

Grant Final Report

Grant ID: 5UC1HS015182-03

Connecting Healthcare in Central Appalachia

Inclusive Dates: 09/30/04 - 08/31/08

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Submitted to:

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Abstract

Purpose: As a recipient of this grant, Appalachian Regional Healthcare, Inc. (ARH) launched the implementation of a major component of its clinical information system initiative, electronic medical records, in its nine hospital locations.

Scope: During the first two years of this program, ARH staff laid the project foundation including the negotiation and selection of a vendor for ARH's entire suite of clinical information system products, establishment and training of staff, review and adaptation of patient care forms and the adaptation of the hardware and software. In the third and fourth years, staff aggressively rolled out this electronic medical records product at each of the hospital locations which included hardware and software installation, additional training, trouble-shooting, and evaluation.

Methods: ARH evaluated the success of this implementation through qualitative and quantitative measures in an effort to standardize processes that produced consistent patient outcomes and enhanced patient safety system-wide.

Results: As a result of this grant program and the implementation of the electronic medical record system in ARH's hospitals, the timeliness and accuracy of care provided to ARH's patients has increased, workflow throughout the system and across the continuum of care has been enhanced, and ultimately the overall quality of care provided to patients has improved.

Key Words: Electronic Medical Records; Central Appalachia; Clinical Information Systems

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Final Report

Purpose

As an integrated, not-for-profit rural healthcare system serving Eastern Kentucky and Southern West Virginia, Appalachian Regional Healthcare, Inc. (ARH) requested funding to initiate implementation of electronic medical records at the system's nine hospitals locations. Implementation of this component of the system's healthcare information infrastructure has improved the quality of care provided to ARH's patients, decreased the likelihood of medical errors, and improved the efficiency of the care provided to patients by physicians and other clinical staff.

ARH is an integrated rural healthcare delivery system serving approximately 20 counties throughout Central Appalachia. ARH is one of the few integrated systems that is located in and serves exclusively rural people. The rural location and wide range of services offered by this system requires an intense focus on building connectivity via technology.

With this proposal, the various facilities that make up the ARH system launched the implementation of a major component of its clinical information system's initiative. ARH recognizes that the incremental introduction of a comprehensive clinical system is critical to its success as a quality healthcare provider. By electronically capturing and managing all patient care-related information, ARH moves toward the development of that comprehensive system while also accomplishing this program's objectives outlined below.

1. Increase Connectivity between ARH Facilities and Staff through the Adaptation of Electronic Medical Records That Accommodates the Needs of the ARH System

The implementation of an electronic medical record has greatly enhanced the overall flow of patients from one aspect of ARH's continuum of care to another, thus increasing connectivity throughout the system and assisting in ensuring patient safety during various aspects of care. To initiate the implementation of an electronic medical record, ARH staff first needed to customize the implementation process to accommodate the variety of needs specific to ARH. Therefore, during the program's first and second years, a core team of information system clinical and application analysts and hospital health information management professionals trained and were responsible for the "build" of the electronic medical record platform specific to ARH. By the end of the second grant term, this customization was complete and the system ready for implementation at all facilities in year three and four. The core team members who were responsible for the customization of the software were key to the actual facilities' rollout that took place during years three and four as they were responsible for directing the rollout in each of the facilities and training the necessary personnel. The software being implemented by ARH was Horizon Patient Folder (HPF) from McKesson. Horizon Patient Folder, by merging electronic data with scanned images, provides access to the patient's hospital records to anyone given secure access via the web. Subsequently, providers along the continuum of care, from the

ambulatory/clinic arena to home health and Durable Medical Equipment (DME), have quick and efficient access to critical information that assists them in caring for their patients.

2. Develop the Necessary Infrastructure to Transfer Current Patient Files to the Electronic System and Alter Workflow Simultaneously

Transferring to an electronic system cannot happen overnight. Years of a paper-based system had to be transferred to the electronic format. Therefore, as initially outlined, a forms core team was established to standardize the forms necessary for transferring the majority of all patient information to an electronic based format. This was an especially large undertaking considering the complexity and make-up of a rural system such as ARH.

