



Implementation of Health Information Technology in Long-Term Care Settings:

Findings from the AHRQ
Health IT Portfolio



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Health IT

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Introduction

In 2004, the Agency for Healthcare Research and Quality (AHRQ) launched a health information technology (health IT) initiative to improve the quality of health care for all Americans, focusing on the following three goals:

- Improve health care decisionmaking.
- Support patient-centered care.
- Improve the quality and safety of medication management.

To address this mission, AHRQ has invested over \$260 million in contracts and grants to more than 150 communities, hospitals, providers, and health care systems in 48 States to promote access to and encourage the adoption of health IT. Within this health IT initiative, there are more than 100 grants classified as the “Transforming Healthcare Quality through Health Information Technology” (THQIT) program. THQIT projects were chosen for their ability to support the development of health IT infrastructure, data sharing capacity, and community-wide health IT, and/or demonstrate the value of health IT toward improving patient safety and quality of care. Among these THQIT grants were several implementing health IT in long-term care (LTC) settings.¹

As part of AHRQ’s mission to improve the quality, safety, efficiency, and effectiveness of health care for all Americans, the AHRQ National Resource Center (NRC) for Health IT provides technical assistance and conducts analysis and dissemination of results from project work funded in AHRQ’s health IT portfolio. The NRC team members developed this report summarizing the key challenges noted, solutions identified, and lessons learned by AHRQ funded projects implementing health IT in LTC settings. The document is not intended to be a comprehensive evaluation of health IT within LTC, an assessment of AHRQ’s health IT portfolio in LTC, or a summary of the grantees’ research findings. Rather, the report is an examination of the project work that AHRQ has funded thus far in the LTC field, developed within the Agency’s continued research interests in the care and support of persons with chronic or disabling conditions.





Method

Grantee Interviews

In-depth interviews were conducted by telephone with six LTC THQIT grantees between August and October 2008. The interviews were guided by predetermined questions of interest, based on findings from a literature review, input from AHRQ, and the interviewers' expertise with health IT in LTC. Interviewees were provided with a description of the NRC project and interview questions to help them prepare for the discussion. Grantees were asked to focus on issues they felt were more specific to or heightened in the LTC setting.

The interviews centered on the following topics:

- Results of the overall implementation
 - Principal implementation successes
 - Important challenges and solutions
 - Best practices and lessons learned
- Topics of particular interest to the LTC field
 - Funding/Resources
 - Development and securing of technology
 - Leadership
 - Staffing
 - Workflow
 - Interoperability

Participants

The projects summarized in this report encompassed a variety of technological focuses, geographic locations, organizational partnerships, and preexisting technological infrastructures. In addition, grantees possessed different levels of health IT experience, and their health IT interventions were diverse in their complexity and research goals. The projects used health IT in LTC settings for a variety of purposes: to obtain access to



hospitals' electronic health records (EHRs), extend existing EHRs, implement barcode medication administration (BCMA), and/or employ computerized physician order entry (CPOE) with clinical decision support (CDS).

The chart below provides project names, principal investigators, team members interviewed, and a brief description of the project. More information on the individual projects can be found in the Appendix: Long-Term Care Grantee Profiles.

Project	Description
<i>Ediba Telewoundcare Network</i> Principal Investigator – Charles Bryant Interviewee – Cynthia Schneideman-Miller	•This project implemented telehealth that incorporated evidence-based guidelines for chronic wound care across homes, clinics, and LTC facilities.
<i>Project InfoCare</i> Principal Investigator – Peggy Esch Interviewee – Karrie Ingram	•The LTC component of this project, which created a community-wide electronic medical record (EMR) with integrated CDS, implemented medication bar-coding in five nursing homes to enable scanning at the point of medication administration.
<i>Using IT To Improve Medication Safety for Rural Elders</i> Principal Investigators – Paul Gorman & Karl Ordelheide Interviewee – Paul Gorman	•This project implemented a master medication list for patients in assisted living and skilled nursing facilities to share information across numerous providers in a single community.
<i>Health Information Technology in the Nursing Home</i> Principal Investigator – Jerry Gurwitz Interviewee – Terri Field	•This project implemented a CPOE system with CDS onto an existing EMR in two nursing homes and examined the impact of medication ordering and monitoring.
<i>Nursing Home IT: Optimal Medication and Care Delivery</i> Principal Investigator – Susan Horn Interviewees – Susan Horn & Siobhan Sharkey	•This project worked with 15 nursing homes located in 8 States to implement health IT systems with CDS modules and evaluated the impact on care processes (related to pressure ulcer prevention), health outcomes, workflow, and staff experience in daily work.
<i>The Chronic Care Technology Planning Project</i> Principal Investigator – Georges Nashan (formerly John Branscombe) Interviewees – Georges Nashan & Jurgen Worth	•The LTC component of this project, which facilitated transfer of information between providers of patients with chronic conditions, involved two nursing homes gaining access to their resident-patients' hospital EMRs.





Long-Term Care Overview

Background

Long-term care (LTC) consists of a variety of care and support services provided to those who require assistance and/or cannot independently care for themselves. Services include assistance with Activities of Daily Living (ADLs), fundamental tasks of self-care such as eating and dressing, and Instrumental Activities of Daily Living (IADLs), tasks necessary to live independently in the community such as shopping and house cleaning.² Long-term care can be provided either in the community (e.g., homes, senior housing, and adult day care) or in institutional settings (e.g., nursing homes and assisted living facilities [ALFs]) by either informal, personal caregivers or by professional LTC staff.

In the following sections, we provide a short overview of the LTC environment based on findings from the literature review, including information on service provision and populations served, facilities, direct care providers, and payment systems. As the THQIT grantees primarily implemented their health IT projects in nursing homes, much of the information provided below focuses on that setting.

Long-Term Care Services and Population

Both the number and proportion of older Americans are increasing because of the aging of the post-World War II baby boomers (those born between 1946 and 1964) and because Americans are living longer. According to projections by the U.S. Census Bureau, those ages 65 or older will more than double from approximately 40 million (13 percent of the population) to 89 million (20 percent of the population) between 2010 and 2050.

Furthermore, the population of those aged 85 or older is expected to more than triple during that period, from 6 to 19 million.³ The growth among younger elderly is largely due to the aging of baby boomers, while “growth among those ages 85 or older is largely due to increased longevity.”⁴ Between 2000 and 2050, the number of individuals using paid LTC services in any setting (i.e., at home, residential care such as assisted living, or skilled nursing facilities [SNFs]) is expected to increase from 13 million to 27 million.⁵



Most persons requiring LTC services live at home or in community settings, not in institutions.² The vast majority of care and support is provided by informal caregivers such as family, friends, and neighbors.⁶ Nearly 1.4 million individuals receive formal home health services, and more than half of these are aged 65 and older.^{6,7} In addition, those not receiving home health care are not necessarily in nursing homes, as they may reside in ALFs, small group homes, continuing care retirement communities (CCRCs), or other residential settings, each of which provides varied levels of supportive services.

Elderly persons with complex chronic conditions regularly transition between care settings, moving between their homes, hospitals, and postacute facilities because of changes in health status or ability to perform ADLs or IADLs.⁸ Of those participants in the 1994 National Long-Term Care Survey, approximately 18 percent of those ages 65 and older had at least one postacute or LTC transition within the 2-year period of the study. Of those that transitioned at least once, 43 percent transitioned three or more times.⁹ According to the Medicare Current Beneficiary Survey (MCBS), of those persons 65 years and older in 2000, 30 percent had emergency department visits, 20 percent had hospital admissions, 4.6 percent were admitted to SNFs, and 10.6 percent had home care admissions. Analysis of the MCBS found that between 13.4 percent and 25.0 percent of posthospital care patterns were complicated transitions, (uncomplicated being operationally defined as a transfer from a higher intensity to a lower intensity care environment, without recidivism).¹⁰ The frequent transitions of this population between skilled nursing facilities, acute care, and other care settings is a key issue that complicates, while also increasing the need for, adoption and usage of health IT across the continuum of LTC.

