

## Health Information Technology: A New World of Nursing Homes

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### Abstract

The United States population is growing older, meaning there will be higher numbers of elderly people. The first baby boomers are now turning 65 and by 2030 the US population aged 65 and over is expected to double, which means that assistance or the transition to long-term care facilities (i.e. nursing homes) will be in higher demand. Advancements in Health Information Technology (HIT) have influenced the healthcare field by becoming more efficient, effective, and have improved patient satisfaction and safety. However, nursing homes and long-term care (LTC) facilities are slower in the adoption process or lack the willingness to transition to the various technologies available. One of the best examples is the adoption of Electronic Health Records (EHRs). While acute care settings and physician practices are adopting EHR systems at a brisk pace, LTC facilities, specifically licensed nursing facilities, have been slower to embrace such technologies. The main barriers to the implementation of EHRs include: cost; training; complex implementation processes; and the lack of evidence that such systems can deliver the promises. This review paper addresses the current state of HIT and what is currently available in nursing homes; it also addresses barriers and benefits that HIT faces with EHR implementation.

**Keywords:** EHR systems; Nursing homes; Complex implementation processes

### Current State of HIT in Nursing Homes

Information technology has the potential to improve the quality and efficiency of health care as well as to reduce error [1,2]. However, in the United States, nursing homes are surprisingly slow to integrate new technologies. According to a recent article published by Boscia [3], electronic medical records create the concern of loss of personal interaction with the residents. It is unknown how the widespread adoption of computer technology will affect the quality of medical care in nursing homes and LTC facilities [3]. The United States is on the verge of converting all health care facilities to electronic medical records by 2015. EHRs and technology in general will most likely reduce costs, increase patient safety and provide greater efficiencies in the health care system [3].

Technology such as laptops, tablets, and cellphones can be utilized in patient's rooms where patient information can be saved permanently and therefore helps eliminate the possibility of lost information. Written charts pose the risk of becoming lost or misplaced. In addition, vital information may become lost within the chart or overlooked—this would cause a delay in treatment. EHRs are helping to keep patients from being injured. HIT is allowing many things to occur and will continually improve by the following: decreasing information unavailability, poor inter-provider communication and inconsistent documentation and thereby improving patient safety across the board [4]. Within a nursing home, medication errors and written medical charting always poses a danger and risk of error or mishaps. Currently, most nursing homes only use hand written charts and medical records. These facilities have a lack of resources and access to technology; therefore, they are slowly making the appropriate changes for the 2015 deadline. As of now, most health care professionals working in nursing homes must go back to the nursing stations in order to retrieve a patient's medical record to chart the appropriate information regarding medication, vital signs, and status. This creates the risk of forgetting, misplacing, or documenting the information in the wrong patient's chart. The use of current and future technology of resident health information in LTC settings depends on the implementation of health information technologies using interoperable standards that enable information exchange [5]. Implementation is slow due to the lack of effort among most facilities as well as lack of employee effort to adapt and become conversant with the technology.

### Available HIT for Nursing Homes

There are several forms of HIT currently available for use in nursing homes and many of them integrate with others, especially EHRs. EHR systems are computer software programs that store patients' medical records in an easily accessible and editable format. They are available through several different vendors and can be adapted to fit the needs of each individual facility.

Table 1 highlights the findings from several surveys conducted on EHR adoption in various nursing homes throughout the United States from 2004-2008. According to these findings, the majority of nursing homes had not yet implemented the use of EHR systems. The survey which found the largest percentage (47%) of EHR use was the National Nursing Home Survey [6]. With this survey, however, the extent of usage in each particular facility was unclear, due to unspecific questioning.

One of the most beneficial forms of HIT is decision support tools. Generally, these are applications built into EHR or other HIT systems. They assist health care professionals in providing the best routes of care for their patients. One way they do this is by alerting the physician when a treatment is about to be used and could potentially be harmful to the patient, such as when there could be drug interactions. Decision support tools can also provide suggestions for treatment and reminders [7].