Similar to the core team for software development, this forms core team was representative of the entire ARH system and various disciplines and continuously monitored and evaluated the program's progress throughout the four-year cycle. Although the development work of this forms core team was initially delayed, work was begun in earnest during the second grant term. Weekly core team meetings were held via videoconference to focus on forms organization and revision. The team members used a set of metrics at every meeting to determine what progress was being made in preparation for the electronic medical record implementation. By the end of the second grant term, the bulk of the work was completed with the standardized forms catalogue for the organization. This work was critical as standardization is a key element to implementing a standard product throughout ARH, which facilitated improved processes and efficiencies with the patient care process.

In regards to assuring that ARH's technical infrastructure was adequate to accommodate the traffic for the electronic medical record, evaluations were conducted that determined that ARH had to transition from the traditional T-1 line to a partial DS-3 line, which substantially increased the bandwidth of the ARH network. Those bigger lines were installed prior to system rollout in all of the communities.

In preparation for the dramatic changes in workflow within the medical records/HIM departments, reorganization of workspace had to be done at each facility. Large and small volume scanners were installed, with respective indexing workstations.

3. Implement the Rollout and Evaluation of the Electronic Medical Records System

ARH rolled out its electronic medical records system in an organized pattern. The actual ARH implementation 'kick-off' event for Horizon Patient Folder was held on May 17, 2006.

Subsequently, the rollout began at the Whitesburg ARH Hospital location at the very beginning of year three of this program. This facility was ideal to kick-off an initiative of this magnitude due to the buy-in and enthusiasm from personnel and medical staff members regarding clinical information system components. As a 90-bed acute care hospital, Whitesburg was also the appropriate mid-size facility to initiate this endeavor. A successful "go live" occurred there the first week of December, 2006. Many lessons were learned and these opportunities were carried forward as preparations were made for the second facility, Morgan County, which went "live" the first week of February, 2007. Morgan County was extremely successful. In the meantime preparations and training were already in progress for the third

implementation at Middlesboro ARH, which went “live” the first week of March, 2007. This implementation also went very well even though many things continued to be learned as this transformation occurred at each facility. Subsequently, the McDowell ARH facility went “live” with the system during June, 2007. Training and preparations at Harlan, the largest facility in the rollout so far, also began in June. A successful implementation occurred there on August 6, 2007. This was the first ARH facility with a Behavioral Health Unit which gave the HPF Team the opportunity to implement HIPAA Security mechanisms specific to behavioral health. This went very well and boded well for implementation at ARH’s larger facilities (Beckley and Hazard) during year four of the grant term since these facilities have large Behavioral Health Units.

Following these implementations, the rollout of the system was postponed for a number of months due to a work stoppage of the registered nurses in the ARH organization. After the implementation at Harlan it was five months before the HPF team got back on track with the rollout of the remaining four facilities. Subsequently the IS team planned a very aggressive rollout that would have all facilities “live” prior to the end of the fiscal year and the end of the grant cycle. This essentially meant the team had to ‘divide and conquer.’ This aggressive rollout also was very dependent on the local facilities to take ownership of their implementations. Preparations and training were carried out simultaneously at two facilities at a time. Williamson ARH went “live” on March 31, 2008 with Summers County right behind them a week later on April 7, 2008. Both facilities were quite successful with their go-lives, with only minor issues relative to printing reports for the physicians.

At this point, preparations had already been initiated at the two largest facilities – Hazard and Beckley. Training at these facilities was massive, not only for the Health Information Management (HIM) staff (three shifts), but also for the huge clinical staffs. Both also had large medical staffs, so more physician trainers had to be trained. Because of this, the go-lives were scheduled five weeks apart, to dedicate more time to each facility. At Hazard, there were eight physician trainers trained, and 32 clinical trainers (for nursing and other clinicians). Training was scheduled from 7 am to 7 pm every day for several weeks to assure that all training was completed prior to go-live. Physicians were scheduled for one-on-one training starting two weeks prior to go-live, and this continued for weeks after go-live. Training for the Hazard HIM staff was actually started prior to the Summers County go-live, to give them adequate time to prepare their three shifts of staff. This was a great challenge to the HPF team, in that again, they had to ‘divide and conquer.’ After much training of staff and physicians, Hazard, the largest facility at 381 beds, went “live” amidst much fanfare on May 5, 2008. A small contingent of the HPF team stayed on there for a month to provide post-live support. The remainder of the team deployed to Beckley, to complete the final implementation.

