities are expensive systems and with growing baby boomers generation reaching retirement age its use and cost is likely to increase. A single-entry system maintaining the electronic health records would provide an equitable approach in solving this problem (DeCoster et al, 1995). Developing such a system requires tracking peoples' use of healthcare resources, tracking their health information and storing the information in one data repository. Alexander and Madsen (2009) in their paper explored the relationship between use of information technology and reporting quality measures in nursing homes in Missouri. Study results showed that using information technology in long term care nursing home enhances the care management of the residents, and support clinical and administrative decisions. Information technology also is used to calculate quality measures which can be used in performance and quality improvement efforts (Alexander & Madsen, 2009). The report from Congressional Budget Office on "Evidence on the Cost and Benefits of Health Information Technology" in the year 2008 emphasized heavily the use of health information technology, and discussed the cost and benefits associated with it. The Congressional Budget Office (2008) reported that Health

information technology has the capability to eliminate or reduce the physical efforts

needed by clinicians and nurses to perform their job. Agency for Healthcare Research and

Quality, 2006, in their report mentioned that Healthcare information technology has the

potential to dramatically change the delivery of health care making it safer, more

effective, and more efficient.

2.3 Factors Influencing Use of Information Systems in Long Term Care Facilities

Kim et al., (2006) in their study about the factors that influence home care and

nursing homes found that more elder care was provided by home care agencies than

nursing homes. There is a demand for reformation of long term care facilities integrating

information technology with care delivery processes to provide efficient and improved

quality (Kim et al, 2006). The study done by Coburn et al., (2000) emphasized improving

nursing facility care for rural residents. Using information technology and EHR systems

it is possible to serve rural elders using a telehealth network. This combination of EHR

systems and telehealth will significantly enhance the availability of clinicians, medical

services, and potentially reduce the hospitalization rates. Use of information technology

in nursing documentation enhances quality of care, but issues like user acceptance should

be addressed before the actual implementation (Ammenwerth et al., 2003). Nurses' use of

information systems depends on the information previously provided to the nurses, prior

education, and use of effective strategies to integrate the information systems in day-to-

day care. Nursing information systems are reported to save charting time, which could be

utilized to provide care to residents. Lee et al., (2004) reported that Quality of care

dependent on time availability.

2.4 Improving Administrative and Clinical Decision Making

Evidence based practice (EBP) has been increasingly supported and encouraged, but it is difficult to motivate clinicians to actually utilize it in day-to-day practice. Bates et al, (2003) in their study about how to encourage EBP found the key factor motivating clinicians to use EBP is to provide information systems that assist in making decisions. Additionally these systems provide clinical decision support and may prevent errors. Administrative function like billing, medical records, and coding requires documentation from the patient's EMR. A integrated EMR system has the capability to both provide the required data and expedite the process of information retrieval (Ganesh & Al-Mujaini, 2009).

2.5 Information Technology Helps in Overcoming Staff Shortage

The needs of nurses in underserved area can be addressed by use of EHR systems by integrating it with telehealth services. Telehealth applications allow professionals to view, send, or store video and digital images for a patient assessment, diagnosis, treatment, and evaluation over video conferencing technology and computer applications. Telehealth can therefore address lack of workforce by such remote services and provide care in underserved areas (Courtney, 2005). National Advisory Council on Nurse Education and Practice (NACNEP) in their report on challenges faced by the nursing workforce recommended use of information technology to enhance nurse retention, and improve patient safety, satisfaction, productivity, and outcomes (NACNEP, 2008). The growing nurse shortage, increased aged population, and concerns about patient safety are

encouraging the healthcare facilities to use information systems to address those situations. With an enhanced ability to make better decisions in timely manner in their daily work nurses can provide care with increase satisfaction and enhanced patient outcomes (Adrbo et al, 2010).

2.6 Compliance and Security

HIPAA was intended to benefit the healthcare industry by streamlining the process of information exchanges and dissemination while saving administrative costs. EHR systems developed accordingly will improve the accuracy of information with enhanced ability to monitor quality of care provided. Lorence and Curchil, (2005) found that a negative association between greater adoption of EHR systems and reported implementation of the security measures. Hence it is essential to assess the security need of the healthcare organization before implementation of such systems. Additionally it is necessary to apply risk management approaches and minimize data leakage by essentially securing access end points. Developing central security policies and complying with security regulations and standards will enhance the security of the information system at a reasonable cost. Assessing both technical and business risks pertaining to industry specific risks and vulnerabilities is essential to identify the key aspects (Coleman, 2004). Administrative simplification of the HIPAA rule is most significant rule impacting the decision regarding adoption of information technology. They address the requirements for policies, procedures and practices that are conducted in the organization (Ferrell, 2001).

2.7 Incentives for Using EHR Systems

Health Information technology adoption requires a return on investment and other incentives such as the capability of performing audit functions and reducing paper work saving time and operating cost (Arkin et al, 2007). Center for Medicaid and Medicare Services are proposing and encouraging the use of EMR systems and providing incentives to organization adopting EHR systems. Hence use of EHR systems in nursing homes and long term care will provide easy access to data and information.

CHAPTER 3

METHODOLOGY

3.1 Background

Researchers at MU evaluated an aging in place model that used RN care coordination to help community dwelling older adults maintain their independence. Using care coordination contributed to improved participant outcomes (i.e., activities of daily living, cognition, depression, incontinence) when compared with individuals of similar acuity in institutional based long-term care (Marek et al., 2005). On the basis of these findings, TigerPlace, an independent senior housing complex, was created to help older adults age in place (Rantz et al., 2010). As discussed in Chapter 2 HIT contributes to positive outcomes in nursing homes. TigerPlace has implemented a variety of pilot projects into its facility. According to Rantz et al. (2005, p. 41), "The primary goals are to design and implement exciting research, education, and practice opportunities at Senior Care and TigerPlace while integrating TigerPlace into the MU campus and the Columbia community". The research team developed a diagram (Fig. 3) that depicted the trajectory of functional decline (dotted line) in older adults, based on research and practice with older adults, while the aimed trend (solid line) was the goal for the use of technology to extend functionality for older adults.
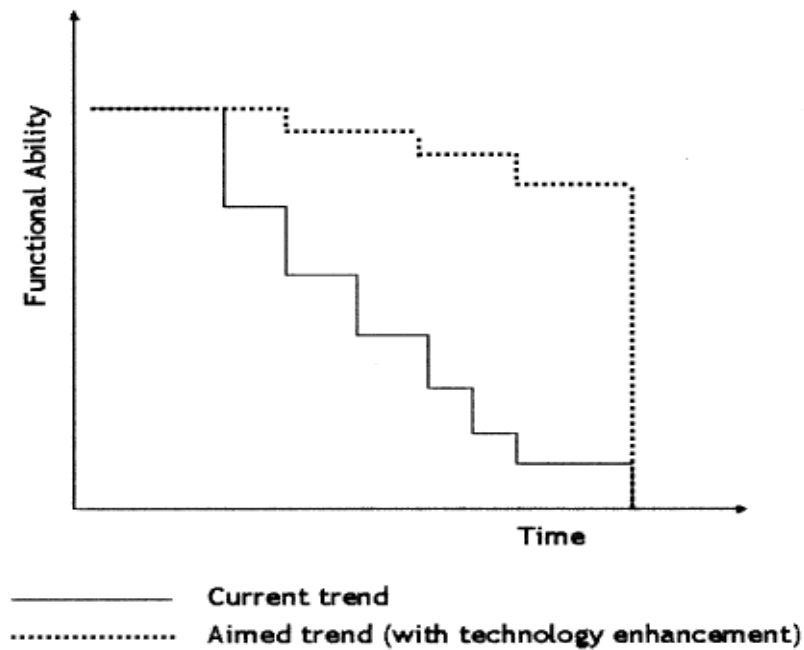
Fig. 3 Trajectory of functional decline and goal for the use of technology

(Rantz et al., 2005)

To achieve this goal, TigerPlace has been working towards developing a comprehensive electronic health record that intends to include all health care activities; both standard health care assessments as well as information gathered through technology-based devices such as the sensors and the telemedicine equipment included to assist health care providers in decision making. The diagram depicted below (Fig. 4) shows the various technology-based systems implemented at TigerPlace to improve efficiency of care to the residents and aide health care providers by supplying them comprehensive health care data to enhance decision making. Rantz et al. (2010, p. 15) states about the integrated system under development at MU that,

> "The system includes:
>   1.   A physiological sensor network including motion sensors, a stove sensor,

and a bed sensor developed by collaborators at the University of Virginia.