Decision support applications are part of computerized physician order entries (CPOEs), which are computer applications that are used by health care professionals to place medical orders [8]. CPOEs can help save time for nursing home staff by eliminating time spent making phone calls to other facilities and filling out paperwork. For example,

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Survey	Respondents	EMR/EHR <sup>a</sup>	Item Wording/Definition
NNHS	1,174 nursing homes—nationally representative	47%	Does {FACILITY} currently use EIS for any of the tasks on this card? Select all that apply. Patient medical records. In a separate Help Screen for this item, "Patient Medical Records" is defined to include nurse's notes, physician notes, & MDS forms.
Maestro Strategies	36 multi-facility long term care organizations – AHCA members	18% 50%	HER/EMR Medical records. Unclear whether or how these terms were defined in the survey. Report presents findings regarding whether an organization had installed or owned various electronic clinical applications.
Kaushal et al.	Expert panel – national estimate for nursing homes	1%	HER. Not defined
CCLC	34 long-term care organizations: 12 freestanding nursing facilities, 22 MSOs New YORK	29%	Estimate is for fully or partially operational EMR system (23.5% partially operational; 5.9% fully operational) Please indicate below the status of EMR implementation in your organization. (For this purpose, the EMR is defined as electronically originated and maintained clinical health information, derived from multiple sources, that replaces the paper record as the primary source of patient information.) Response options appear to include: Fully operational Partially operational Developing plans to implement No current plan to implement
Stratis Health	297 nursing homes – Minnesota	32%	Do you have an HER or a paperless system? Estimate is for a fully or partially-implemented HER-S. EHR is not defined other than as stated in the item stem.

a. Approximate percentage as mentioned in table.

**Table 1:** Surveys conducted on EHR adoption in various nursing homes throughout the United States from 2004-2008 [6].

if a physician refers a nursing home patient to a specialist, the referral along with any necessary part of the patient's health record can be sent to the specialist electronically. E-prescribing also involves CPOE and allows physicians to electronically send prescriptions to nursing homes or pharmacies [7]. E-prescribing software works with decision support tool applications to protect patients from potential medication issues. It also protects patients by eliminating errors due to illegible handwriting.

Geriatric Risk Assessment MedGuide (GRAM) is another type of decision support software that can assist pharmacists or physicians in ensuring that nursing home patients are taking the correct medications. This software takes into consideration all of the different drugs taken by a patient and how they may interact with each other. It then creates a report containing a plan to monitor the patient if the drugs they are taking could have possible adverse side effects when taken together. The use of GRAMs is especially useful in a nursing home setting because a common reaction to taking multiple drugs is delirium, which can lead to falls in elderly patients [9].