Skilled Nursing Facilities

Skilled nursing facilities (SNFs), commonly called nursing homes, provide the most resource-intensive level of medical and non-medical LTC for those requiring the highest degree of assistance in performing ADLs. In 2007, approximately 3.2 million Americans utilized SNF services at some point during the course of the year. A cross-sectional survey conducted in 2008 found approximately 1.5 million residing in SNFs at that point in time.^{11, 12} Residents can be classified into one of two groups, both of which need assistance with ADLs: (1) individuals who are in postacute/recovery care and need aid for relatively short



periods of time and (2) individuals who have chronic functional and/or cognitive impairments needing ongoing assistance, requiring longer stays.

Nursing home residents are at higher risk than noninstitutionalized elderly of adverse health events such as falls, fractures, pressure ulcers, urinary and bowel incontinence, infections, delirium, and medication errors (due in part to the higher number of medications received). These facilities have a unique service delivery model, as ancillary services (such as pharmacies and laboratories) are often provided by external contractors. Only a small percentage of nursing homes have in-house pharmacies; most are served by community pharmacies. One of the functions of health IT such as EHRs is to help care providers manage care and outcomes through accurate and comprehensive resident information, clinical decision support, and improved medication management.^{13, 14}

Payment Systems

Over time, changes in the structure of public insurance have affected the LTC nursing home resident population. Currently, 64 percent of nursing home care is funded by Medicaid, with 22 percent from private and other sources and 14 percent from Medicare.¹¹ Since the early 1980s, implementation of The Medicare Prospective Payment System and Congressional Balanced Budget Act and States' adoption of case-mix Medicaid payment systems have resulted in decreased lengths-of-stay in hospitals and an increased proportion of Medicaid residents in LTC facilities.¹⁵ As hospital lengths-of-stay have fallen, patients' degree of impairment at the time of hospital discharge has increased, a trend that alters the mix of services delivered by nursing homes, as well as home health agencies and other postacute care providers. Furthermore, although illness acuity has increased in the skilled nursing setting, relative staffing levels have not.

Care Providers

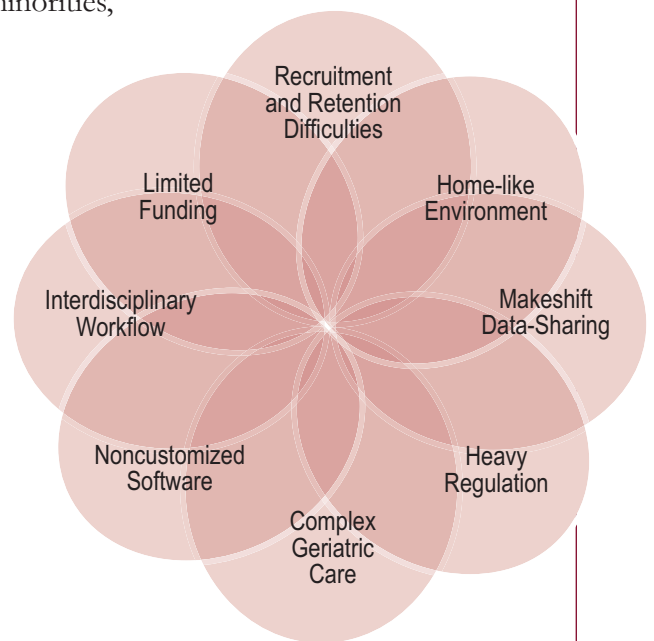
Long-term care providers are classified as either professionals (credentialed care providers such as physicians, nurses, social workers, and therapists) or paraprofessionals (direct caregivers, such as nursing assistants, home health aides, personal care aids, orderlies, and attendants). While some nursing homes use a staff model, employing medical directors and other physicians to provide care to the residents, most have arrangements with community



physicians. These attending community physicians provide care while on-site, but many of the care decisions are made when the physicians are outside the facility, through regular communication with the facility nurse managers.

The vast majority of professionals in LTC are nurses, either RNs or LPNs/LVNs, both of which are licensed by the State. In general, RNs develop the treatment plans and supervise the direct care staff, LPNs provide patient care; paraprofessionals interact most directly with residents, assisting them with ADLs. These paraprofessionals are primarily women, and they are much more likely than RNs to be racial or ethnic minorities, immigrants, and have low levels of education.¹⁶

The LTC industry has a well-documented chronic shortage of workers. The Institute of Medicine notes a severe and growing shortage of geriatric specialists, possibly due to lower pay relative to other specialties.¹⁷ Nursing facilities have difficulties with recruitment and retention, resulting in high rates of turnover and discontinuities in who provides care to the residents. In 2007, the turnover rates for Certified Nursing Assistants (CNAs) and Directors of Nursing were 66 percent and 38 percent, respectively.^{17,18}



Characteristics of Long-Term Care

The characteristics of LTC combine to present unique challenges that require creative solutions when implementing health IT. These unique characteristics often pose barriers to health IT implementation in nursing homes. Analyzing the key lessons and best practices learned by LTC grantees must take this dynamic into account.

A selection of key characteristics of LTC is shown below.

- **Recruitment and retention difficulties** – High staff turnover at all levels, especially direct-care staff that have heavy and vital workloads.



- **Home-like environment** – A home-like setting that supports the resident’s life beyond curing episodic illness and that requires consideration of the individual’s comfort and dignity.
- **Makeshift data-sharing** – Data-sharing agreements with other providers (such as pharmacists, home health agencies, and hospitals) are often required, as they are usually outside the organizational or corporate service delivery system.
- **Heavy regulation** – Heavily regulated and closely scrutinized, nursing homes face severe repercussions for any compromises of patient care or confidentiality, risks that can be introduced with health IT such as electronic data sharing.
- **Complex geriatric care** – Geriatric care consists not only of clinical care, but also assessments of individuals’ functional abilities, and cognitive and mental health. The elderly resident-patients often have multiple chronic conditions that result in variable care needs over time and frequent transitions into and out of acute, long-term, and home care settings.
- **Noncustomized software** – Vendor software is often originally developed for other health care settings and then adapted to LTC, which means that it is not well-integrated with preexisting administrative and clinical software used by LTC facilities and requires considerable customization.
- **Interdisciplinary workflow** – Care decisions are shared across multiple disciplines and are often made by physicians who are not at the facility; nurses are primarily responsible for administering and managing care plans; and paraprofessionals are directly delivering patient care.
- **Limited funding** – Decisionmaking is often influenced by State and Federal payment and certification requirements. Organizations have tight budgets and low profit margins, often with no full-time IT staff.



Long-Term Care as an “Archetype” of Health Care

Although they are not exclusive to LTC settings, the characteristics identified above must be taken into account when examining health IT in LTC. Long-term care was described as the “archetype” of health care in a 2007 Report to the National Commission for Quality Long-Term Care. As the authors stated, “Long-term care is just like the rest of health care, only more so.”¹⁹ While some of the characteristics identified above are found in acute or ambulatory care settings some of the time, it is only in the LTC setting that all of these issues are present all of the time. A few examples are shown below.