2. A video sensor network, which focuses on preserving the resident's privacy by extracting anonymous silhouettes or other graphical representations of the residents used to capture falls and gait information.
3. A behavior reasoning component that combines the sensor and video data, analyzes routine patterns, and generates alerts of potential problems.
4. An activity database for storing sensor data, as well as customized alert conditions.
5. The EHR database including all of clinical information and the standardized assessments.
6. Secure web-based interfaces with customizable access to display the data for the researchers, clinicians, family members, and residents".
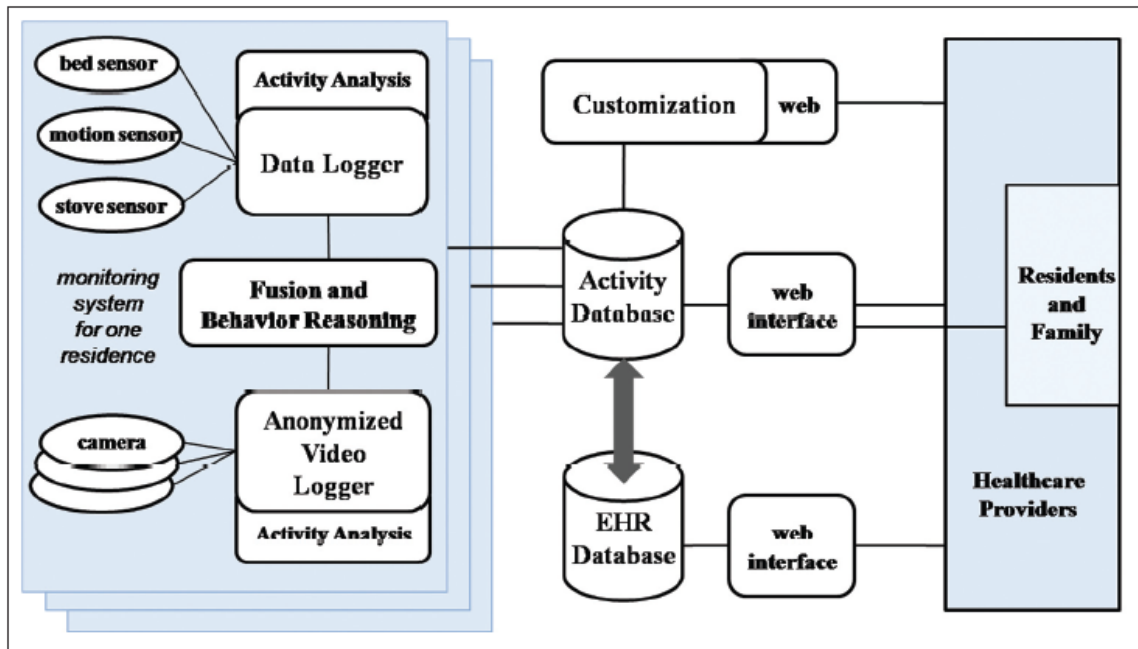

Fig. 4 Integrated system of sensor and electronic health record databases

(Rantz et al., 2010)

This thesis mainly focuses on the Electronic Health Record database part of the integrated system and its interaction with other clinical systems in the network.

3.2 Need for Home-Grown EHR System

When TigerPlace opened in 2004, a commercially available EHR was adopted, but not all standardized assessments used in TigerPlace could be documented (Rantz et al., 2010). This commercial system was a PC-based system that was installed on each laptop and computer located at the facility. The system used the Windows operating system and functioned as a standalone application on systems which had the application installed. Nurses used their laptops to record health care related data for each resident by either documenting while visiting their apartments, or by filling in paper charts and later uploading the recorded information in to the application at the nursing station. The application was however not limited to clinical data entry only; but it also included certain administrative functions such as billing. To store, retrieve, and analyze all recorded information, the application used SQL server technology located at the facility. Though the commercial EHR was built specifically for home health care, it had certain limitations for its use at TigerPlace.

First, as the commercial EHR was a standalone application, nurses collected and stored information on their remote laptops and PC's and pushed this information manually into the remote server. A major drawback of this technology was that the server was not being updated with information in real time, which did impact other work processes and ultimately affected the efficiency of care to residents. Nurses had to constantly remind themselves and their colleagues to manually use the application to push data in to the remote database server to keep it with up to date information. This not only included extra administrative work for the nurses but also utilized their time which could be better invested in care for the residents. Second, the system could only be used

at the TigerPlace facility. Therefore if the nurse or any other care provider wanted to use the information related to any particular resident, from a remote location, it was not possible for them to do so. This limited the access of information failed the goal to provide right information at the right time at the right place to the right person. Third, as the commercial EHR was owned by a third party vendor, it incurred cost on the facility for maintaining and upgrading the system on a regular basis. Furthermore, as the database was not similar as to what other clinical systems in the facility used, it was impossible to share information from EHR database with other clinical application systems. Therefore, databases were needed to enhance the EHR, which link the EHR data with databases containing standardized assessment information and data from the sensor system under development at TigerPlace (Rantz et al. 2010). Data collected by the systems at TigerPlace facility is used for research purpose with approval of MU Institutional Review Board (IRB) and informed consents from residents. However, since the facility did not know about the database architecture of the commercial EHR system, this data could not be used by researchers. Finally, the facility wanted a more flexible EHR system, more specifically designed to record and handle residents' routine assessment health records, medication history, demographic and family information, insurance related information, apartment maintenance request, and other administrative information.

Understanding the limitations of currently in use commercial EHR system mentioned above, and the features of a required EHR system for the facility, TigerPlace decided to build an EHR system. Primary goal towards developing this home-grown EHR system was to be able to comfortably integrate it with other technologies and systems installed at the facility.

16

3.3 Selection of Technology

The Internet is at once a worldwide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location (Leiner et al., 1997). The Internet has been one of the most recent technologies which led to many revolutionary changes in accelerating the process of sharing information and data among people and organizations. Its influence reaches not only to the technical fields of computer communications but throughout society as we move toward increasing use of online tools to accomplish electronic commerce, information acquisition, and community operations (Leiner et al. 1997).

In research conducted by Kohane et al. (1996) traditional architecture of EMR's, their limitations, incapability to compromise coding standards, and lack of capability to share information with other systems has been discussed in detail. As a solution to these limitations the research group recommended use of World Wide Web (www or W3) technology in building EMR systems. Kohane et al (1996) explains,

"The W3 is a collection of Internet protocols that support easy access to a huge variety of information. The use of W3 mechanisms provides a rich toolkit for useful functions that can support EMRSs. Hyper Text Transfer Protocol (HTTP) supports a universal naming scheme for information on all computers accessible through the Internet. HyperText Markup Language (HTML) is a relatively simple markup language that allows formatted and multimedia documents to be displayed in a way that is device-independent (i.e., the document appears approximately the same on a Macintosh, under Windows, or on a UNIX workstation) and that supports embedding hyper-links that connect to other documents. Use of such mechanisms in EMRS development addresses and averts, in part, the otherwise high cost of developing special-purpose systems for medical use from scratch."