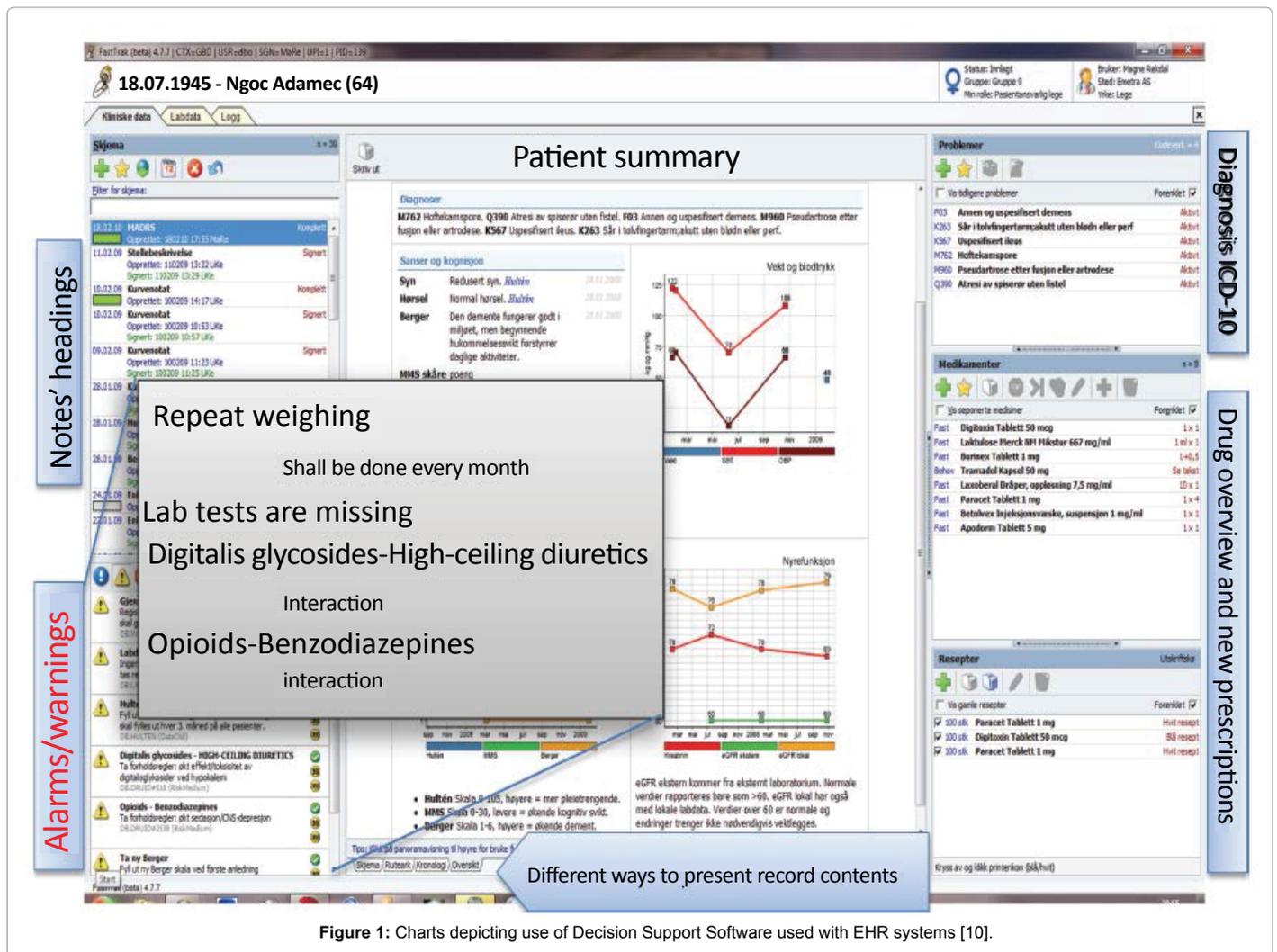
Decision support applications work with other HITs, such as electronic medication administration records (eMAR), systems that health care professionals use when administering drugs to patients. The medications taken by a patient are tracked either through scanning a bar code on the medication container, or by manually entering the medication. By tracking medications electronically, a decision support application is able to provide an alert in case there is a problem with the medication about to be administered, such as a drug allergy [7]. Figure 1 represents an example of an EHR system containing a decision support application which was tested in a study of seven nursing homes in Norway [10].

Figure 2 shows how various forms of decision support software, used along with EHR systems, are able to be utilized in order to provide the best possible care for nursing home patients [11]. The chart illustrates the various users, residents, staff members, and administrators, and their roles in the usage of the software.

An integral component of the HIT infrastructure is represented by the Health Information Exchange (HIE) systems, which also collaborate with EHR systems. HIE systems come in several forms. Some forms only receive or send data, while others do both. They provide nursing home staff with the ability to electronically communicate with other facilities [7]. For example, if a patient is transferred from a hospital to a nursing home, the patient's medical records can be sent to the nursing home electronically via an HIE system instead of having to be transferred in a paper format. Table 2 shows HIE system utilization between nursing homes and various health care facilities in Minnesota [12]. According to the table, there were greater percentages of exchange partners who were able to receive electronic health information than there were those who were able to send the information.

A very important part of HIT for nursing homes and all health care facilities is the capability of keeping a patient's records secure. Security software that provides secure electronic messaging is available to assist with patients' privacy rights. This software integrates with EHR or other HIT systems and allows messages containing private information to be sent quickly and securely both within and outside the facility [7].