Health Care	Long-Term Care
Shortage of nursing staff with high turnover rates	Nurses have higher turnover and higher vacancy rates
Diagnosing and managing disease and chronic illnesses and/or preventive care	Diagnosing and managing disease and chronic illnesses, preventive and palliative care, treatment of disabilities, aging effects, and quality of life concerns
Relatively slow to adopt technology when compared to other fields	Slower to adopt technology than other areas of health care

Health IT Adoption in Long-Term Care

Several studies have documented that adoption of health IT in LTC is well behind that of physician offices and hospitals.²⁰⁻²³ However, a recent study analyzing data from the 2004 National Nursing Home Survey concluded that the utilization levels of health IT in nursing homes was much greater than previously estimated.²⁴ Nonetheless, adoption of information technology in health care as a whole has been slower than expected.²¹ With respect to LTC in particular, the lack of standards for sharing information in an interoperable manner is one of the most significant barriers to health IT adoption. Another barrier is that the processes for completing government mandated data sets are distinct from the processes used to maintain EHRs.²² Other barriers include: lack of capital resources, no reimbursement for using health IT, lack of computer skills among LTC staff, lack of a proven benefit or clarity regarding return on investment, potential consequences of new State and Federal requirements, difficulties finding appropriate products, and a shortage of professional health IT staff.^{21,25}



Despite these challenges, preliminary research suggests that implementing a health information infrastructure that supports an EHR system can yield clinical and operational benefits in LTC settings.^{21,25} The improved communication via usage of an EHR may have many positive benefits to LTC, including:

- Reduced medical errors and increased resident and patient safety.
- Valuable information available at the point of care.
- Enhanced communication and information exchange between varied entities, such as physicians, staff, residents, families of residents, pharmacies, and others.
- Improved regulatory compliance.
- Improved provider efficiency and satisfaction.





Lessons Learned

Given the unique characteristics of LTC, the NRC team conducted a series of grantee interviews and synthesized the lessons learned. The lessons presented below were selected based on criteria such as how frequently the issue was mentioned, whether the issue was supported by the literature and reflected a characteristic endemic to the LTC environment, and the importance of the issue to grantees' projects and others implementing health IT in LTC settings.

The lessons are organized into the following categories:

- Staff Engagement and Preparation.
- Working With Partners and Vendors.
- Adapting Software to the Long-Term Care Environment.
- Managing the Implementation.

Staff Engagement and Preparation

Providers are often hesitant to implement health IT because of a lack of funding, uncertain return on investment, limited experience with technology, and resistance of staff to change. A key step in implementation is getting the staff motivated and committed to the project. The grantees as well as the literature identify key characteristics of the LTC environment relevant to staff engagement and preparation:

- In LTC facilities, direct care staff members are often overburdened with responsibilities vital to patient care. They will often resist taking on new responsibilities unless there is a clear directive and ongoing support from a leader champion.
- Many direct care staff have poor computer skills and are apprehensive at the prospect of using new technologies.
- A chronic short supply of funding and resulting low staff salaries lead to difficulties recruiting staff and to high turnover and vacancy rates.
- The majority of health IT implementations are for administrative and financial functions that are driven by State and Federal regulatory and reimbursement policies;



there is relatively little use of clinical health IT applications beyond what is mandated for reimbursement and certification.

To Obtain Staff Buy-In, Emphasize Benefits To Patients' Care

Most grantees emphasized that the key to motivating their staff was demonstrating that the adoption of the technology was not singularly important in and of itself. Rather, they emphasized that the technology was simply a tool to assist them in achieving their goal of improving the quality of their residents' care. During the interviews with Scheideman-Miller, Gorman, Field, and Sharkey and Horn, the grantees each emphasized that, to garner staff buy-in, it is essential to demonstrate that the IT implementation will have a direct impact on the residents.

Sharkey and Horn said, "IT implementation is the means, not the end. The goals are to reduce inefficiencies in daily work, improve communications among caregivers, and provide residents with optimal care that results in a good health outcome. IT is the tool to help achieve these goals." Their project's preimplementation phase included working sessions with the nursing home direct care staff to streamline workflow and demonstrate the link between the IT implementation and improved clinical outcomes such as reduced pressure ulcer development. This effort reinforced to the CNAs that the documentation elements in the IT system were used for reports that guided clinical care and that the significance of the IT implementation was more than simply automation of the paper process.

Scheideman-Miller and Gorman both noted the need to promote the project using a message of resident- and patient-safety, and they also stressed the need to tailor that message to the audience. Gorman noted that patient safety is perceived as important by clinicians and is the primary factor that motivates them to be involved. In addition to the patient safety message, Scheideman-Miller and staff also communicated an understanding of the needs of individuals in rural environments—similar to those where the project was based—because they came from the same type of background.

Field's project performed an analysis of the estimated rate of adverse drug events (ADEs) and found that preventable ADEs occurred at higher rates than most staff had assumed.



The project developed presentations for staff members and conveyed this information to demonstrate the need for the intervention. The presentation showed how the ADEs could be reduced through the use of technology. This exhibit of both the need for and the potential benefit of the intervention promoted acceptance and motivated the staff.

Interdisciplinary Input Results in a Better Product and Work Environment

Successful adoption of a new technology depends on the motivation of staff from all departments and disciplines of the organization. A crucial step in the preimplementation period is gathering input from across the organization. Several grantees emphasized the importance of this step. Field noted that it is important to “include people across the board across all areas and involve all participating specialties – not just physicians.” Sharkey and Horn also mentioned that it is critical for the entire team to feel responsible for the implementation. They noted that if all care providers (nurses, CNAs, dietary specialists, social workers, restorative nursing aides, rehabilitation nurses, and so on) are involved and responsible for providing input prior to implementation, the result is a more collaborative and productive work environment.²⁶

Additionally, during the development of the health IT system, staff from outside of the traditional departments can often provide valuable input. For example, Ingram noted that when building their electronic medication administration record (eMAR) system, the project team gathered input from staff with different backgrounds, including those from the quality improvement department, med-techs, and ward clerks. She noted “in long-term care, the key people are not just the clinical staff and the administrators, but also the ward clerks who run the building and know what everyone does and have the institutional knowledge you need.” Including staff with diverse roles and specialties in development allows for unique insights into how the implementation should be carried out.

Champions May Emerge From Outside of Administration or Information Technology Departments

Grantees noted that a champion is a critical factor in propelling health IT implementation efforts forward in LTC, as it is in other health care settings. Field identified the Director of



Nursing's (DON) energy and motivating drive as a key success factor. Horn stated that the efforts of the DON were critical. "If the DON was not supporting things, it was difficult to motivate the other staff and there were lags in the implementation timeline."

An unusual distinction in the LTC setting is that health IT champions often work outside of the administration and IT departments. A front-line staff member may see an important need and opportunity and become the driving force behind the implementation. This may be a DON, but could also be the head of the physical therapy or dietary department. Wurth, the Food Service Director of his project's LTC facility, was the key staff member driving the implementation effort in his facility, developing solutions by working through the patient privacy and data security concerns of the facility administration.

Perform a Comprehensive Workflow Analysis Prior to Implementation

Before adopting a new technology, grantees were clear that it is imperative to fully understand all preimplementation workflow processes and how these can be redesigned under the new system. The workflow in the LTC facility is what drives the structure of the IT implementation, rather than the other way around. Sharkey and Horn identified the need for a comprehensive understanding of workflow and the potential need for workflow redesign prior to implementation as a key lesson learned.

Both Field and Ingram identified specific examples of unique characteristics in LTC workflow that factored into their implementation planning procedures. Field noted the importance of being aware of and adjusting for workarounds that had been developed prior to the implementation (e.g., pharmacists fixing incorrect physician orders, which should be handled electronically in the new system). Ingram noted that nurse administrators within the facilities made changes to residents' medication routines—such as the time a medication is administered—without sending a new prescription order to the pharmacist. The pharmacist only needs information regarding changes in drug or dosage, not nurses' adjustments to routines. Ingram stated, "In long-term care you change orders all the time . . . Though you're supposed to change the prescription with a new order if you're providing a dosage at 8 a.m. instead of 10 a.m., usually people don't." Sending a new order to the pharmacy simply to change the time of administration is an example of how the new system benefited



from a keen awareness of workflow issues, allowing projects like this to carefully develop implementation plans that accommodated the practicalities of prescribing and changing medications in LTC.

Working With Vendors and Partners

Long-term care provider organizations are often not integrated into local or regional health care networks and have lower levels of IT infrastructure, full-time staff, and resources. Consequently, deciding upon, customizing, and integrating vendor software is often a daunting step in the implementation process. The following LTC characteristics were identified in the literature and by grantees as important features to consider when working with vendor and partner organizations.