One advantage of the Web environment is the ability to link disparate components, servers, applications and even clinical information systems themselves, into more complex systems (Cimino et al., 1998). Analyzing the strength of W3 technology and after experiencing the drawback of the previous standalone commercial EHR system used at the facility, the TigerPlace research group decided to adopt web-technology when building its EHR system.

Front end interface of the EHR system was designed using combination of various web-technologies such as HTML, PHP (Hypertext PreProcessor), CSS (Cascaded Style Sheet), JavaScript, and Ajax (Asynchronous JavaScript and XML). MySql database was used as a back-end to store, retrieve, and analyze the EHR data. The main advantage of this technology is that it is cost effective, efficient, and solves the purpose of being able to share information with other similar technology-based systems implemented at the facility.

3.4 Architecture of the EHR System

As shown above in figure (Fig. 4), EHR database is an integral part of the comprehensive EHR system which is under development at TigerPlace. All servers for the various systems implemented at TigerPlace are located at a central location in the MU campus. These servers are constantly monitored and the data on the servers is backed-up on a regular interval basis by the System Administrator. The servers run on a Linux platform.

The architecture of the web-based EHR system includes the following four components;

1. User Interface: Understanding that a simple user interface will be more

   ergonomic, the EHR interface has been designed accordingly. The user interface

   is built using HTML, PHP, JavaScript, Ajax, and CSS web-technologies. As this

   technology is platform independent, the interface can be accessed from any

   computer or laptop supporting browser features. To make the nurses and other

   care giving professionals at TigerPlace more comfortable with adopting and using

   the system, an effort to replicate efficient functions from the previous commercial

   EHR in use have been made. Precautions have been taken to avoid unnecessary

   pop-up windows which interrupt users while working on the system. This clean

   and simple interface allows users to add, delete, update, and analyze all records

   from the database with ease.

2. Security: As the EHR contains critical and sensitive information about the

   residents at TigerPlace, efforts have been made to make the system tightly

   secured. Various security measures of authentication, authorization, and

   encryption are used to make sure that the right person can access the right data. As

   the system is based on web-technology, any authenticate user can access the

   system remotely using the Internet. Two levels of authentication are used for

   accessing the system, Lightweight Directory Access Protocol (LDAP)

   authentication is used at the first level. Users must have an MU user account thus

   ensuring they have rights to access the MU system. The second level of

   authentication is the interface authentication to access the EHR system. The EHR

   database has a table of authenticate users for the EHR system which allows only

   those users to access the EHR system. In this case even though all MU members

can access the system to the LDAP level, not all members have the right to access the EHR database. Further, a provision to have different authorization levels to access data from the EHR is defined in the authentication table of the database. Currently, all users have been given the administrative access to the data; however, as the EHR develops, plans to have different authorizations will be implemented. To ensure security of data in the database, confidential data such as passwords have been encrypted and stored into the database. Interface level and database level scripts have been written to clean data while data is entered, stored, and retrieved from the database. Apart from all the above mentioned application security, the EHR systems also follows privacy and security rules stated forward by the Health Insurance Portability and Accountability Act (HIPAA).

3. Database: Each clinical technology system used at TigerPlace has its own separate database developed and placed on the same MySql server. At current stage, there are about 78 tables in the EHR database that not only store, retrieve, and analyze health related information about the residents at TigerPlace, but also contain administrative data into it. Apart from this, the database also has tables to collect information related to safety incidents, events at the facility, guest list, and other. The complete entity relationship diagram of the TigerPlace EHR database is included later in the 'Appendix' section.

4. Integration with other systems: The purpose of the new web-based EHR system is to function as an integral part of the comprehensive EHR development project at TigerPlace. As mentioned earlier, TigerPlace has several clinical technology systems such as the physiological sensor network and the video sensor network.

The EHR database and all other database function independently in capturing

health care data for residents. However, since all the system reside on a same

server, efforts are being made to integrate the information from each database and

provide health care professionals and care givers with comprehensive health

record information about each resident. For example, the sensor network monitors

movement of resident in their apartment. If the resident is for some reason

hospitalized, the sensor network will not capture any movement for that particular

resident in his apartment. A hospitalization record for that resident is entered into

the EHR database. As the sensor database and the EHR database are linked, a

notification of hospitalization in the sensor database will be recorded, which

specifies the reason for absence of sensor information for that resident. The

following figure (Fig. 5) demonstrates the interface of how sensor data is captured

and displayed to the user.
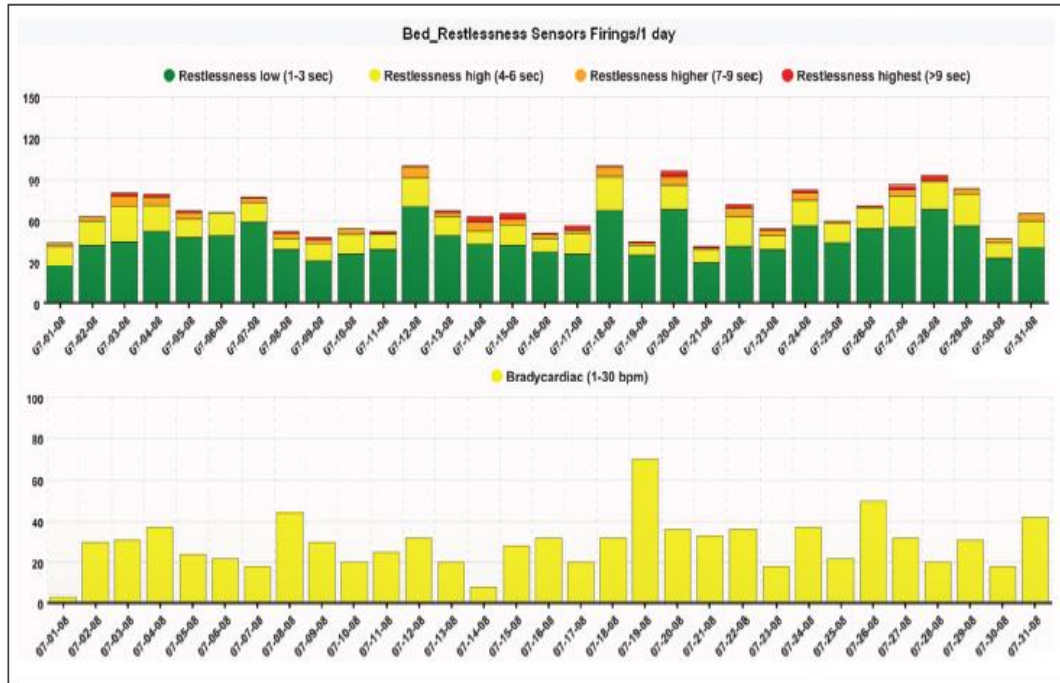
Fig. 5 Screenshot of web-based interface for sensor data (Rantz et al., 2010)

As a recent new pilot project, TigerPlace has installed telemedicine equipment in resident apartments that allow residents to enter their simple medical information such as vital signs into the telemedicine system. The team is working on writing a script that will automatically import the data entered into the telemedicine system to the existing EHR system.

The architecture of the EHR system is thus built on an understanding to function efficiently and effectively with other related clinical information systems at the facility. The design of the system is kept simple at the same time effective and easy to use for any user with minimal training on the system. The architecture also follows all guidelines necessary for proper functioning of a health care system.