Another category of HIT that can be useful in nursing homes is telemedicine, which includes various applications that allow health care providers to care for patients when they are not in the same room. One type of telemedicine technology allows physicians and nurses to view their patients' vitals, such as their heart rates, from computers at



a centralized station in the facility or even outside the facility. Another form of telemedicine is live video conferencing, which provides physicians with the ability to communicate face to face with their patients when it is not possible for them to be there in person [7]. Since most nursing homes do not have full time physicians or specialists on staff, the use of telemedicine has the ability to play a vital role in providing medical care to patients that was not possible in the past. Forms of telemedicine can also be useful for nursing homes that are located in rural areas and are difficult for physicians to access them on a regular basis.

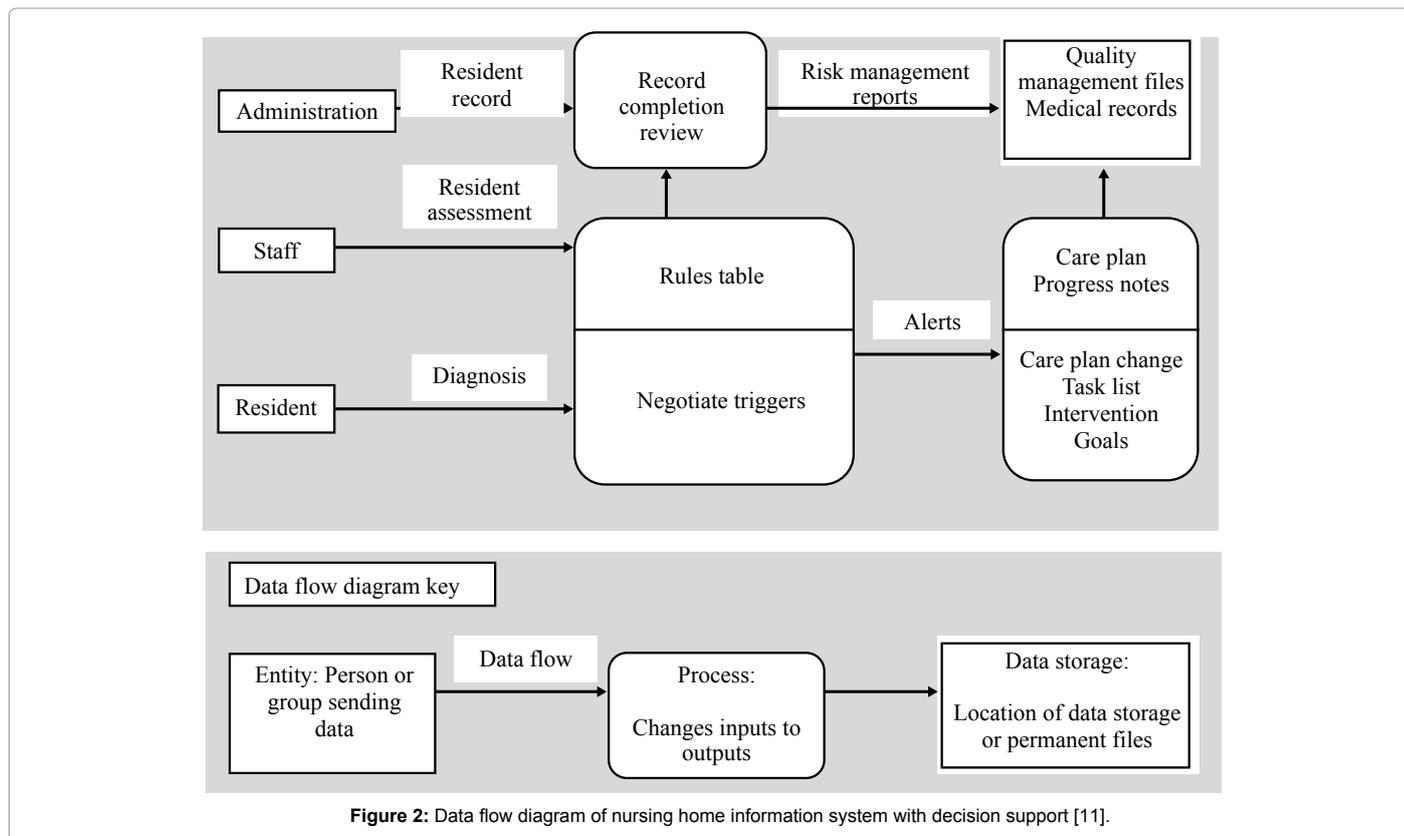
Electronic quality management and reporting applications are also available to assist in improving the quality of care provided in nursing homes. These applications work with information from EHR systems to track the quality measures of a facility. These measures can include a variety of categories including illnesses, accidents, and outcomes of treatments. After gathering the data, the applications organize it into usable forms so that problematic areas within nursing home facilities can be easily seen and improved by administrators [7].