- Pharmacies are not usually regular data-sharing partners with LTC facilities and have little or no financial incentive to participate in LTC facilities' health IT projects.
- Long-term care facilities often do not have established relationships with provider networks that also care for the LTC patients.

Maintain Realistic Expectations When Working With Vendors

Grantees noted the importance of molding provider expectations to facilitate successful software adoption. Sharkey and Horn noted that nursing homes should not look solely to vendors to educate staff on the potential pitfalls of their products and on what they will need to do organizationally for successful implementation. They believe that providers often underestimate the need for a detailed review of vendors' products, and that the customization, setup, hardware, and technical issues often require more time and resources than providers anticipate.

Develop Collaborations Strategies When Working With Vendors and Partner Organizations

In their project, which focused on implementing health IT as a tool for quality improvement and pressure ulcer reduction, Sharkey and Horn have worked as liaisons between 60 to 70 nursing homes and 7 to 8 vendors. They suggested that LTC providers should consider



working in groups and approach vendors as a collaborative to customize the product to fit their needs: “Some vendors have been resistant to modifying their products to suit an individual provider’s needs. We have found that the vendor community is more receptive to customize software in response to a group of nursing homes working as a collaborative.”

Health IT projects in LTC facilities often engage partners that do not regularly share data and who may have little to benefit from the implementation. It is important that these relationships are carefully developed, the need is demonstrated, and the impact on the partner is minimized. Ingram’s project developed a strategy for building partnerships with pharmacies that serve the nursing home residents in their facilities. Their approach was to bring all of the needed pharmacies together to a dinner event, exhibiting a compelling, evidence-based presentation on medication errors, their impact on patients, and the potential impact of BCMA to reduce these errors. Ingram noted that this approach helped to demonstrate the value of the health IT implementation: “I think that if we talked to them one-on-one, it wouldn’t have worked.”

Ingram’s project also made every effort to minimize the expense and impact of workflow changes for the pharmacies. For example, to reduce pharmacies’ expenses, Ingram’s project provided them with barcode creating software and a label-making device. In addition, to minimize changes to pharmacists’ workflow, the project had the vendor work closely with the pharmacies to accommodate the procedures and requisition numbers for medication orders that met the pharmacists’ expectations.

Adapting the Software to the Long-Term Care Environment

Care assessments, medication delivery processes, lengths of stay, and other patient care features are significantly different in the LTC setting than in inpatient settings. Grantees identified gaps between the actual administration of care needs and the features available in vendors’ health IT tools. Several characteristics of the LTC environment must be considered when incorporating health IT in this setting.

- Long-term care facilities often do not have their own IT departments to customize and implement vendors’ software.



- Health IT software and systems are often complex, not user-friendly, and do not fit workflow processes of the LTC environment.
- Physicians are typically not full-time staff members of the LTC facilities. Rather, they are community-based physicians who often practice at multiple locations and are usually offsite, where they make many resident care decisions.
- Paraprofessionals perform a large share of the direct care, which is supervised by nurse managers and based on care decisions made by physicians who are often not at the facility.
- Home-like settings require that care processes are adapted to be minimally restrictive and invasive to the resident as well as sustainable over the long-term.
- Geriatric care involves medically complex patients, who often have one or many of the following: functional dependency, cognitive impairment, and chronic, complex illnesses, all of which can impact care needs, treatment, and settings of care over time.

Unique Long-Term Care Medication Management Processes Require Customization

All grantees identified gaps between the needs of the facilities and the solutions provided by the health IT vendors. Field and Ingram provided specific examples of how LTC facilities must customize technologies to utilize them effectively.

Field noted some of the medication management processes in the nursing home that are different from what the CPOE system was originally designed to do. They faced a number of customization issues specific to the LTC setting. For example, they had to set up special orders for hydration units given subcutaneously as opposed to intravenously (as would be done in a hospital); documentation for the influenza vaccine needed to indicate if patient consent occurred; and starting doses of medications needed to be lowered.

Ingram provided another key example of how differences between long-term and inpatient care may require different approaches to implementing technology. The BCMA product selected for their project was designed for staff members to verify medication by scanning the patient's wristband to identify them and then scan the medication to ensure that the right medication is provided to the right patient. However, the residents living in nursing homes do not wear wristbands because of skin integrity and patient dignity concerns. The solution



the project identified was to utilize the EMR system's ability to take photographs and use pictures of the residents as identifiers. They created a report in the system that printed the picture along with the resident's unique barcode and then added the report to the med-carts. The med-tech's workflow was adjusted so that, when they are in sight of the resident, they open the cart drawer, scan the report that confirms the identity of the person, and then scan the medication. The process retains much of the rigor and goals of bar-coding, supporting the verification of the "right patient" while also accommodating the features of LTC.

Integrate Into Both Onsite and Offsite Physician Workflow

Grantees developed creative approaches to increase system accessibility and reduce impediments to physician workflow. Field and Nashan both mentioned the need to provide a variety of choices that allow physicians to access patient records. Nashan's project adjusted its implementation plan from having physicians access a patient's EMR at nursing stations, to providing physicians with remote access via a wireless internet connection. Field's project set up system access on physician's laptops, home computers, and/or PDAs, depending on the preference of the doctor. Field noted, "The only way for clinical decision support to be effective is if physicians are entering prescriptions themselves. The system had to be developed so physicians can prescribe from their offices and from home."

Grantees also took steps to minimize disruptions to provider workflow. Field's project provided computers on wheels via a wireless connection in the facilities so that physicians could enter prescriptions while on rounds. Ingram also mentioned efforts to minimize disruptions to providing care. She discussed an extensive project effort to develop a system workaround that would enable editing of medication information (e.g., time administered) without sending a new requisition to the pharmacies. She also noted project tasks such as reducing pop-up alerts and creating automatic prescription re-orders that allowed physicians to more easily incorporate the new system into their workflow.

Managing the Implementation

Besides engaging staff preimplementation, grantees identified further lessons learned regarding both direct care staff and management personnel during the implementation process. In projects with less sophisticated preimplementation health IT infrastructure, the



primary challenges centered on overcoming staff barriers, not technological ones. The following LTC characteristics affecting implementation were identified by grantees and through the literature:

- The heavy and vital workloads, limited computer skills, and frequent turnover often present in direct care staff require systems that are easy to learn and easy to use.
- The complexities and inflexibilities of some systems can lead to underutilization as time passes.

Provide Personalized and Continuous Training Within the Environment

The grantees emphasized the importance of both initial and ongoing training efforts—a lesson supported by other health IT efforts. Gorman noted the value of having a trainer “help at the elbow” during the implementation phase. A key lesson he learned was the importance of providing the clinician with in-person help to learn how to use the system as well as the availability of an engineer who can conduct site visits to address individual problems and identify local solutions. Field also stressed the importance of training. Her project tailored the training efforts to meet the needs of specific facilities, hiring additional in-house staff during the transition period for the facility less accustomed to CPOE. Ingram mentioned that her group changed its original plans from having the facility staff come to the project team’s office, to sending the project team onsite to facilities for training. They found the experience so valuable that they continued the practice after “go-live,” traveling to facilities for updates, providing exercises to reinforce the lessons, and giving the staff the option of additional online learning. She stated that “the implementation went smoothly only because we did a lot of training.”

Ongoing Monitoring, Improvement, and Support Is Imperative

A final lesson learned was the need to take a step away from thinking of health IT implementation as occurring in a fixed period of time. Facilities must understand that the “implementation phase” will never really be over, but rather will become part of their work processes. Horn stated that “one of the big lessons learned from nursing homes is that this concept of health IT implementation is not a phase where there is a clear beginning and an end. It’s an understanding that this implementation will be in various phases and part of



ongoing operations.” Staff roles will change too. The organizations will need to allow for long-term investment to manage the ongoing implementation issues. This will require persistent testing, training, and monitoring as well as ongoing revisions of plans, processes, and software. Ingram noted her principal key to success as “continual course correction.”