22

3.5 Function and Behavior

The new web-based EHR system was successfully deployed at the TigerPlace facility in March 2009. Initially, the staff used both, the previously purchased commercial EHR system and the new web-based EHR system simultaneously, until the new EHR system was not equipped with required functions necessary for clinical and administrative processes. After all data from the previously used EHR system was imported into the new EHR system, the facility initiated full use of the new EHR system.

As the system uses web-technology to access the EHR database located at the MU facility, the user has to be connected to the Internet. Once the authenticated user accesses the home page of the EHR system by entering the URL into the web browser, he is presented with the 'Login' form. The user then needs to enter his login credentials for the username and password field before submitting the form. The following figure (Fig. 6) depicts the login interface for the web-based EHR system at TigerPlace.
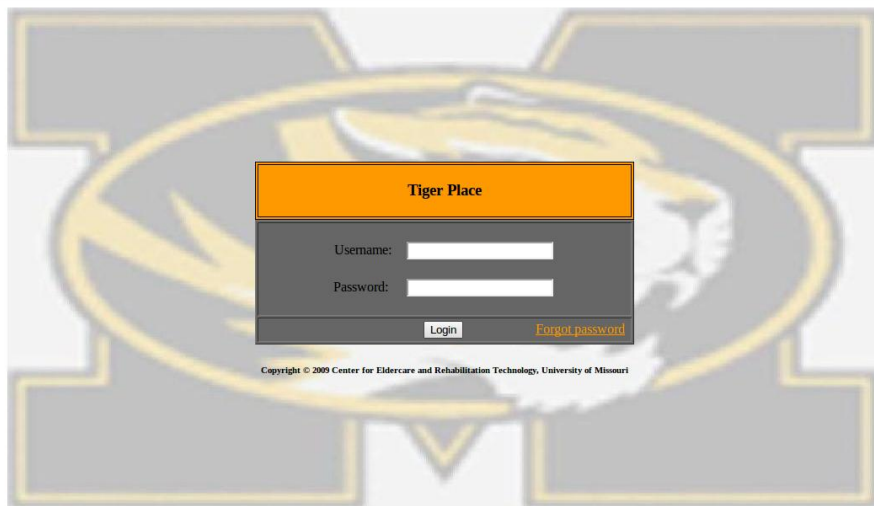
Fig. 6 Login screen for web-based EHR system

After being authenticated, the user is then presented with the main navigation screen (Fig. 7) from where various clinical, administrative, and other comprehensive

information of resident can be managed.
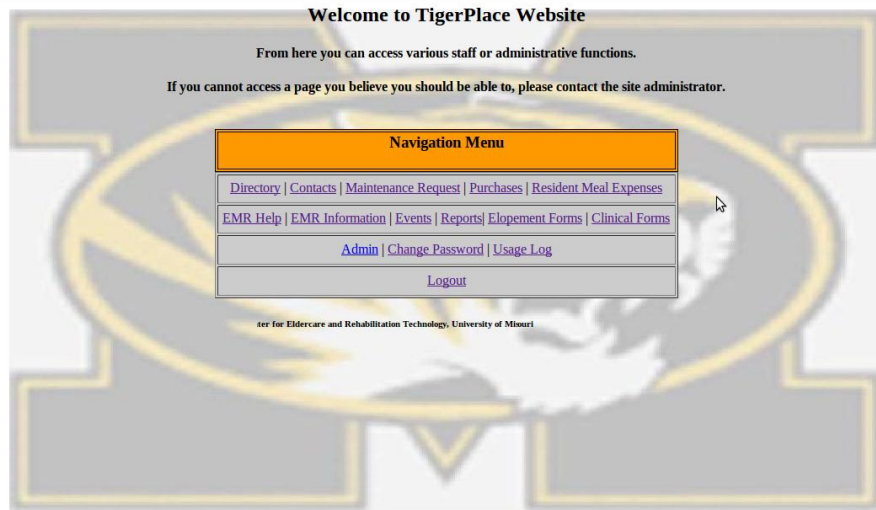
Fig. 7 Navigation Menu screen

Care givers at TigerPlace can access any module of the EHR system by clicking one of the options presented in the 'Navigation Menu'. Each option is hyper-linked to its specific activity module. For example, health care professionals at TigerPlace can use 'EMR Information' option from the menu to record or access assessment forms, medication records, hospitalization records, and so on for residents. Administrative staff can record or access admission forms, demographic information forms, and other related forms using the 'Admin' option from the menu.

Nursing staff and health care professionals at the facility often use 'EMR Information', 'Reports', 'Elopement / Resident Health Assessment', and 'Clinical Forms' to manage clinical information for residents at TigerPlace. A detailed description of each form and its modules is as discussed below:

1. EMR Information: The 'EMR Information' form is mainly used to manage medical information about residents at the facility. The form contains modules for managing information such as medications, vital signs, ER visits and

hospitalization records, various assessment forms, and medical reimbursement module HCFA-485. The following figure (Fig. 8) depicts the view of the 'EMR Information' form.

Resident Information

Resident Name : [▾]   Resident ID : [▾]   11-29-2010

HCFA-485

IPO

Assessment

Visit

Medication

ER Visits

Hospitalization

Progress Notes

IADL

ADL

Fig. 8 EMR Information form

To access any information for a resident, the user first has to select a resident either by using 'Resident Name' or 'Resident ID' from the respective selection list. After selecting a resident, any module for the form can be accessed one at a time to manage the related information. Users can enter new records, view previous records, or edit records for each of the respective modules. The 'HCFA-485' module records a complete medical history for every resident that includes; start of care date, demographic information and personal information, medication history, ICD9 principal and pertinent diagnosis, ICD9 surgical procedures, supplies used, safety measures, nutrition, allergy information, functional activities, admitted activities, mental status, physician clinical notes and other information. The 'IPO' module is used for interim physician order

entry and records information related to medication, allergies, list of primary

care physicians for the resident, and physician orders. 'Assessment' module lists

four assessment records, SF-12, Mood Scale, Fall Assessment, and Mini-Mental

State Exam. These assessments are used to record physical and mental status of

each resident completed every 6 months. Care providers are able to initiate care

and services based on assessment findings. The 'Visit' module records

information about vital signs and certain assessment questions which are

entered into the system every time the nurse visits the resident's apartment.

This is one of the most used modules in the 'EMR Information' form. The

'Medication' module, as the name suggests, is used to manage all information

about the current and past medications. The 'ER Visit' module and

'Hospitalization' module is used when the resident makes an ER visit or is

hospitalized for any medical reason. 'Progress Note' module is used by staff to

share any nursing notes related to residents. This module basically acts as an

effective means of communication and reminders between the staff members.

The 'ADL' and 'IADL' modules assist nursing staff to assess and record the

daily activities of each resident at the facility. Similar to the Assessment

module, 'ADL' and 'IADL' modules also record a score for each resident which

allows staff members to assist residents to help in their daily activities.