Table 3 shows the usage rates of various HIT from a survey conducted from December 2011 to January 2012 regarding Minnesota nursing homes [12]. According to the tables, the largest percentages of nursing homes utilize EHR systems for basic patient information,

such as the Minimum Data Set (MDS) assessments (which are required for patients who are covered by Medicaid or Medicare), demographics, and care plans. The smallest percentages of nursing homes utilize EHR systems for tasks such as e-prescribing, tracking administered medications, and tracking laboratory results. Similar results were found in a study of 137 LTC facilities in Texas in 2011 [13].

### Benefits

Residents of any age in nursing homes may not remember their medical history or what medications they take. Some do not have family or a person who is in charge of them to help them remember or residents may unintentionally report their history incorrectly [14]. The benefits offered by the EHRs are tremendous because they help eliminate the problems that might occur, especially in LTC facilities. In this case, nursing home residents are typically older and frailer than acute care patients and stay in the facility much longer. The length of stay, along with, on average, six to seven different medications per resident suggests that s EHRs will help prevent harmful drug interactions, track patient assessments, and monitor clinical outcomes better than current paper methods that are currently the typical solution. Not only EHRs provide safety benefits, they also help improve efficiency, raise compliance, reduce and help eliminate paperwork redundancies, and reduce time spent charting [15].



Exchange Partners	Send Percent (Number)	Receive Percent (Number)	MN E-Health Report: Nursing Homes Exchange A small number of nursing homes had the capability to exchange health information with a wide variety of exchange partners. The table on the left lists eight of the exchange partners. 27 nursing homes were part of one large multi-facility chain
Assisted Living Facilities	4% (9)	16% (34)	
Behavioral/Mental Health	2% (4)	14% (31)	
Clinics/Ambulatory Providers	2% (5)	15% (33)	
Dental/Oral Health	0% (1)	13% (29)	
Health Plans	4% (9)	17% (37)	
Home Health Agencies	1% (2)	14% (30)	
Hospice	2% (5)	14% (31)	
Hospital in our systems	5% (11)	22% (47)	

Source: Minnesota Department of Health, Office of Health Information Technology, MN HER Nursing Home survey (2011)  
Response rate: 83% (316/382)

**Table 2: Capability for Electronic Exchange of MN Nursing Homes by Partner (N= 217).**

There are also EHRs tailored to LTC facilities. An EHR built for an acute or ambulatory care setting may have different functionality versus one developed for LTC settings and may not convert easily into a LTC setting. Going one step further to introduce HIT to work alongside the EHR systems can further benefit LTC facilities by bringing high-tech, efficient ways of performing clinical tasks. With this comes some natural resistance from staff, so education and on-boarding is also an essential part of implementing EHRs with HIT for LTC facilities.

Another benefit to implementing an EHR is the potential for higher reimbursement. A good EHR has integrated safeguards to ensure that forms are filled out completely. If there is certain information left out, the physician can be notified of action items. Providers can reap another important benefit with EHRs providing a way to share records among providers. Of course, this involves standards for integrity, authentication, and non-repudiated status [16]. Table 4 represents the benefits of EHR usage found in a study involving 13 nursing homes and home health agencies across the US that have implemented the use of advanced HIT.