Once the system is running, there remains a need to monitor and manage staff utilization of the system. This ongoing monitoring includes managing staff expectations of the system and its impact on their work as well as incorporating the health IT tools into strategic quality improvement plans. Field noted that, once staff buy-in is achieved, they often develop unrealistic expectations of what the "perfect system" should be capable of doing. Sharkey and Horn also observed that, after getting over the initial hurdles of using the technology, the staff wanted only the “latest and greatest.” When there were delays receiving upgrades, providers often used the systems less. They advise to prepare for this phenomenon, calling it, “Anticipating the 18-month lull.” Specifically, they suggest monitoring both the direct-care staff and how the information is used within the facility. As they said, “IT in and of itself does not lead to quality improvement.”





Remaining Challenges

When identifying the lessons they learned, grantees often also mentioned issues for which they had no ready solutions and that remained challenges throughout the course of their projects. The following obstacles were noted by grantees as characteristic of the health care system itself. Such challenges are minimally affected by individual projects or organizations and may require larger scale, industry-wide efforts, continued funding, and additional research.

Regulatory and Legal Concerns

The literature has identified considerations involving privacy, misuse of health information, use of information for liability claims, and vagueness in standards as impediments to adoption. Research has shown that clinicians are reluctant to share or grant access to information for fear of violating the Health Information Portability and Accountability Act (HIPAA).²⁷ The LTC grantees agreed with this finding. For example, Gorman, whose project sought partnerships with the pharmacists in a small community, identified the process of sharing data across those organizations in a market-oriented environment as his project's biggest challenge. Scheideman-Miller and Nashan also noted staff worries about HIPAA as a barrier to expanding access to patients' health information.

Insufficient Funding

Although it has been well-documented that the expense of IT investment, lack of reimbursement, and misalignment of costs and benefits all serve as financial impediments to the adoption of health IT, all grantees took the time to mention lack of financial resources as a barrier to their implementation efforts. According to Field, "Money is much more important that we give it credit for." Both grantees working in small stand-alone institutions and those in facilities integrated with sophisticated technological infrastructures mentioned the burden of insufficient funds.



Technology Fears

The grantees implementing smaller scale health IT projects in settings without experience with EMRs encountered a phenomenon known to be a significant barrier to adoption efforts—fear of technology. Both Scheideman-Miller and Wurth identified staff suspicions and uneasiness with technology as significant barriers to their implementation efforts.

Wurth and Nashan noted that many, even senior, staff in the facility are often uncomfortable with computers and are not familiar with what they can and cannot do. They stated that staff members frequently have preconceptions of computers from in-home computer use by their children, not from their experience with computers as a business tool. This discomfort with technology led to resistance from the staff and required limiting the scope of the project.

Scheideman-Miller's project used an Internet-based EMR that links direct care providers in nursing homes and patients' homes to wound-care specialists, building upon a pilot study that utilized a video phone for telehealth wound assessment. The team found that, while the group was comfortable with digital cameras, they were not comfortable with communicating information via the internet. Therefore, instead of electronically transferring wound photographs via the internet, the project developed a compromise to take digital photographs and manually transfer the wound pictures via memory card from patients' homes to the physician.

Staff Turnover

High staff turnover rates result in the need for re-training and re-education of those responsible for patient care. The resulting fragmentation of direct care staff's knowledge and experience is a critical hindrance to the quality of patient care. Unfortunately, while the direct care staff members play a larger role in LTC, the turnover and vacancy rates are higher than in health care as a whole. Gorman, Nashan, and Scheideman-Miller each identified staffing changes as a persistent difficulty. They each expressed frustration about the wasted time and effort caused by training and retraining for the same positions.



Lack of Interoperable Standards

Gorman and Ingram both identified the lack of interoperable standards as among their projects' biggest challenges. The lack of standards resulted in considerable time and resources spent by Ingram's project in developing their drug dictionary to capture all possible drug names, doses, and methods of administration. One hundred percent accuracy was necessary to ensure the "Five Rights" of medication safety (i.e., the right patient, medication, dose, time, and route) for their residents. The lack of standards meant that they did not have anything to build upon. Gorman's project struggled with the lack of terminology standards for medications used in electronic prescribing, as the organizations involved with the project used different drug knowledgebase vendors. This made it difficult to group medications by class in the medication lists received from the various organizations, since there is no standard way to indicate drug class. As a result, the project staff had to develop their own process for organizing and grouping the medication information.

Discontinuity of Care

Recipients of LTC services are especially vulnerable because they frequently transition between types of care settings. Many LTC facilities are not part of an integrated delivery system and therefore cannot exchange critical resident-patient data across settings. If this information is shared at all, it is likely to be by phone and through use of hard-copy documentation such as chart summaries. Gorman, Nashan, Ingram, Scheideman-Miller, and Field each identified discontinuity of care, that is, lack of an integrated health delivery system, as a challenge. Gorman noted that, "One of the difficulties was that the computers at the pharmacies, nursing homes, hospitals, and physicians' offices did not talk to one another." There was no way to ensure that, for example, if a pharmacist or nurse updated a patient's medication information, other care providers would receive the revision. This discontinuity could affect the quality of care, placing residents at greater risk of medication errors, pressure ulcers, and other unfavorable outcomes.



Conclusion

AHRQ has funded a diverse set of health IT projects that are implementing health IT in LTC settings. By sharing these lessons learned and challenges encountered, AHRQ hopes to inform and assist those introducing health IT to LTC settings. The document is intended to inform the community of some of the obstacles that may arise and potential solutions that have been found. While some of the information gathered from the discussions is currently in the literature, these lessons learned and challenges identified reinforce the need for continued attention to the issues that limit adoption of health IT in LTC settings.





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Appendix: Long-Term Care Grantee Profiles



Project: Telewoundcare Network

PI: Charles Bryant

Long-Term Care Setting: Two nursing homes and three home health agencies

Description of Health IT: This project was designed to demonstrate the clinical effectiveness and cost-effectiveness of utilizing telehealth technology to expand current evidence-based wound care services. The goal was to reduce the days to heal for chronic wounds. The technology improves access to knowledgeable caregivers, point-of-care processes, and dissemination of best-practice information. Wound care is approached as a continuum of care addressing underlying etiology (i.e., diabetes) as well as the immediate wound treatment regimen. An Internet-based electronic medical record (EMR) allows the project staff and point-of-care provider to access the same information, which includes vital signs, digital photographic documentation of the patient's wound, lab results, and any other relevant notes about the patient's progress.

DISTINCTIVE PROJECT CHARACTERISTICS:

- This project took place in rural Oklahoma, which presented issues such as large distances between patients and providers, local resistance to “outsiders,” limited access to technology and the Internet, and local beliefs about wound care techniques, which affected the implementation strategy.
- The network's specialty team includes a burn/wound care specialty physician and a staff of wound care nurses working with diabetes management specialists. This expert team monitors the patients and intervenes in their care using evidence-based best practice knowledge when necessary.
- During each patient visit, the provider takes the patient's vital signs and enters them, and any relevant notes, into the EMR via telephone from wherever the patient is. This information is downloaded to a security-protected database, which can then be viewed by the wound care specialty team. Because some facilities have technical or personnel limitations, providers also take digital pictures and send them on a memory card. Other data such as lab results are sent via fax.



BARRIERS NOTED:

- Staff time is the key—physician office, home-health care, and long-term care (LTC) staffings are very lean and have very limited time for additional work. Furthermore, staff turnover is high. It was common for someone to get trained and on-board, and then shortly be fired or quit. The project had to repeatedly train staff members.
- Home remedies for wounds seemed to be deeply meshed in the local culture and were sometimes hard to overcome.
- Many patients did not have home telephone service that could be used to transmit patient data.
- Many home health care workers and other staff members had no computer experience and were not comfortable transmitting digital pictures electronically. In addition, sending pictures required at a minimum 126k Internet access speed, which was a big barrier as many facilities' infrastructures were insufficient. Most preferred sending the pictures by mail via the digital camera's memory cards.
- Some facilities with small profit margins have not had a great enough need for Internet access to offset the significant cost burden to get Internet service such as DSL.
- There were legality fears over storing pictures of wounds, since wound care is one of the most common reasons for litigation in LTC.