2. Reports: The 'Report' form helps staff in generating reports for each resident

related to their vital signs, medications, visits, progress report, and clinical

report. Data for each report is extracted from the database and arranged in a

tabular manner to provide care givers with a full record history. Reports are

useful in determining the changes in health status of residents. The following

figure (Fig. 9) shows how the user can access each report for a resident.
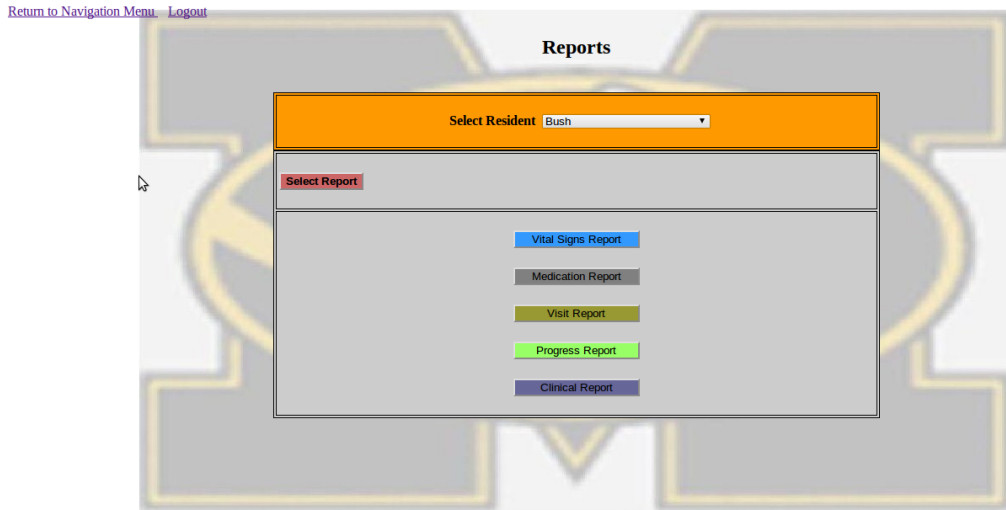
Fig. 9 Report form

3. Elopement / Resident Health Assessment form: The 'Elopement / Resident Health Assessment' form is also used to manage information related to resident's health. The form includes; 'Elopement Risk Assessment', 'Evaluation for Self-Administration of Medication', 'Post Fall Assessment', 'Care Plan', and 'Missing Resident Procedure'. The following figure (Fig. 10) is a screen-shot of the 'Elopement / Resident Health Assessment' form interface.

Resident Health Assessment

Resident Name : [▼]   Resident ID : [▼]   11-29-2010

Elopement Risk Assessment

Evaluation For Self-Administration of Medication

Post Fall Assessment

Aging In Place Care Plan

Missing Resident Procedure

Fig. 10 Elopement / Resident Health Assessment form

The 'Elopement Risk Assessment' module is used to record mental, emotional,

medication changes, and elopement status of resident. It also includes

measurements taken to improve health status of resident. 'Self-Administration

Medication' module helps the staff in understanding whether the resident is

capable of monitoring his medication by himself. The 'Post Fall Assessment' is

recorded every time a resident falls. The 'Care Plan' module includes detailed

information of resident's current, as well as previous care plan. The 'Care Plan'

module includes social history and interests of resident, the amount of

assistance he/she requires to manage his/her daily activities at the facility, and

special needs of the resident. In case any resident is found missing from the

facility, the 'Missing Resident Procedure' module is filled out by the staff. As

the facility does have a few residents with Alzheimer's disease, this module is

handy for staff to keep a record for patients if they are found missing.

4. Clinical Forms: 'Clinical Form' has two modules for managing immunization

records and clinical assessment records.

Clinical Health Assessments

Resident Name : [▼]   Resident ID : [▼]   11-29-2010

Immunization

Clinical Assessment

Fig. 11 Clinical Assessment form

Other forms included in the main 'Navigation Menu' are 'Directory', 'Contact', 'Maintenance Request', 'Purchase', 'Resident Meal Expenses', 'Admin', and 'Events'. All these forms are used for administrative purposes. 'Admin' form is the module used to perform administrative tasks to manage every residents' as well as staffs' personal and demographic information. The module also has provisions to manage apartment details. When a new resident is first enrolled at the TigerPlace facility, his/her basic information is entered to the database using this interface. Along with basic personal information about the resident, his/her family's contact information is also recorded. Similar to resident information, each staff member's information, apartment information at the facility, and office details at the facility is managed from this module. The following figure (Fig. 12) depicts the interface of the Admin form in the EHR system.

Administrative Actions

Manage Account Status

Add New Resident

View/Edit Resident Details

Add Contact Details

View/Edit Contact Details

Add New Staff

View/Edit Staff

Add New Apartment

View/Edit Apartment Details

Add Office

View/Edit Office Details

You can add, edit, delete, and manage accounts from this page. Please select an administrative action from the menu on the left.

Fig. 12 Admin form

'Directory' form and 'Contact' form list each resident's personal and demographic information in a tabular format for quick reference. 'Maintenance Request' form is used to record any maintenance request for resident apartments and the facility. The 'Purchase' form and 'Resident Meal Expense' form is used to record any purchases requested by residents. For example, if the resident has guests invited to the facility, the resident can pay for the guests meal expenses. The Events form is used for recording all safety incidents for residents at the facility. Whenever there is an incident related to fall, an adverse event such as medication error, a safety report, is entered into the system using this form.

Interface screenshot for each clinical and administrative form mentioned above have been included in the Appendix section.

3.6 Features of the EHR System

The primary goal of researchers at TigerPlace is to develop a comprehensive EHR to: (a) enhance nursing care coordination at TigerPlace, independent senior housing that helps residents age in place; (b) integrate clinical data and data from new technology; and (c) advance technology and clinical research (Rantz et al., 2010). The web-based EHR provides all comprehensive clinical information to health care professionals working for TigerPlace to support program goals. Other features of the EHR include the following:

1. Remote Accessibility: As the EHR system is based on web-technology, which makes system readily accessible to authenticated users from any remote area that has an internet access. Since the system has the capability to manage data in real time environment, users have access to up-to-date records.

2. Administrative Functions: The system allows administrators to manage personal and demographic information for resident and staff members. Medical insurance claims are filed using the information in HCFA-485 module. To a certain extent personal expenses of residents, such as their purchases and meal expenses are also managed using this system. The system allows for accessing and maintaining a complete directory for all its residents, as well as their family contact. Apart from this, apartment information, availability, and maintenance are managed using the Admin form in the system.

3. Research Data: Staff at TigerPlace enters diverse clinical and health care data into the EHR system. This data is then used by research groups at the facility, with informed consent of participating residents and authorization from MU Institutional Review Board. Data such as fall incidents, elopement risk

assessment, mental and physical condition and ability of residents is used to

study and improve process of care at the facility.

4. Compatibility and Stability: The technology used to build EHR system at

TigerPlace is web-based and platform independent. In this case, the EHR

system can be accessed on any computer having a browser feature. This makes

the system more efficient in use for staff members. If there are new computers

installed at the facility, there is no need to install any application for using the

EHR system. As mentioned in previous section, all information recorded into

the EHR system is stored on a secured and a stable server located at MU. The

server is regularly monitored and schedule to back up data has been set.

5. User Friendly: Any user at the facility can use the EHR system with minimal

training. An option for detailed help document has been included in the main

Navigation Menu.

CHAPTER 4

<u>RESULTS</u>

It took more than a year to develop the required EHR system for TigerPlace. In March 2009 TigerPlace replaced the commercial EHR system and implemented the web-based EHR system. The experience gained in developing a real world comprehensive EHR system and working with a diverse group of researchers from various engineering and health care departments at MU was an asset to one.

4.1 Benefits of the EHR System

The web-based EHR system at TigerPlace is an integrated set of a comprehensive EHR project that manages health care and personal data for residents at the facility. The system is tightly linked with other clinical systems used at the TigerPlace and facilitates the capability to share data with these systems. Apart from health care data, the system database was designed to support additional functions related to administrative processes. With a simple interface design, staff members found the system very easy and user friendly to use. The capability of being able to access the EHR system from any remote area with Internet access proved to be the most beneficial feature of the system. Compared to the previously used commercial EHR system which required nurses to manually update the data from their local system to the server, the new EHR automatically updated the data in the database server in real time. Furthermore, many of the paper based assessment forms used by care givers at the facility were integrated into

the new EHR system. This feature of real time update and automation of paper based assessment forms helped to save nurses time in documentation, thereby freeing them up to spend more time with residents.