Thirty clinical staff trainers were trained at Beckley and 10 physician trainers. Training was scheduled from 7 am to 7 pm for weeks prior to go-live. Physicians were scheduled for one-on-one training with a schedule similar to Hazard. Beckley went “live” on June 16, 2008, right on time. There were a number of challenges at Beckley, the major one being that the physicians were used to a different electronic medical record system at a second facility in town. Naturally, it proved difficult for many of them to adapt to a different system. This was a different situation than any other facility in ARH, and did prove to be a problem for several months, but seems to be improving at this time.

During the initial grant application, rollout of the electronic medical records system was only planned for two hospitals during the three-year grant term. However, during the extended

negotiations and planning sessions with ARH's selected clinical information system vendor, it was determined that the actual rollout timeframe per facility was shorter than originally anticipated, and ARH was able to implement this system at all nine hospitals during the four year duration of this grant program which included an extension year. This staggered implementation allowed time for troubleshooting between each rollout at the various facilities. A project manager, clinical analyst, application analysts, and core teams were responsible for directing this rollout. As previously mentioned, these core teams consisted of representatives from all disciplines within ARH and included the front-end users.

4. Prepare ARH for Further Implementation of Clinical Information System Components through Evaluation and Analysis of Current Rollout and Future Needs

In its own right, an electronic medical record brings valuable features to the infrastructure of a clinical information system. However, also important to the development of this system is the fact that this component is an essential layer to the future development of the entire clinical information system, including provider order entry and the development of the longitudinal patient record. Without the addition of this component, future components would not be able to function at their full capacity and would not offer the ultimate benefit to ARH's patients, medical staff, and other personnel. Comparatively, the full benefit of an electronic medical record will not be experienced until future components of ARH's clinical information system are installed. With the installation of an electronic medical record, ARH is now able to evaluate and implement the next steps in the clinical information system plan.

During this grant program, several additional clinical information system components, along with the electronic medical record, were also implemented and the full impact of all of these systems is slowly being realized. One of the most significant additional clinical information system implementation milestones of this grant term was the implementation of a critical piece of the clinical information system, the Physician Portal. This web-based application provides the physician with access to all patient information currently in the ARH computer systems. This includes patient demographics, patient lists, census, allergies, medications, orders, radiology reports, and billing summaries. ARH also implemented a new state-of-the-art laboratory system (McKesson Horizon Lab) in June, 2006, and after that time the physicians were able to access lab results on-line via Portal. Through the portal, prior patient encounters are viewable, as well as encounters at other ARH facilities (cross-organizational functionality). This provides the opportunity for the physician to access results from other facilities which helps to decrease redundancy in testing. Home health patient information is also available through the Physician Portal.

What was so important about this accomplishment is that the Physician Portal is the single point of entry for the physician into the clinical information system, as it progresses over time. Subsequently as the electronic medical record (Patient Folder) was implemented through this grant, physicians were able to access it through the Portal. Having the physicians already trained and utilizing the Portal made the introduction to Patient Folder more successful and produced a better outcome overall.

Another significant clinical information system step during this grant term was the implementation of the Enterprise Master Patient Index (Passport). This software is another

essential piece of the ARH clinical information systems strategic plan as it facilitates the generation of a patient identifier across the continuum of care (hospital to clinic to home health).

During this grant term, another critical piece of the ARH clinical information systems initiative was implemented, Horizon Clinicals Infrastructure (HCI). HCI provides the foundation for all the clinical systems, and integrates with the Passport to make the organization 'enterprise-aware.' These situations facilitate the integration of patient information from system to system, and as new systems get implemented.

Also during this timeframe, work began on the ambulatory electronic medical record, Horizon Ambulatory Care (HAC). One of the most important functions that HAC provides is electronic prescribing with real-time medication screening. Important to note here is that HAC will integrate with Physician Portal, and HPF, so that the provider can easily navigate between systems. This gives the provider the ability to easily review the patient's history relative to hospital, clinic and home health encounters. At this time HAC is 'live' at one clinic with an impending rollout to all other clinics (12) in 2009.