LESSONS LEARNED:

- Once the 'staff in the trenches' were able to see the patients' progress, they became more trusting of the health IT.
- The Web site was modified so that it became very simple to use, requiring no more than two clicks to get to any page. The EMRs with the wound care information had the same format for each LTC setting, which facilitated adoption. Vendor willingness to customize the EMR was an important success factor.
- It is very difficult to get nursing homes to participate in this program, even with physicians helping to make the referrals. Only 3 percent of referrals to the program were from nursing homes.
- 'Rural helping rural' was a key success factor.



BEST PRACTICES EMERGING FROM THIS PROJECT:

- Well-received education offered through the telewound care network, such as teleconferences on wound care and diabetes, to train new providers and keep current providers up to date on treatment protocols
- Additional training through videophones that link a wound care specialist to a provider while the provider is working onsite with a patient

PROJECT RESULTS:

- Implementation Story: AHRQ-Supported Telewound Care Networks Aims To Speed the Healing Process
- This is a sustainable project because (1) the wound care specialist can save considerable mileage across a five-county area in avoided trips to visit patients and (2) nursing homes can now treat more advanced wounds from the facility, thereby reducing transportation costs and increasing revenues.

PRINCIPAL INVESTIGATOR QUOTES FOR HEALTH IT PROJECTS:

"Web-based telecare that links nursing home aides, home health workers, and other providers to wound care and other specialists is the technology of the future, but it will take a while to get there."

"Patients in the wound care network receive more consistent and coordinated evidence-based care because of better communication among providers, which translates to quicker healing for patients."



Project: Project Infocare

PI: Peggy Esch

Long-Term Care Setting: Six nursing homes/residential care facilities

Description of Health IT: Project Infocare was implemented to enable a patient to enter at any point into the continuum of care and have a personal identity that is maintained across that continuum. Physicians and other caregivers were provided with access to all of the patient's medical information within the health care continuum.

This specific long-term care (LTC) component of the project was to implement barcoding of medications to enable scanning at point of administration. Medications are packaged in bubble packs and those packs are barcoded by eight local retail pharmacies that supply medications to the LTC facilities. The pharmacies had been provided with a label maker and software that creates barcode labels. The nursing homes electronically send the medication orders to a fax server, which faxes the orders to the correct pharmacy. The medications are delivered with the barcodes to the nursing homes and scanned before being administered to the residents.

DISTINCTIVE PROJECT CHARACTERISTICS:

- This is one of the first successful barcoding implementations in stand-alone nursing homes that use local pharmacies, as most typically involve in-house pharmacies.
- An electronic medical record (EMR) with order entry and electronic medication administration records had already been implemented in the nursing homes through Project Infocare.
- An IT specialist with project management experience was hired specifically to customize and help implement the vendor software and this application.

BARRIERS NOTED:

- Patient wristbands are the usual means to ensure the medication is being given to the right person, but wristbands were not an option for the residents due to dignity and skin integrity issues.



- There were no uniform national drug codes or dictionaries used by the nursing homes.
- There is little incentive for retail pharmacies to participate in barcoding.
- Regular changes in resident status and medication orders that affect the administration and barcode, but not the medication order at the pharmacy end, required the greatest amount of customization, followed by the need to efficiently manage medication reorders.

LESSONS LEARNED:

- Months of manual labor (e.g., review of medication orders and development of drug manuals) were devoted to developing a drug dictionary; the dictionary has to be 100 percent accurate for barcoding and must cover every possible form and dosage of a medication.
- Build a quality improvement program with regular reporting to managers that shows a list of clinical staff and the percentages of medications that they are scanning. This will assist in monitoring the implementation and in measuring levels of staff resistance.
- One of the keys to success was providing the software and equipment to the pharmacies and working out many of the IT issues before implementation, so that the cost and time burden for the pharmacies was minimal.
- It is important to have the right people on the team, including someone from each facility and from varied backgrounds. This project team included a former director of nursing in LTC, persons with a quality improvement background, nurses, med techs (certified to dispense medications), and ward clerks. The ward clerks were crucial, as they had been in the facility the longest and were deeply familiar with its organization, materials, and staff, as well as the regulatory environment.
- Commitment of the vendor to the product “for the long haul” is essential.
- A big win was simplifying reorders, which also require barcodes, by saving the orders and creating a customized fax reorder report, which then sorts by and prints to the correct pharmacy.
- After implementation in each facility, the percentage of medications scanned rose quickly, with all facilities achieving greater than 85 percent adoption.



BEST PRACTICES EMERGING FROM THIS PROJECT:

- Effective project salesmanship: the director invited pharmacies to a dinner and collectively enlisted participation, starting with a presentation on the number of medications administered in the nursing homes, estimates of medication errors, impact on residents, and how many might be prevented with the barcoding.
- A proactive implementation team approach fostered institutional commitment to barcoding prior to going live. Key qualities in the team members included knowledge of department or function, trust and respect, working well with other departments, and the ability to meet deadlines.
- Use of photos instead of barcoded wristbands for matching patients with their medications, since wristbands compromise skin integrity as well as resident dignity.
- Provide pharmacies with a label maker and low-cost software that creates and prints barcode labels.
- Customized EMR software to submit and route requisition orders to the pharmacies, with all relevant information needed for delivery and scanning back at the nursing home, avoiding faxing hand-written orders or calling the pharmacy. A solution was created to allow modifications to the order (e.g., when administered), without generating a new medication order.
- Training offered in many modalities—group training, one-on-one, superusers at the facilities, online learning management system, CDs, and through local colleges.
- Superusers including charge nurses, certified nursing assistants, medtechs, and ward clerks.

PROJECT RESULTS:

- This is one of the first successful barcoding projects involving nursing homes and local pharmacies.
- Presentation at AHRQ Annual Conference, 2007: “Putting the Electronic in Ambulatory Record”
- Presentation at LTC Summit, 2005: LTC Facility Case Study: “Implementation & Business Case”



- Presentation by CIO Denni McColm at HIT Conference, 2006: “The Implementation Phase – How to Roll Out your HIT Implementation”
- Citizen Memorial Hospital has received AHRQ health IT Ambulatory Safety and Quality (ASQ) funding for a project entitled “Standardization and Automatic Extraction of Quality Measures in an Ambulatory EMR.”

PRINCIPAL INVESTIGATOR QUOTES FOR HEALTH IT PROJECTS:

“In long-term care, orders are changed all of the time and have nothing to do with the doctor. Legally, there should be a change to the prescription and barcode if the medication is being provided at a different time, for example, but the pharmacy does not want or need all of those types of edits. They only need to know if the drug or dosage changes. So we built in the ability to stop, send, or edit an order without sending a new requisition to the pharmacy.”

“We take advantage of ‘tech for a day’, where a technical person goes out once a month to check on the nursing home’s IT issues. We go with them. When we meet with the facility staff face-to face, we get questions related to the health IT systems that they would not normally contact us about. It helps us address issues other facilities may be having as well.”



Project: Using IT to Improve Medication Safety for Rural Elders

PI: Paul Gorman, Karl Ordelleide

Long-Term Care Setting: Skilled nursing, assisted living, rural hospital, long-term care pharmacy, and rural primary care clinics.

Description of Health IT: This project used health IT to share patient medication information among numerous providers in a single community. Among the organizations involved in the project were two assisted living facilities, one skilled nursing facility, one long-term care pharmacy, and several physician's offices. The system allows viewing of medication lists from multiple providers for a single patient, and can generate a report formatted as a hospital Medication Reconciliation form, which can be printed, taken to the patient's bedside, and integrated into the medication reconciliation process.