4.2 Security and Confidentiality

Security and confidentiality is a primary concern for health care data systems. With two levels of authentication incorporated to access the EHR system, residents' health care data can only be accessed by intended authorized users. Along with access security, the system also follows HIPAA requirements. Security is not only implemented at the database level, but is also implemented at the interface level where the user inputs and accesses data.

4.3 Challenges

The success of building a home-grown EHR system for TigerPlace was not achieved without overcoming challenges. Developing interfaces for each module and managing a huge database was a priority concern. The process of developing the EHR system started with building simple assessment modules. Later, complicated forms we designed and integrated. The research group conducted meetings on regular basis to discuss each feature used for building the system. After the system was in use, many modifications suggested by the end users were also taken into consideration. At certain times this involved modifying interfaces as well as the database design. Scripts were written to share data between different forms to avoid users requiring entering data more than once. Even though the EHR system is in use at the facility research on developing

new modules is in progress. Modules in the system are built as certain process need to be automated. Integrating the EHR database with other clinical systems at the facility remains a challenge, and is still in progress. We believe that this integration will be readily achieved because the foundation for each clinical system and the EHR system is already built.

CHAPTER 5

<u>CONCLUSION</u>

Experience gained in designing and implementing a web-based EHR system for TigerPlace and development towards integrating it with other clinical systems in the facility suggests that the concept of building comprehensive EHR system is possible. Such a system will not only help care providers in obtaining a complete health care information about residents but will also improve the quality of care for the residents in long term care facilities. Work on developing a comprehensive EHR for TigerPlace is still in progress. However, with the early success achieved in this pilot research, we believe that other long term care facilities will soon adopt the model of building similar comprehensive EHR data to improve the quality of care and efficiency of decision making.

REFERENCES

Scharlach, A. (2008, September). Supporting Family Care Givers. *AJN* , pp. 16-22.

Abdrbo, A., Hudak, C. A., Anthony, M. K. & Douglas, S. L. (2010). Information Systems Use, Benefits, and Satisfaction among Ohio RNs. *CIN* , 59-65.

Alexander, G. L. & Madsen, R. (2009). IT Sophistication and Quality Measures in Nursing Homes. *Journal of Gerontological nursing* , 22-27.

Alexander, G. L. & Wakefield, D. S. (2009). Information Technology Sophistication in Nursing Homes. *JAMDA* , 398-407.

Ammenwerth, E., Mansmann, U., Iller, C. & Eichstadter, R. (2003). Factors Affecting and Affected by User Acceptance of Computer-based Nursing Documentation: Results of a Two-year Study. *JAMIA* , 69-84.

Arkin, J., Bean, B. K. & Ward, K. P. (2007). The EMR & ROI Making the Important Decisions. *Advance for Health Information Professionals* , 1-5.

Bates, D. W., Kuperman, G. J., Wang, S., Gandhi, T., Kittler, A., Volk, L., Spurr, C., Khorasani, R., Tanasijevic, M. & Middleton, B. (2003). Ten Commandments for Effective Clinical Decision Support: Making the Practice of Evidence-based Medicine a Reality. *JAMIA* , 523-530.

Center for Disease Control and Prevention (CDC). (2004). *The National Nursing Home Survey.* Hyattsville, Maryland: DHHS Publication.

Cimino, J. J., Sengupta, S., Patel, V. L., Kushniruk, A. & Huang, X. (1998). Architecture for a Web-Based Clinical Information System that Keeps the Design Open and the Access Closed. *AMIA* , 121-125.

Coburn, A. F., Keith, R. G. & Bolda, E. J. (2000). *Multiple Hospitalizations Among Elderly Nursing Facility Residents: Is Rural Residence a Risk Factor?* Research & Policy Brief.

Coleman, J. (2004). Assessing Information Security Risk in Healthcare Organizations of Different Scales. *CARS* , 1-4.

Congressional Budget Office. (2008). *Evidence on the Costs and Benefits of Health Information Technology.*

Courtney, K. L. (2005). Visualizing nursing workforce distribution: Policy evaluation using geographic information systems. *International Journal of Medical Informatics* , 980-988.

Curtiss, E. T. & Eustis, S. (2010). *Long Term Care and Nursing Home Information Systems Market Shares, Strategies, and Forecasts, Worldwide, 2010 - 2016 .* Lexington, MA: WinterGreen Research, Inc.

DeCoster, C., Roos, N. P. & Bogdaovic, B. (1995). Utilization of Nursing Home Resources. *Medical Care* , 73-83.

Ferrell, T. (2001). *Impact of HIPAA Security Rules on Healthcare Organizations.* SANS Institute.

Ganesh, A. & Al-Mujaini, A. (2009). Electronic Medical Record System: Have we Bitten off More Than we Can Chew? *OMJ* , 1-4.

Kim, E., Cho, E. & June, K. J. . (2006). Factors influencing use of home care and nursing homes. *Nursing and healthcare management and policy* , 511-517.

Kittredge, R. L., Estey, G., Pappas, J. J. & Barnett, G. O. (1996). Implementing a Web-based Clinical Information System Using EMR Middle Layer Services. *AMIA* , 628-632.

Koren, M. J. (2010). Improving Quality in Long-Term Care. *Medical Care Research and Review* , pp. 141-150.

Lawler, K. (2001). *Aging in Place Coordinating Housing and Health Care Provision for America's Growing Elderly Population.* Cambridge, MA: JOINT CENTER FOR HOUSING STUDIES OF HARVARD UNIVERSITY.

Lee, T., Lee, T., Lin, K. & Chang, P. (2004). Factors affecting the use of nursing information systems in Taiwan. *ISSUES AND INNOVATIONS IN NURSING PRACTICE* , 170-178.

Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D. C., Postel, J., Roberts, L. G. & Wolff, S. S. (1997). The Past and Future History of the Internet. *COMMUNICATIONS OF THE ACM* , 102-108.

Lorence, D. P. & Churchill, R. (2005). Incremental Adoption of Information Security in Health-Care Organizations: Implications for Document Management. *IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE* , pp. 169-173.

Lourde, K. (2009). Long Term Care Health Information Technology Inevitable. *Provider* , 21-32.

Marek, K. D., Popejoy, L., Petroski, G., Mehr, D., Rantz, M., & Lin, W. C. (2005). Clinical outcomes of aging in place. Nursing Research, 54, 202-211.

National Advisory Council on Nurse Education and Practice (NACNEP). (2008). *Meeting the Challenges of the New Millennium.*

Quality, A. f. (2006). *Costs and Benefits of Health Information Technology.* Santa Monica, CA : AHRQ Publication.

Rantz, M. J., Marek, K. D., Aud, M., Tyrer, H. W., Skubic, M., Demeris, G. & Hussam, A. (2005). A technology and nursing collaboration to help older adults age in place. *Nursing Outlook* , 40-45.

Rantz, M. J., Skubic, M., Alexander, G., Popescu, M., Aud, M. A., Wakefield, B. J., Koopman, R. J. & Miller, S. J. (2010). Developing a Comprehensive Electronic Health Record to Enhance Nursing Care Coordination, Use of Technology, and Research. *Journal of GerontoloGical nursing* , 13-17.

Weir, C. R., Hicken, B. L., Rappaport, H., & Nebeker, J. R. (2010). Crossing the Quality Chasm: The Role of Information Technology Departments. *American Journal of Medical Quality* , pp. 382-393.