During this same time period RelayHealth, a secure messaging system, was also implemented in the ARH ambulatory clinics. Relay Health provides secure email messaging between the provider and the patient. In addition any time a patient wishes he/she can use the RelayHealth service to: request prescription renewals or lab results; schedule appointments; request referrals; and access valuable health information. Patients are able to communicate with their physician's office when it's most convenient for the patient. Relay Health also provides functionality for electronic prescribing, and this was implemented in a number of the clinics where the HAC implementation was delayed.

Horizon Medical Imaging (PACS) was also implemented at all the ARH facilities during the rollout of Horizon Patient Folder. PACS is the system that sends radiology images electronically and deletes the use of film. Horizon Medical Imaging is very tightly integrated with Physician Portal and Horizon Patient Folder and provides the medical providers with images on-line almost immediately after the study is completed, impacting the timeliness of care.

Planning for the implementation of other clinical information system components is also currently underway within ARH and will help ARH's patients, medical staff, and other personnel to more fully realize the benefits of an electronic system. These other components include a comprehensive clinical pharmacy system, electronic nursing documentation, and medication administration with bar code scanning at the point of care. Also on the timeline is a system for the Emergency Department and Operating Room. Significant to note is that all these systems will integrate together through the clinicals infrastructure (HCI), as noted above, and lessons learned from this grant funded HPF implementation will be utilized for future implementations.

Scope

To understand the significance of this program's information technology implementation and the receipt of these grant funds, one must examine the rural healthcare system where this is taking place and the area that is served by this system. ARH, and its precursor, the Miners Memorial Hospital Association, is an historic presence in the Southern Appalachian Mountain region. For over 50 years, ARH has addressed the healthcare needs of the residents of Eastern

Kentucky and Southern West Virginia, adhering to its mission to, “improve health and promote the well-being of all the people in Central Appalachia in partnership with our communities.”

The system provides a continuum of care for residents of Central Appalachia, offering clinics, inpatient and outpatient medical services, psychiatric services, rehabilitation, and home health and durable medical equipment and supplies. Hospitals range in size from critical access facilities to this proposal’s lead applicant, a 381-bed regional medical center in Hazard, Kentucky.

With numerous facilities located in two states, the challenges that ARH faces in trying to provide consistent quality healthcare are tremendous. The timeless beauty of Appalachia’s mountains and narrow valleys obscure many of the ugly facts facing the area. The area is fraught with some of the highest chronic health prevalence rates in the country for lung cancer, diabetes, and heart disease. To compound these problems, ARH’s facilities are located in areas that are at least partially classified as Medically Underserved Areas and Health Professional Shortage Areas by the U.S. Department of Health and Human Services, Health Resources and Services Administration, and the Bureau of Primary Health Care. In addition, the areas served by ARH are also faced with unemployment rates that are substantially higher than state and national averages and a higher number of citizens in these areas rank below the national poverty level when compared to state and national statistics.

Other challenges facing the residents of ARH’s service area include an aging population; lack of insurance or the funds to pay for both healthcare and medications among the working poor; lack of knowledge regarding basic healthcare needs and availability of services; low literacy levels, and limited access to care.

ARH is committed to the task of bringing 21st century healthcare to the people of Appalachia; however, it has always been faced with imposing financial restraints and has struggled to keep up with the demands and costs associated with healthcare technology. When originally founded, this healthcare system prided itself on bringing new healthcare facilities and equipment to these underserved areas. Today, renovated facilities and new equipment continues to consume the system’s tight resources. However, advancing the system’s technology infrastructure has also become the norm and a drain on finances. With all of this in mind, it is easy to see why the receipt of this grant award was so appreciated but also a daunting undertaking.

The plans outlined in the initial grant application for the implementation of electronic medical records system were not only the natural next step in technology for this system but also the beginning of significant investments in both time and finances. That is why ARH’s staff decided to conduct further evaluation regarding possible clinical information system vendors once this grant award was received. As documented in the initial grant application, ARH already owned the software for the electronic medical records system. However, once the grant award was received, ARH management wanted to ensure that this was the appropriate vendor for the entire platform of clinical information system products, since using the same vendor for the entire suite of products was preferred. The implementation of the electronic medical records component through this grant program has been only one of the first steps in implementation of a comprehensive clinical information system for all ARH facilities. Therefore, additional site visits were conducted and further analysis was performed regarding the various vendors during the initial months of the first year of this grant. A project of this dimension for the entire ARH system dictated tremendous planning, extensive documentation, and defined execution. With this additional research and planning in place, a contract with ARH’s selected vendor for the

system's entire clinical information system, including the electronic medical records component, was finalized in late March 2005.