DISTINCTIVE PROJECT CHARACTERISTICS:

- This project was designed to demonstrate the feasibility of implementing a health IT system for shared medication management in long-term care among multiple provider organizations that are not data-sharing partners or part of a single network.
- A core group of participants contributed data and expertise to the project, but most provider systems, belonging to national retail pharmacy and long-term care chains, elected not to participate, limiting the inclusiveness and therefore the usefulness, of the system (a lack of organizational interoperability).
- Data sharing required the development of unique solutions for each provider system due to variations in data sharing agreements and to the lack of uniformly implemented standards for storing and sharing patient health information (a lack of technical interoperability).
- A prototype application was deployed in one hospital unit, found useful for common clinical tasks, adopted by hospital staff in other units, and remains in use today.



BARRIERS NOTED:

- Nursing home barriers included limited use of computers, medication issues that require multiple nurses over multiple shifts for resolution, heavy documentation requirements, and the continued requirement for and predominance of paper documentation (e.g., for written, signed physicians' orders).
- Participating organizations store data in isolated systems tailored to individual tasks (prescribing, dispensing, administration, monitoring) and organizational needs, but not designed to communicate outside their organization, creating silos of data.
- Each organization employs a continuous process for ensuring accuracy of medication lists, integrated into their unique work process (for example, monthly dispensing and packaging of medications for long-term care residents). "Medication Reconciliation" as a discrete, one-time, transition-related process, and separate technologies designed to perform it, are a poor fit to the ongoing activity of long-term care.
- There were strong barriers to cooperation and sharing among the organizations in long-term care due in part to the commercial and proprietary interests of potential competitors in a health care market, who are unaccustomed to open sharing of information.
- Another strong barrier for these organizations is the perceived risks of sharing patient information in a complex regulatory environment. Each organization interprets privacy and other regulations differently, so that reaching agreement among participants requires substantial time and effort, often involving working with far-removed corporate headquarters. The ultimate perception may be that it is safer not to share data at all.
- There continue to be no universally adhered-to standards for drug information, such as drug name and class, and this remains a major barrier to collaborative medication management. Proposed standards were not sufficiently harmonious or mature (e.g., RxNorm, NDF-RT), and vendor systems implemented standards differently, or not at all.



LESSONS LEARNED:

- The number, diversity, and independence of the organizations involved in long term care demand a very substantial project management overhead. The complexities of technology development and roll-out are compounded by the problems of coordinating action among such a large, disparate, and independent group.
- Persistence, communication, person-to-person familiarity, and shared interest in patient care helped break down barriers. As one CEO put it, “I didn’t ask the lawyers, because I knew they would say ‘No.’”
- This project had little impact on nursing home and assisted living. This was due to low implementation of technology in these settings, poor fit of the technology to work processes and goals, and to constant change in this environment: of ownership, local management, staff personnel, and also technology.
- This system had greatest success in settings such as the emergency department and day-surgery, where integration with existing clinical tasks was most complete.
- Adding clinical decision support is perceived to be an important enhancement to sustain the system.
- Each organization devotes substantial resources to ensuring accurate medications, and substantial savings in professional time could be realized if effective sharing of medication information could be achieved.
- The project had significant beneficial side effects, in the form of related technology implementation that became possible as a result of this project; for example, increased use of technology in the assisted living center and increased implementation of chronic disease registries in local physician practices.

PROJECT RESULTS:

- Implementation Story: Making Medication Safe for Elderly People in Long-Term Care
- This project has received new AHRQ health IT funding to expand RxSafe technology to incorporate clinical decisionmaking.
- Presentation at 2005 Connecting Rural Health Communities through Information Technology Conference: “RxSafe: Using IT to Improve Medication Safety for Rural Elders”



- Oregon Rural Practice-Based Research Network Website: RxSafe: Using IT to Improve Medication Safety in Lincoln City
- AHRQ Panel: “RxSafe: Using IT to Coordinate Medication Reconciliation”

PRINCIPAL INVESTIGATOR QUOTES FOR THIS PROJECT:

“Fragmentation’ and ‘flux’ are the major challenges in developing health IT in long-term care. Fragmentation because, while the providers are all located in close proximity, organizationally and technically they are fragmented and not accustomed to sharing information. Flux, because the management and staff change almost as often as the residents do.”

“Medication data is more standardized at the dispensing and payment levels, and there is better sharing of information between pharmacies, intermediaries, and payers. But at patient side, where we were trying to standardize which drug, how much, how often, and how to administer—there was no standard.”



Project: Health Information Technology in the Nursing Home

PI: Jerry Gurwitz

Long-Term Care Setting: A large academic long-term care facility

Description of Health IT: A computerized physician order entry (CPOE) system with clinical decision support (CDS) was developed and implemented in two nursing homes, including a large geriatric care center with many levels of care. The basic CDS system (CDSS) was added to an existing electronic medical record (EMR) system used by the facilities. The system was designed to meet the needs of healthcare providers in the long-term care (LTC) setting, in particular by informing prescribing decisions, reducing the frequency of prescribing and monitoring errors, and reducing adverse drug event rates. An additional CDS function was added later to provide prescribers with patient-specific maximum dosing recommendations based on renal function.

DISTINCTIVE PROJECT CHARACTERISTICS:

- The LTC facility in this project was among the first LTC institutions to implement CPOE with CDS.
- The LTC facility in this project had more resources than the typical nursing home. They had already implemented an EMR, had an IT department and in-house pharmacy, and had resources to implement this CDSS. They also provided a more intensive level of care than is provided in most nursing homes.
- Team members with a range of specialties were involved in developing the CDSS—including pharmacists, physicians, nursing, and IT staff.
- Extensive accommodations were put in place to ensure that physicians could enter drug orders from both the LTC setting (during rounds, across units, and from facility offices) and offsite.
- Specialized programmers were available to customize the EMR software to implement the CDSS.

BARRIERS NOTED:

- Prescribing issues unique to the LTC setting required special modifications to the



CPOE software; for example, nursing home patients frequently require non-standard doses of many medications that are not automatically displayed by CPOE systems.

- The CPOE/CDSS placed a large burden on existing computer networks, and required hardware and network upgrades.
- Engaging many specialties, while a success factor, also made it difficult to manage and meet the expectations of the many participants, who developed very high and somewhat unrealistic expectations of the system during the planning process.

LESSONS LEARNED:

- The software cannot be used “off the shelf” for safe and reliable clinical decisions. The customization and testing of the software required substantial investments of time and energy.
- The CPOE/CDS system did not initially save time for the clinician.
- Commitment of the vendor to the product “for the long haul” is essential.
- The lack of specificity of alerts in the CDSS may have led to alert fatigue, lowering the potential impact on prescribing.
- To be most effective, CDS systems in LTC need to increase their scope and address the broad range of types of adverse drug events (ADEs) that occur in nursing homes.
- The entire range of specialties that will be affected by the implementation of CPOE/CDS should be represented in the development team, but their expectations must be balanced against reality.
- CPOE software is likely to require extensive, repeated testing of both its functionality and its fit within the institution’s procedures.

BEST PRACTICES EMERGING FROM THIS PROJECT:

- Having an enthusiastic nursing director, supportive of health IT, which championed and facilitated the implementation.
- Fostering an institution-wide “craving” to improve patient safety, by educating in-house staff with published rates of ADEs and those due to prescribing and monitoring errors, which “turned them around.”



- Multiple and readily accessible ways for physicians to order medications, including mobile workstations at home and practice for increased access to the system.
- Committed in-house pharmacists who played a critical role in testing, debugging, and modifying the system.
- A second CDS function for guided medication dosing for residents with renal insufficiency was evaluated with positive impact on prescribing and monitoring.

PROJECT RESULTS:

- Associated with Developing and Implementing a Computerized Clinical Decision Support System for Guided Medication Dosing for Patients with Renal Insufficiency. JAMIA reprint, July 2008.
- Computerized Physician Order Entry with Clinical Decision Support in the Long-Term Care Setting: Insights from the Baycrest Centre for Geriatric Care. J Am Geriatr Soc Oct. 2005; 53(10):1780-9.
- Computerized Clinical Decision Support during Medication Ordering for Long-term Care Residents with Renal Insufficiency. JAMIA, 2009, in press.
- A module to guided dosing of psychotropic medications has been implemented and is being evaluated through this project.
- This grantee received additional AHRQ Health IT funding for continued CDS research, entitled “Improving Posthospital Medication Management of Older Adults through Health IT.”

