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

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 responses.

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,
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 administrating 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 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].

Figure 1: Charts depicting use of Decision Support Software used with EHR systems [10].
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...

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**Figure 2:** Data flow diagram of nursing home information system with decision support [11].

| Exchange Partners               | Send Percent (Number) | Receive Percent (Number) | MN E-Health Report: Nursing Homes Exchange |
|---------------------------------|-----------------------|--------------------------|--------------------------------------------|
| Assisted Living Facilities      | 4% (9)                | 16% (34)*                | A small number of nursing homes had the capability to exchange health information with a wide variety of exchange partners. |
| Behavioral/Mental Health        | 2% (4)                | 14% (31)*                | The table on the left lists eight of the exchange partners. |
| Clinics/Ambulatory Providers    | 2% (5)                | 15% (33)*                | 27 nursing homes were part of one large multi-facility chain |
| 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).
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 in EHR adoption is training staff on the use of EHR systems; these  activities stated 47% and 67% of nursing homes with EHRs use the HER for activities in the table on the left.

## 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.

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