Prior to this grant award, ARH had piloted and tested various information system endeavors carefully, always mindful of limited financial resources. In fact, ARH piloted and developed the Pathways Home Care software with HBOC (now McKesson). During the mid-1990s, there was no comprehensive IS system available to address the needs of home health. After an extensive search and many discussions, ARH made a decision to partner with HBOC (McKesson) to develop a program based on the way care is provided in the home health setting. The end product of that partnership resulted in a clinical/financial solution that has been very effective for ARH. The first home health agency went "live" in 1998, with subsequent rollout to all ARH agencies. The system is utilized by all home health nurses who carry laptops with them as they make home visits. All patient data is loaded into the system directly by the nurse at the time they see the patient and then is downloaded onto the network later that day. The Pathways Home Care System provides for the input of the data and subsequent billing for the encounter. Since the time of implementation there have been a number of upgrades to the system, with progressively established more clinical functionality.

Prior to this grant, ARH had also successfully implemented new financial/billing systems that are demonstrating desired results. The rollout process and train the trainer method of education utilized with these financial systems were modeled with the implementation of the electronic medical records. With these financial systems in place, the time was right when this grant was awarded to begin implementation of clinical systems that could interface with the patient accounting systems to create operational efficiencies.

The scope of this grant-supported implementation has been far-reaching, and ultimately involves the entire organization, as this system lays the groundwork for more electronic systems to come. This has been a vision of ARH for a number of years, in that the very first system Clinical Information Systems Steering Committee was formed in 1993 by a previous CEO (Forrest Calico, MD), who believed very strongly that clinical systems could make a difference in the quality of patient care delivered. There have been many challenges and backsets from that time to now, but many have stayed true to that vision and carried on to make the vision real. The most recent Clinical Information Systems Steering Committee (CISSC) was formed in 2002 by the CEO at that time, who also believed that computer systems could make a difference. The CISSC consisted of representatives from each community and was made up of physicians, administrators, nurse leaders, and other clinicians. Their charge was to evaluate all activity that had gone on before, and determine what ARH needed to do to accomplish this vision of a computerized medical record.

Many individuals throughout ARH participated in the planning and implementation of these clinical systems. The HPF Advisory Council consisted of all the HIM Directors (from each community), and representative Senior Leadership, Information Systems, Revenue Cycle Managers, Chief Nursing Officers, Education Coordinators and other clinicians. This team provided oversight and input into the overall implementation, as well as advice and counsel on issues such as policies and procedures, workflows and job descriptions.

The HPF Implementation Team was made up of the Information Systems Project Manager, Applications and Clinical Analysts, Portal Administrator/Trainer, and two HIM Directors.

Methods

ARH recognizes that the incremental introduction of a comprehensive clinical system is critical to its success as a quality healthcare provider. By electronically capturing and managing all patient care-related information, ARH will reduce medical errors, improve clinical documentation and optimize the patient care encounter. This grant-funded program allowed ARH to take a major step toward advancing its electronic information exchange platform and establishing a major jumping off point for future implementations.

The Study Design was based on comparing what was being done prior to implementation with what was accomplished, and what is being done after implementation and the improvements therein.

The following goals were utilized as measures to guide the success of this electronic medical record implementation throughout ARH.

Improved Access to Patient Information for Medical Providers

With the implementation of this electronic medical record, an initial step has been completed toward physicians and nurses being able to trade in their paper charts for an electronic system that will allow them to entirely access patient information at the click of a button. Although completely ridding the facilities of paper charts is not possible with just the electronic medical record system alone, this component was a major stepping stone for that eventual occurrence. This will prove especially important for a system such as ARH, since the facilities are scattered across a wide service area. However, even now with just the electronic medical record implementation, the ARH health professionals in the clinics or home health settings are able to access patient information collected at the hospital. For example, a home health nurse is able to review a home health patient's hospital records after they have been discharged from the hospital and are once again enrolled in home health services, thus, creating a seamless continuum of healthcare services. This especially facilitates medication reconciliation, one of the most important areas of care especially with an older patient population such as ARH's. This access is accomplished through access to HPF, through Portal, via the worldwide web – the only requirement is a web browser. This demonstrates only one scenario, and there are countless others.