Wilson, K. B. (2007). Historical Evolution of Assisted Living in the United States, 1979 to the Present. *The Gerontological Society of America* , pp. 8-22.
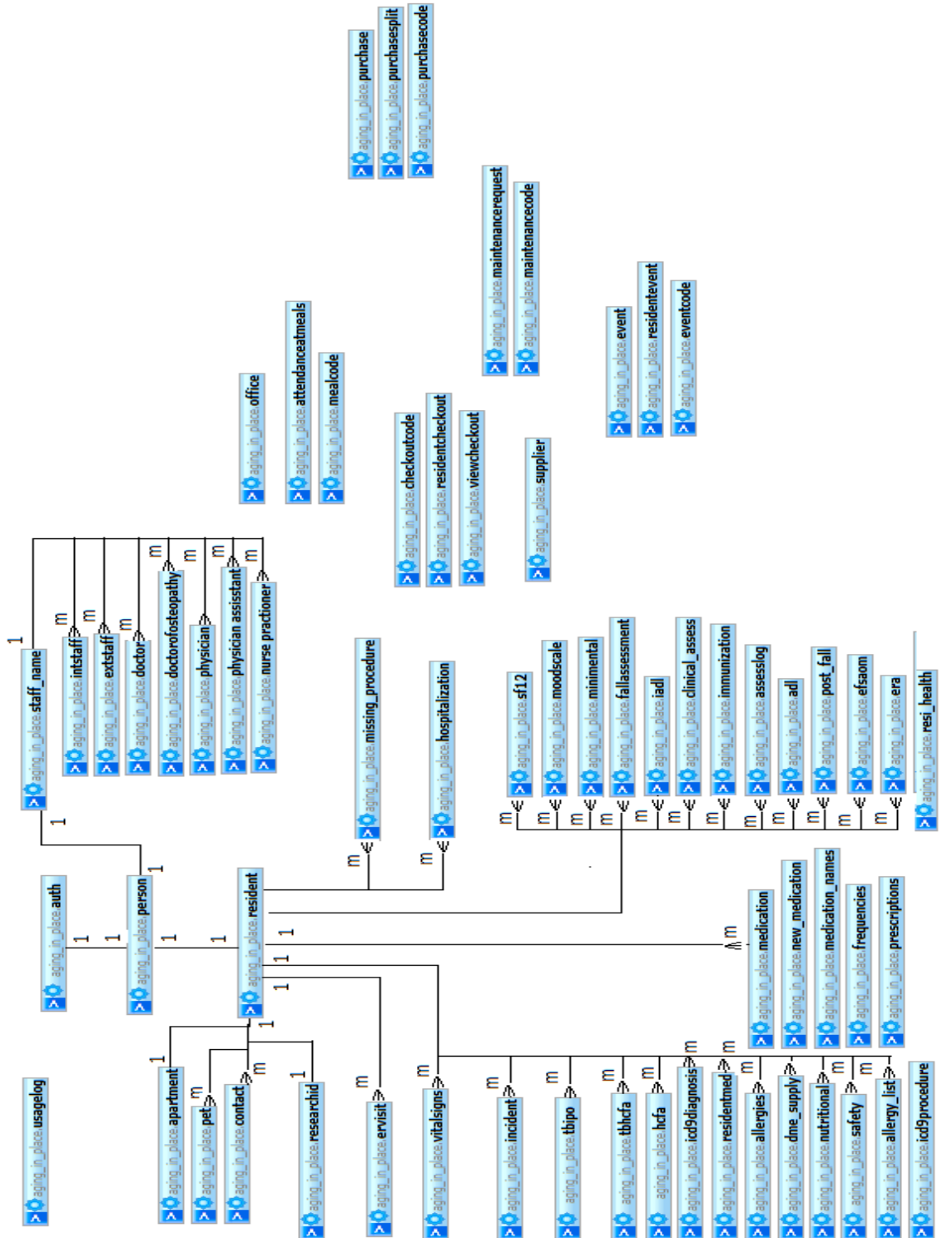
Entity Relationship Diagram

HCFA 485 - HOME HEALTH CERTIFICATION AND PLAN OF CARE

1. Resident No./ Resident's Name	2. Start Of Care Date	3. Certification Period		4. Medical Record No.	5. Provider ID.
▬▬▬ ▬▬▬	08-09-2004	From: 1966-04-02 To: 1987-04-02		MRID100000014	234587

6. Resident's Address:	7. Provider's Name, Address and Telephone Number:
2910 Bluff Creek Drive Columbia MO	Sinclair Home Care 2910 Bluff Creek Drive Columbia, MO 65201 573-256-4800

8.Date of Birth: ▬▬▬	9.Sex: Female

10.Medications: Dose/Frequency/Route

Medication	Status	Date

11. ICD9-CM Principal Diagnosis:

ICD9 Code	Principal Diagnosis	Date
0010	CHOLERA D/T VIB CHOLERAE	

12. ICD9-CM Surgical Procedure:

ICD9 Code	Procedure	Date

'HCFA-485' (1)

16.Nutritional Req:

ID	Nutritional Requirement
1	General
7	Lactose Restricted

17. Allergies:

ID	Allergic to Medication
1	Accu-OTC + Lutein

18 A. Functional Limitations:

1 ☐ Amputation	2 ☐ Bowel/Bladder (Incontinence)	3 ☐ Contracture
4 ☐ Hearing	5 ☑ Paralysis	6 ☐ Endurance
7 ☐ Ambulation	8 ☑ Speech	9 ☐ Legally Blind
A ☐ Dyspnea With Minimal Exertion	B ☐ Other (Specify)	

18 B. Activities Permitted

1 ☐ Complete Bedrest	2 ☐ Bedrest BRP	3 ☐ Up As Tolerated
4 ☐ Transfer Bed/Chair	5 ☐ Exercises Prescribed	6 ☑ Partial Weight Bearing
7 ☐ Independent At Home	8 ☐ Crutches	9 ☐ Cane
A ☑ Wheelchair	B ☑ Walker	C ☐ No Restrictions
D ☐ Other (Specify)		

19. Mental Status:

1 ☐ Oriented	2 ☐ Forgetful	3 ☐ Disoriented	4 ☑ Agitated
5 ☐ Comatose	6 ☐ Depressed	7 ☐ Lethargic	8 ☐ Other

'HCFA-485' (2)

21.B. Current Status:

This a test

22. Goals/ Rehab, Potential, Discharge Plans:

This a test

Staff Completing Plan: Gene Taylor

23. Employee Signature and Date of Verbal Soc Where Appilicable Staff Obtained Verbal Approval :

This a test

24. Date HHA Recieved Signed POT: 2016-10-15

25. Physician's Name and Address:

Last Name	First Name	ID #	Address 1	Address 2	city	State	Zip	Phone 1	Phone 2
Upton	Gary	F40914	1101 HOSPITAL DR	Student Health Center	Columbia	MO	65212	573-882-7481	

27. Attending Physician's Signature and Date Signed

This is a test

Print Form

'HCFA-485' (3)

SF-12® Health Survey Scoring Demonstration

'SF-12' assessment

'Medication' module (1)

'Medication' module (2)

Resident Name [redacted]   Resident ID 100000121

Name of Staff: [redacted]

Date: 7 ▼   28 ▼   2009 ▼   Today's date

Start Time: 2:45 Pm   Please use format as hh : mm

End Time: 4:38 Pm   Please use format as hh : mm

Type of visit: ◉ Soc   ○ Continuing   ○ Discharge

Service Type:
☐ Home Health Aide Visit (HHA)
☐ Medication Reminder Visit (Med Rem)
☐ Home Health Aide Aging in Place Visit(HHA AIP)
☐ Skilled Nursing Hourly (Sn Hourly)
☐ Assessment Visit(AV)
☐ MD2 Medication Visit (MD2)
☐ Skilled Nursing Aging in Place(SN AIP)
☐ Wellness center non chargable (WCNON)