### Barriers

Going beyond the obvious limitation of funds for implementation, financial sustainability and getting the staff invested in an organization mindset are also quite challenging. “A recent study by the California Health Care Foundation found that the greatest barrier to implementing HIT solutions is a lack of capital resources to invest in the necessary equipment, training, and maintenance” [14]. To elaborate more on organizational mindsets, the staff must view the EHR as a technology that will make work easier, improve quality, and strengthen the facility. Furthermore, an industry-wide view must be developed to standardize data and content to all levels of healthcare.

Culture change is also an important barrier regarding the move to an EHR system. There are many very talented nurses and doctors who are well-versed with computers and will soon be forced to become proficient with the computer program the LTC facility has chosen. Thus, one can see that the EHR system might make such individuals

Use of HER	Current use	Plan to use	MN E-Health Report: Nursing Homes Use Over 80% of nursing homes with EHRs used the EHR for documentation of the activities found in the table on the left. Among all nursing homes not using the HER for these activities stated plans to being use in the next 18 months.
Document MDS Assessment	99% (214)	1% (3)	
Document resident demographics	98% (212)	0% (1)	
Document resident list/census	97% (210)	2% (4)	
Document diagnosis or condition list	96% (209)	3% (7)	
Document care plan	96% (208)	3% (7)	
Document allergy list	95% (207)	4% (9)	
Document clinical notes	88% (191)	6% (14)	
Document vital signs (e.g., blood sugar, O <sub>2</sub> levels)	87% (189)	9% (19)	
Document Assessment other than MDS	81% (176)	14% (31)	
Document activities of daily Living/Point of care	81% (175)	15% (32)	

Source: Minnesota Department of Health, Office of Health Information Technology, MN HER Nursing Home survey (2011)  
Response rate: 83% (316/382)

**Table 3:** Use of HER by MN Nursing Homes with EHRs (N= 217) (1 of 4).

Use of HER	Current use	Plan to use	MN E-Health Report: Nursing Homes Use Between 47% and 67% of nursing homes with EHRs use the HER for activities in the table on the left Almost a quarter of nursing homes plan to start to use the HER to document the medical history and physical
Care plan /flow sheet (chronic/rehab)	67% (145)	5% (11)	
Document therapy/treatment plan	63% (136)	14% (30)	
Alerts/reminders for medication (e.g. dosing, support, drug allergy)	62% (134)	14% (30)	
Document advance directives	60% (130)	16% (34)	
Document medical history and physical	56% (122)	23% (49)	
Alerts/reminders for resident specific or condition specific activities (e.g. foot exam)	48% (104)	17% (37)	
Alerts/reminders for preventive services due (e.g.immunizations)	47% (102)	18% (38)	

Source: Minnesota Department of Health, Office of Health Information Technology, MN HER Nursing Home survey (2011)  
Response rate: 83% (316/382)

**Table 4:** Use of HER by MN Nursing Homes with EHRs (N= 217) (2 of 4).

feel threatened. This is where careful planning and training becomes important [17].

Another barrier to EHR adoption is the hardware that must be put in place to support such a system. The hardware considerations are very important and involve substantial cost. Not only are servers required, but routers, switches, and wireless access points may all be required for an implementation. Depending on the size of the implementation, the cost can be extensive [18]. According to the study performed in Minnesota, the challenge that affects the largest percentage of nursing homes in EHR adoption is training staff on the use of EHR systems; while, the challenge that affects the smallest percentage of nursing homes is availability of technical resources [12]. Another major challenge, as evidenced by the study conducted at the Texas nursing homes, is funding, whereas the complexity of the technology might not be a significant barrier [13].