Another excellent example of improvements in accessing patient information is a situation in ARH's Hazard community. Hazard ARH Regional Medical Center has a 123 bed psychiatric facility (a collaborative with the State of Kentucky). During the implementation of HPF at Hazard, meetings were held with Leadership from the Community Mental Health Centers to determine how the EMR at ARH could help them to better care for these patients. Access was provided to certain providers at the Community Mental Health Centers, and they were trained at the Hazard facility by ARH's trainers. Now when a behavioral health patient is treated at the ARH Psychiatric Center-Hazard, and then discharged to the care of the Community Mental Health Center, their provider has quick and efficient access to their records at the hospital, which includes all exams, treatments, medications, and interventions. Prior to this, the Community Mental Health Center would have to wait for paper records, which often were much delayed because of the paper trail, subsequently hampering optimum care for their patients. There is no

question that the implementation of this system has improved access to patient information for medical providers throughout ARH's service area.

Increase in the Timeliness of Care Provided to Patients Because of the Improved Access to Medical Records

Medical providers no longer have to search for ancillary reports or review stacks of paper patient files, just to receive an update on a patient's health status. Medical providers are able to view ancillary results and a patient's medical records all in one location through the electronic system. In addition, ancillary results are posted in the electronic system automatically; paper reports are no longer transferred throughout the facility or even across the ARH system. Since ARH utilizes PACS for radiology interpretation throughout the organization, and has centralized laboratory services, the electronic medical record system assists in furthering the pursuit of providing quality care in a timely fashion.

Timeliness of patient information has been impacted (in a positive way) because of the way the electronic medical record works. There are a number of automatic electronic 'feeds' into the system that facilitate more timely filing of reports and results. During the patient's hospital stay all of the information entered into the Hospital Information System (STAR, another McKesson product) feeds into HPF. This includes all demographic information and any other information entered at registration and assessment. Horizon Lab feeds automatically into Portal and HPF for quick reviewing of results – with criticals designated as red or yellow, to alert the physician. PACS images flow just as soon as the study is completed, even before the Radiologist has completed the interpretation and report. All dictated/transcribed reports (History & Physicals, Consults, Operative Reports, Progress Notes, etc.) flow over into HPF/Portal in real time, just as soon as they are typed. Inasmuch that all this information is accessible through Portal, via the web remotely; providers are seeing information much sooner in a more efficient manner, than ever before. Especially given the previous lag time on paper reports being delivered to the nursing units, and then filed into the paper chart where the physician would have to plow through to get the information he/she needs to make an informed decision about the patient's care. Reported turn-around-times for lab and radiology reports previously at the larger facilities (Hazard and Beckley) reflected 12, 18 and sometimes 24 hours (or longer) for reports to get to the floor and filed on the paper chart. With the EMR, the turn-around-time is immediate upon the completion of the test or report.

Reduction in Medical Errors and Risks of Errors Because of Better Safeguards and Precautions in Place Due to the Electronic Based System

Human error is naturally going to take place, but with an electronic medical record in place, the likelihood of those errors is lessened. For example, if a patient's ancillary results must be transferred through four different members of the hospital staff before they reach the physician, the likelihood that an error has occurred during that transfer of information is greater than if the physician is able to simply view the ancillary results directly via a computer. Although computer systems still rely on the human to operate them correctly, there is no question that automation improves the accuracy of the process. Lab results and radiology images and reports are

electronically filed into the patient's electronic record, as versus a busy ward clerk multi-tasking, attempting to manually file a stack of paper records on a very busy nursing unit, who is very apt to mis-file a patient's record into the wrong paper chart. Subsequently the physician may very well treat the patient based on wrong information, which could lead to a medical error that could ultimately even be fatal. As ARH staff is fully aware given the data from the Institute of Medicine on medical errors, these type scenarios occur daily in a busy hospital setting.