PRINCIPAL INVESTIGATOR QUOTES FOR THIS PROJECT:

"CPOE software is likely to require extensive, repeated testing of its functionality and its fit within the institution's procedures for managing medications. You cannot just take something off the shelf or flip the switch when you have to make clinical decisions. You have to ensure that decisions made are reliable and safe. This is harder than people think it will be."

“One can plan for the implementation of CPOE, but the actual process takes on a life of its own that calls for flexibility.”



Project: Nursing Home IT: Optimal Medication and Care Delivery

PI: Susan Horn

Long-Term Care Setting: Eleven nursing homes, half part of larger systems or corporate systems

Description of Health IT: The foundation for this project is the “On-Time” pressure ulcer model, which integrates clinical guidelines and clinical information into each nursing home’s daily routines and processes. This project started with the development and redesign of documentation forms to create data collection templates to be used by certified nursing assistants (CNAs) to track pressure ulcer risk factors. An important goal was to streamline and focus CNA documentation on the most critical data. This data and resulting reports guide resident assessment, care planning, care delivery, communication and reassessment. Weekly outcome feedback reports are also generated for the care planning team.

The nursing homes selected the health IT solution of their choice to automate the collection of CNA documentation data, ranging from a lower-cost solution, digital pens, to customized electronic medical records (EMRs) to streamline integration with other documentation systems. The grantees worked closely with nursing home IT staff and their software vendors to help them incorporate the documentation template into their products; each nursing home’s health IT solution to implement the CNA documentation forms was different.

DISTINCTIVE PROJECT CHARACTERISTICS:

- The health IT solutions deployed varied by nursing home, with some nursing homes implementing stand-alone applications that only capture the documentation data and generate reports. Other nursing homes worked with their EMR vendors to integrate the documentation form into their EMR and/or other systems.
- The grantees developed software specifications and worked with seven or eight software vendors to implement the documentation software.
- This is the only AHRQ-funded project reviewed that relied on CNAs to input data.



BARRIERS NOTED:

- The complexities and challenges of interfacing this documentation system with other systems used by nursing homes were greater than expected, exacerbated by the fact that several nursing homes used multiple, poorly integrated clinical software products.
- There was a postimplementation lull in most projects, with a drop in enthusiasm and health IT use. As staff excitement wore off, it was necessary to re-engage participants.
- The lull was often driven by desired enhancements to the reports, which could not be implemented quickly enough for the users.
- Before implementation, vendors were unaware of and reluctant to help the nursing homes identify and possibly streamline workflow, care processes, paper forms and documentation, and regulatory requirements that would affect customization of their application.
- Although most nursing home staff found the reports useful, finding time to regularly review the data and reports collected for this project was difficult.

LESSONS LEARNED:

- When responsibilities are delegated to an entire team as opposed to just the project leaders and champions, there is more consistent health IT adoption and fewer disruptions in implementation.
- Incorporation of health IT into workflow is not a one-time event but rather a commitment to improve the process, requiring ongoing staff education, management of the implementation, and attention to changing workflow and staff roles.
- Use of health IT requires constant reminders, monitoring, and inservicing for staff. CNA staff members need frequent instruction and rewards for correct documentation.
- The quality of the documentation by the CNAs greatly improves when they understand why they are documenting their work and how it relates to the residents' care: health IT-enabled documentation is not just more required "paperwork."



BEST PRACTICES EMERGING FROM THIS PROJECT:

- Extensive interdisciplinary planning for workflow redesign using the “On-Time” model, prior to implementation of the health IT.
- Facilitating the implementation of the CNA documentation template and reports to variable nursing home health IT environments, and offering a low-technology/low-cost solution.
- Dedicated resources on-site for health IT implementation, ongoing management of the implementation process, and regular compliance checking.
- Taking advantage of a collaboration between nursing homes when working with vendors, to agree on the best ways to customize and enhance health IT products.
- Starting slow, and limiting the number, frequency, and amount of information in feedback reports.
- Focusing on the most critical information and only sharing it with the relevant staff members who need to review it.
- Careful validation and re-checking of documentation by CNAs across all shifts.
- Nonpunitive corrective techniques to ensure high compliance.
- Anticipating and managing the health IT “lull” and “keeping the team focused.”

PROJECT RESULTS:

- Reduction in pressure ulcer rates in participating nursing homes
- PFQ Grant Summary: Real-Time Optimal Care Plans for Nursing Home Quality Improvement
- Health Care Innovations Exchange
- Implementation Story: Long-Term Care Facilities Embrace Health Information Technology
- On-Time Quality Improvement for Long-Term Care—materials, tools, streaming video related to this program
- The project has been implemented in several States with assistance from the Medicare Quality Improvement Organizations (QIOs) and/or health departments.



- This project has received continued funding from AHRQ to expand and further evaluate the impact of this model on pressure ulcers care and other LTC quality improvement (QI) areas.

PRINCIPAL INVESTIGATOR QUOTES FOR THIS PROJECT:

"There's no real beginning and end to health IT implementation."

"Quality improvement should lead the health IT, not the other way around."



Project: Chronic Care Model

PI: Georges Nashan (originally John Branscombe)

Long-Term Care Setting: One 100-bed nursing home

Description of Health IT: The goal of this project was to improve chronic care health management in northern, eastern, and central Maine by planning for standard exchange of clinical information for patient transitions within the health provider continuum. The specific long-term care (LTC) component of this project involved a single nursing home that gained access to the electronic medical records (EMRs) of patients from two local hospitals in order to facilitate the coordination of care between the hospital and nursing home. Role-based access to select patient information in the medical record was carefully negotiated. This information is now accessed from a portal to the hospital EMR, printed from one designated computer in the nursing home, and then scanned into electronic copies that are easily distributed to all of the nursing home departments that will be caring for the newly admitted patient.

DISTINCTIVE PROJECT CHARACTERISTICS:

- This 100-bed freestanding nursing home does not have an EMR.
- Role-based sign-on to hospital EMR was authorized only for select nursing home staff.
- IT staff were shared between the hospitals and the nursing home, as they were part of the same health network.

BARRIERS NOTED:

- The nursing home administrator had serious concerns about Health Insurance Portability and Accountability Act (HIPAA) and about sharing patient data that needed to be addressed.
- Scanners connected to desktop computers were initially met with resistance by IT staff working in the mainframe environment.



LESSONS LEARNED:

- The reduction in the amount of time involved in visiting and calling hospitals to request, copy, re-request, fax, mail, and distribute patient medical record information during transitions in care, as well as the amount of paper used, was immediate and significant once this system was in place.
- The level of effort, cooperation, negotiation, staff training, and IT staff participation required for this relatively low-cost and uncomplicated health IT project is not insignificant for nursing homes.
- Small successes provide a strong foundation for and build trust between nursing homes and the other providers with which they exchange patient information. These successes also help build support for other uses of health IT in long-term care.
- Most nursing homes do not have dedicated IT staff, and often the health IT champions are those staff members that have become proficient in using computers and software, understand how health IT can benefit resident care, and go beyond their job role to advocate for and help develop systems such as these.

BEST PRACTICES EMERGING FROM THIS PROJECT:

- Cautious approach and carefully negotiated, role-based data sharing agreements between hospital and nursing home.
- Low-cost but highly effective methods for nursing home staff to access patient medical record information from hospitals.

PROJECT RESULTS:

- Staff time savings in accessing and distributing patient information needed to help patients transition from hospitals to nursing homes.

PRINCIPAL INVESTIGATOR QUOTES FOR HEALTH IT PROJECTS:

"Using health IT to obtain patient information from hospitals requires close working relationships between the hospitals and nursing homes, and careful attention to protecting patient information."





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