### Other Health Information Technologies

HIT has expanded and is becoming more advanced every year. Along with common and the most needed technologies, some nursing and LTC facilities are offering technologies that promote rehabilitation and therapy. Computer therapies are breaking into the market with ample benefits and the ability to provide treatment plans that are interactive and entertaining. These therapeutic technologies provide the ability to improve an individual's gross and fine motor coordination and skills. One such technology is the use of sim-cycles which provide visual and physical stimulation. This technology provides the ability to exercise and a visual stimulation to make the exercising fun and motivating. Memory games such as "identifying the states," "make a deal," or card games are also associated with these technologies and incorporate memorization skills, hand and eye coordination, as well as providing the individual to have a choice on a given activity. They provide entertainment rather than what can be conceived as a boring therapy. These updated computer therapies have taken away the

monotony of therapy. In addition to resident benefits, this program also benefits the provider through increasing reimbursable therapy minutes and Centers for Medicare and Medicaid Services (CMS) F-tag regulation compliance [18].

Other technologies that have been added to these facilities and in homes are InTouchLink technologies. InTouchLink [19] technologies provide easy to use computers, email, and internet. This technology provides an inter-generational component because it enables seniors to stay in touch with family members and build generational bonds as well as providing entertainment and education. There are also safety and satisfaction benefits built in with this technology including the ability to broadcast messages to all residents in suite to alert of activities or even emergencies. InTouchLink provides brain fitness because these user friendly interfaces and activities give individuals a chance to challenge him or herself and use his or her mind to stay active and up-to-date on every day technology as well as news, games, entertainment, and with family and friends [19].

Tablet PCs offer a great potential for using existing and future technologies in the LTC environment. Unfortunately this technology has not become as widely used as one might anticipate. "In the last years, with the increasing development of the tablet PC market, very few companies or initiatives have taken benefit of the new capabilities provided by those devices, while most of them are proprietary" [20]. In their article, Torres-Padrosa et al. [20] discuss how technologies such as videoconferencing, calendaring, instant messaging, and contact management, can help bring a more organized level of access, sharing, and organization to the management of records for LTC centers.

### Further Research

Recently, the new proposed EHR incentive requirements emerged from the US Department of Health and Human Services and stakeholders have mixed feelings regarding the requirements. The

incentive requirements are based on a number of different meaningful use categories which health care providers must meet. Many health care providers are struggling to meet the previous stage of incentive requirements and many more yet have not begun to implement EHRs [21]. One of the payers is Medicare and LTC patients are going to have this as their insurer. This presents even more challenges. Although some federal health IT initiatives benefit long-term care, LTC facilities are not eligible for direct financial assistance through the meaningful use incentive program. As a result, LTC facilities must be more effective and efficient in their adoption of electronic systems and technology [22]. Even so, LTC facilities are adopting EHRs at a similar rate to clinical practices. As defined by the CMS, to demonstrate meaningful use “providers need to show they are using certified EHR technology in ways that can be measured significantly in quality and in quantity” [23]. The definition is fairly straightforward, but complications arise when the new incentive requirements ask for 10 percent of Medicare and Medicaid patients demonstrating meaningful use regarding accessing their health information. How does one determine if the patient is using that information meaningfully? Moreover, Medicare patients are typically not involved with computers and may not even have easy access to them [22]. Thus meaningful use can be difficult to achieve, especially for LTC facilities.

Since LTC facilities are almost exclusively home to patients with Medicare, they have a large stake in meeting federal guidelines for meaningful use. The reimbursement opportunities that meaningful use provides are essential to these types of facilities where funding is historically very low. Therefore, nursing homes goal should be EHR deployment and use—not just for funding, but for the benefit of their unique patients.

## Conclusion

Health information technology has improved substantially over the past ten years. It is becoming a requirement and a necessity in nearly every health care facility in the United States. Technology has provided the ability to maintain a consistent flow of information regarding personal patient information, medications, allergies, and past history, just to name a few. It provides the ability to transfer information from facility to facility with ease and virtually no concern. These advancements have created a “new world” for nursing home facilities. There are currently advanced technologies that are in use, but there are also various other technologies that are available but not yet integrated in nursing homes.