Improved Patient Care Management and Workflow Due to a Uniform System That Integrates Data, Real-Time, across the System's Continuum of Care

The uniformity that has been established with the implementation of electronic medical records has greatly reduced the time that it takes to perform job functions and process patients for care. This is especially true when considering that this system makes it possible for medical personnel at an ARH clinic, home health agency, or home care store location to directly view follow-up information regarding a patient from the hospital setting. This follow-up information no longer needs to be faxed, telephoned, or mailed.

Improved Security and Confidentiality of Patient Information

Each component of the clinical information system requires that patient information be protected as dictated by Federal, state and HIPAA standards. With the installation of electronic medical records, additional layers of protection/gatekeeping have been added to protect this patient information even further. This component of the clinical information system plan lays the groundwork for what could eventually be a paperless trail of information, which would be the ultimate safeguard in protecting the privacy of ARH's patients. Patients' information is located in a secured database that is only accessible by individuals who have been given access via a unique login. Access to this database is requested by each facility's local Security Officer and is submitted via a secure website to the ARH HelpDesk, where the request is then routed to the Portal Administrator. The Portal Administrator reports to the ARH Corporate Security Officer (who is also the Principal Investigator to this grant), and is well-schooled in the HIPAA Security Standards. Individuals only receive the access they need to get their job done (the 'minimum standard'). Many individuals only receive access to a worklist, where the HIM Director can assign medical records of only the patients these individuals need to review (they have no 'search' capability) in the entire patient database. In addition, there is excellent audit capability within the electronic record so that any access to patient information can be identified and tracked.

Reduction in Unnecessary Healthcare Costs Because of a Reduction in Duplicate Orders and Unnecessary Tests

Since patients' information is now located in one place, the likelihood of ordering duplicate orders or unnecessary tests has diminished. ARH believes strongly this will eventually lower the cost of care and is something that is continually tracked. In addition, over time ARH staff

believes the length of stay will be impacted as the patient care process gets more efficient through the use of the EMR.

Increase Satisfaction of Patients and Medical Providers

With improved timeliness of care, reduction in medical errors, better security of patient information, and a reduction in healthcare costs, it is only natural that patients' satisfaction has increased with the implementation of electronic medical records. Medical providers are also benefiting from more convenient access to patient information, which leads to more direct time for one-on-one patient care.

With these goals in mind, the burden has been on ARH to prove the value of implementing this electronic medical record system in Central Appalachia which has been the guide for decisions regarding possible future implementations. ARH's Senior Leadership views this implementation as being very successful, with good results not only relative to patient care but also in improving the Revenue Cycle functions. Subsequently there is definite movement to continue along the clinical information systems strategic initiative and plan for the future implementation of a new pharmacy system with medication administration/bar code scanning at the bedside, and clinical documentation. This plan also includes the implementation of Computerized Physician Order Entry eventually down the road.

Results

Measuring the success of implementation and utilization of electronic medical records has been vital to ARH's overall clinical information systems initiative, as this represents a key stepping stone. ARH has evaluated the success of this electronic medical records implementation through qualitative and quantitative measures.

Evaluation of the success of the system's implementation, to a certain extent, has been measured through attendance and participation at training sessions, successful competency rates, and smooth transition from paper to paper-less with favorable feedback from clinicians and other staff, utilization of the system, and forms standardization. Other good measurements include turn-around-times on chart scanning and indexing, which determines how soon after discharge the electronic record is available to the physician, and chart delinquency rates.

Feedback and evaluation sessions conducted by the Principal Investigator with the core teams and the Clinical Information Systems Steering Committee also helped determine the success of this implementation and generate lessons for the future.

Principal findings relative to training were positive overall and in line with other implementations ARH has been through. Staff found that the facilities with a full-time Education Coordinator had a more organized training schedule with better results – more staff were trained prior to go-live (including physicians) with less chaos on the units at the time of go-live. A principal finding in regards to paper vs. paperless was that many physicians (not all) are not ready to go paperless, and are still very dependent on their paper chart during the patient stay. Several of the facilities had decided to limit printing of the information accessible through Portal

(all electronic feeds) – there was varied success with that, and a couple of the facilities have had to allow physicians to print some documents. It will definitely be a ‘weaning’ process over time.

Utilization of the system has grown over time and currently we are seeing at least 80 percent of the physicians accessing at least parts of the record electronically, which is a huge improvement from when this initiative began.