Test	Type	Reading
Pulse	Apical ▼	55 / Min
Temperature	Oral ▼	18 °F
Blood pressure	Standing ▼	80 / 121 (mmHg)
Respiration		50
Weight		115 (lbs)

'Vital Signs' module

Report - Vital Signs

Vital Signs Report For : [redacted]

Pulse Rate	Temperature (°F)	Blood Pressure (Min / Max)	Respiration .	Weight (lbs)	Height (Inch)	Oxygen Saturation (%)	Comment (Notes from Nurses)	Date (YY-MM-DD)
1	1	1 / 1	0	0	0	0	Type any comment here	2009-08-04
1	1	11 / 11	1	1	1	1	1	2009-08-04
1	1	1 / 11	1	1	1	1	Resident is normal !	2009-08-04
1	0	0 / 0	0	0	0	0	Type any comment here	0000-00-00

Report generated for particular resident's vital signs

Report - Medication

Medication	Dose		Frequency	Route	Status	Date
Accupril	10 mg		Daily	P.O.	New	2009-08-07
Accu-OTC + Lutein	1 tab		Daily	Oral	New	2009-08-07
Accupril	20mg		BID	Oral	New	2009-08-07
Acetaminophen	1000 mg.		Daily	P.O.	New	2009-08-07
Acebutolol HCI	200 mg.		Daily	Oral	New	2009-08-07
Aciphex	20 mg.		Daily	Oral	New	2009-08-07

Report generated for particular resident's medications

Add New Resident

(Resident's Personal Information)

Return to Navigation Menu

Logout

Administrative Actions

Manage Account Status
Add New Resident
View/Edit Resident Details
Add Contact Details
View/Edit Contact Details
Add New Staff
View/Edit Staff
Add New Apartment
View/Edit Apartment Details
Add Office
View/Edit Office Details

Prefix: Mr

First Name:

Last Name:

Nick Name:

Gender: Male ○ Female ○

Date of Birth: mm dd yyyy

Street Address:

City:

State

Postal Zip

Add Research ID: Yes ○ No ○

Move in Date: mm dd yyyy Today's date

'Add new resident' module

Elopement Risk Assessment

| Resident Name : ▓▓▓▓▓▓ | Resident ID : 100000165 | Date 12-07-2010 |

Mental Status:	Score
Not Disoriented = (0) Occasionaly Disriented = (2) Disoriented Daily = (3)	
Emotional Status:	
Content = (0) Agitated = (2) Combative = (3)	
Activity:	
Ambulatory = (3) Ambulatory with assistant = (2) Non - Ambulatory =(0)	
Medication:	
No significant medications that alter mental status = (0) Medications that alter mental status or psychotropic's = (2)	
Elopment History:	
Has not wandered in past or attempted to leave facility = (0) Wanders the facility but does not attempted to leave = (5) has attempted or left the facility in the past quarter = (10)	

'Elopement Risk' module

Evaluation for Self Administrartion of Medications

| Resident Name : ▓▓▓▓▓▓ | Resident ID : ▓▓▓▓▓▓ | Date 12-07-2010 |

Does the Resident have the ability to:

	Yes	No	NA
1. Read/comprehend and follow label directions	○	○	○
2. Tell time/day/month	○	○	○
3. Count (number of pills, number of gtts, etc.)	○	○	○
4. Manual dexterity for handling:	Yes	No	NA
a. Mediation vials/punch cards	○ Yes	○ No	○ NA

'Self-administration of Medication' module

47

Post Fall Assessment

| Resident Name : ████████ | Resident ID : ██████ | Date | 12-07-2010 |

| Date of Fall: [   ] | Location of fall: [   ] | Time of fall: [   ] ○ Am ○ Pm |

What was resident doing at the time of fall ?

[   ]

Was this the first time ?

[   ]

Was resident alone at the time of the fall? if no who witnessed the fall ?

[   ]

Enviornment Conditions (check items that may have contributed to fall)

Throw Rugs ☐   Water Spills ☐   Bath Mats ☐   Furniture ☐   Clutter on Floor ☐   Cords or Turbing ☐

Poor Lighting ☐   Improper Bed height ☐   Improper Foot Wear ☐   Clothing got in a way ☐

Comments Regarding Enviornmental Factors:

[   ]

'Post Fall Assessment'

Missing Resident Procedure

| Resident Name : ████████ | Resident ID : ██████ | Date | 12-07-2010 |

DEMOGRAPHIC INFORMATION

Add Photo

| Sex: MALE | Height: [   ] Cms | Weight: [   ] lbs | Eye Color: [   ] |

| Date of Birth: 04-14-1919 | Hair Color: [   ] | Glasses: ○ Yes ○ No | Language: [   ] |

ADDITIONAL INFORMATION

| Time Discovered Missing ? [   ] ○ Am ○ Pm | Where Resident was last seen ? [   ] |

Physical Description:

'Missing Resident Procedure' module

48

Clinical Assessment

Resident Name : ▓▓▓▓▓	Resident ID : ▓▓▓▓▓▓	Date	12-07-2010

Screenings	Results	Date
Mammogram		
CXR		
PPD		
Colonoscopy		
PSA		
Dexa		
Vision		
Hearing		
Dental		

Immunizations	Results	Date
Influenza		
H1 N1		
Pneumovax		
Zostavax		

'Clinical Assessment' module

ER Visit

Resident Name : ▓▓▓▓	Resident ID : ▓▓▓▓▓▓▓	12-07-2010

Date of Visit:	mm ▼ dd ▼ yyyy ▼
Reason:	
Consequences:	
Follow up care:	

Submit   Reset Page

'ER Visit' module

49

'Hospitalization' module

Progress Notes/Incident Report

Resident Name : ███████   Resident ID : ███████████   12-07-2010

Message For (Name): _____

Location: Tiger Place ▼

Method: Life Line ▼

Incident: False Alarm ▼ (If Other, Specify in comment)

Date: 12 ▼ 7 ▼ 2010 ▼ Today's date

Time: _____

Subject: _____

Comments: [   ]

'Progress Note' module

IADL

Resident Name : ██████   Resident ID : ████████   Date   12-07-2010

M0780: Current management of oral medication: Patient's ability to prepare and take all prescribed oral medication reliably and safely, including administration of the appropriate times/intervals. Excludes injectable and IV medications (Note: This refer to ability, not compliance or willingness)

☐ Able to independently take the correct Medication(s) and Proper Dosage(s) at the correct times
☐ Able to take medication(s) at the correct times is (a)Indiviual dosage are prepared in advance by another person or
   (b) Given daily reminders or (c) Someone develops a drug diary or chart
☐ Unable to take medication unless administered by someone else
☐ NA- No oral medication prescribed.

M0790: Current management of inhalant/Mist medications: Patient's ability to prepare and take all prescribed inhalant/mist medication (nebulizers, metered dose devoces) reliably and safely, including administration of the correct dosage at the appropriate times/intervals. Excludes all others forms of medication (Oral tablets, injectable, IV medications)

☐ Able to independently take the correct medication and proper dosage at the current times
☐ Able to take medication at the correct times is (a)Indiviual dosage are prepared in advance by another person or (b)
   given daily reminders
☐ Unable to take medication unless administered by someone else
☐ NA - No Inhalant/Mist medications prescribed.

'IADL' module