There is a plethora of benefits offered by technology adoption and implementation into nursing homes, but as with all advancements, there are also barriers. “These barriers consist of culture, a lack of capital resources to invest in the necessary equipment, training, and maintenance” [15]. Because these facilities are often most in need of the reimbursement programs, it is even more important that they are able to show meaningful use of such technologies. Given that by 2030, the US population aged 65 and over is expected to double, these technologies are becoming ever-important. The major challenge for the next couple of years is to understand what features are underutilized – whether the software needs to be improved or whether providers require some incentive to make greater use of systems they have already purchased. At the same time, further research is needed to determine

whether use of advanced HIT is associated with better quality of care in these facilities.

## References

1. Ford E (2010) Electronic health records hold great promise for long-term care facilities. *iHealthBeat: Reporting technology's impact on health care*.
2. Liu D, Nicholas GC (2009) Health information technology in nursing homes. *Journal of Applied Gerontology* 28: 38-58.
3. Boscia T (2011) Study: health information technology poses no harm to nursing home residents, *Cornell Chronicle*.
4. Darves, B. (2012). E-Health Records: Are We Safe(r) Yet? *iHealthBeat: Reporting Technology's Impact on Health Care*.
5. Alexander GL, Madsen R (2009) IT sophistication and quality measures in nursing homes. *J Gerontol Nurs* 35: 22-27.
6. Richard A, Kaehny M, May K, Kramer A (2009) Literature review and synthesis: Existing surveys on health information technology in nursing homes and home health. U.S. Department of Health and Human Services.
7. Kramer A, Richard A, Epstein A, Winn D, May K (2009) Understanding the costs and benefits of health information technology in nursing homes and home health agencies: Case study findings, U.S. Department of Health and Human Services.
8. Dixon B, Zafar A (2009) Inpatient computerized provider order entry (CPOE) (Publication No. 09-0031-EF). Rockville, MD: Agency for Healthcare Research and Quality.
9. Lepane K, Hughes, C, Daiello L, Cameron K, Feinberg J (2011) Effects of pharmacist-led multicomponent intervention focusing on the medication monitoring phase to prevent potential adverse drug events in nursing homes. *J Am Geriatr Soc* 59: 1238-45.
10. Krüger K, Strand L, Geitung JT, Eide GE, Grimsmo A (2011) Can electronic tools help improve nursing home quality? *ISRN Nurs* 2011: 208142.
11. Alexander GL (2008) A descriptive analysis of a nursing home clinical information system with decision support. *Perspect Health Inf Manag* 5: 12.
12. Johnson R (2012, February 9) Minnesota's EHR mandate: What does it mean for adult day programs? *Aging Services of Minnesota* 2012 Institute.
13. Wang T, Biedermann S (2012) Adoption and utilization of electronic health record systems by long-term care facilities in Texas. *Perspect Health Inf Manag* 9: 1g.
14. Evaluation of the Elderly Patient (2013) The MERCK Manual for Healthcare Professionals.
15. Pacicco S (2008) The current state of EMRs in LTC settings. *Nursing Homes: Long Term Care Management* 57: 34-37.
16. Oatway DM (2004) Electronic records in long-term care. *Nursing Homes: Long Term Care Management* 53: 84-89.
17. DeVore D, Price C, Natzke J (2007) Preparing for electronic charting. *Nursing Homes: Long Term Care Management* 56: 28-31.
18. It's never too late (2012).
19. InTouchlink (2012).
20. Torres-Padrosa V, Calle E, Marzo J L, Rovira M (2011) A medicosocial videoconferencing tool for the elderly, impaired, and long-term care patients. *Communications in Computer and Information Science* 221: 11-20.
21. Goedert J (2012) Meaningful use stage 2 brings cheers, fears. *Health Data Manag* 20: 40-43.
22. Weaver S, Dick M, Dougherty M, Anderson D, Everhard L, et al. (2011) EHR adoption in LTC and the HIM value. *J AHIMA* 82: 46-51.
23. Centers for Medicare & Medicaid Services.