One of the principal findings of this project involves the work done on forms standardization. Once that work on forms standardization began it was found that the situation was much worse than predicted, and a major initiative was launched. It was determined that there were over 2000 bootleg forms throughout the organization (600+ at Hazard alone). A Task Force was established with representatives from each facility, mostly nursing, as this was where most of the bootleg forms originated. The Task Force gathered all of the bootleg forms (to the best of their ability) and began to dig in. Focus groups were convened to work on their unit forms (behavioral health, operating room, emergency department, obstetrics, ICU/CCU), with multiple meetings and extensive discussions. The Community Chief Nursing Officers were very involved with all the focus groups and provided input into revisions, additions and deletions, as well as the creation of new, needed forms. A significant finding during this time was that the ARH Print Shop was not capable of keeping up with the demand for forms and this was forcing staff to develop and print their own (on laser printers). In addition to standardizing the forms, barcodes had to be assigned and applied. This work was all done internally by HPF team members in conjunction with ARH Materials Management.

Principal findings involving the HIM department and workflows were probably the most insightful to our project. The main function of the HIM department (traditionally referred to as Medical Records) involves the processing and maintenance of the patient’s medical record. Historically, the process was after discharge. The paper chart gets routed to HIM (which may have happened timely or more often did not) for discharge processing and analysis. After the chart was put in order and analyzed it was routed to the coder and would eventually make it to the physician’s shelf for completion. If there were more than one physician who attended to the patient’s care, the chart would get routed one after the other (not very timely). During this time period loose filing would come down from the floor, and hopefully get filed into the paper chart (to make it complete for the physician so that accurate documentation could be done, as well as appropriate follow-up care). Historically, there were no policies or standards relative to productivity, and turn-around-times on patient record processing. It could take as long as a week or longer to make it to the physician’s shelf for dictation and signatures. Today, with the implementation of the EMR, all the workflows within the HIM department have changed. Clerks make timely rounds to the nursing units to pick up charts of discharged patients and take them to HIM. The chart is then prepped for scanning, and then scanned either on a flatbed scanner or a high powered scanner which can scan 90 sheets per minute. After the chart is scanned it is then indexed to assure that all the forms in the chart are electronically ‘filed’ in the right folders. Most of the ‘filing’ is done automatically by the system through the use of barcoded forms (hence the intense work to standardize all the forms and assign barcodes). Manual indexing only has to be done when there is a ‘bootleg’ or rogue form that does not have a barcode. As soon as the chart has been indexed it is now available and accessible on-line to anyone who needs it (coders, abstractors, billers, physicians). The corporate standard is 24 hours turn-around-time for inpatient charts. The standard for ED records is 12 hours, as well as other outpatient records. These standards clearly promote a productive and organized HIM process, which then facilitates improved completion of the patient’s medical record. A very positive

byproduct of this is that it also impacts the revenue cycle, to improve coding, billing and ultimately accounts receivables.

Another very positive outcome has been the improvement in chart delinquency rates (completion of records within 15 days of discharge). Facilities that have been 'live' longer than six months are seeing a definite drop in these rates, which will have a positive impact on billing and accounts receivable, as well as meeting standards of the Joint Commission. Hazard has seen a dramatic drop in their chart delinquency rate, from above 25 percent to 8 percent this last quarter.

An unexpected outcome has been the ability to streamline the data collection process through the utilization of work queues in HPF. Through work queues, records can be routed relative to principal diagnosis codes and/or procedure codes to a worklist. Subsequently, the HPF team has built work queues for Core Measures charts.

This process makes the data collection effort more efficient, as the Performance Improvement Coordinator now has the records needed to complete this, without requesting a stack of charts from the HIM department.

ARH learned a very valuable lesson in regards to clinical documentation and the standardization of organizational forms. Gathering the focus groups together proved to be a greater learning experience than ever imagined, because the learning had a lot more to do with documentation than it did forms. The focus groups had lengthy, intense discussions regarding how and what documentation was needed, in regards to patient safety, quality, regulatory issues and Joint Commission standards. It was an overall major performance improvement initiative for the organization.

Implementation of the overall electronic health record, which includes the grant-funded electronic medical record and subsequent implementations of clinical documentation, clinical decision support, and provider order entry, will facilitate improvement in the overall patient care process by enabling ARH opportunity for re-design. ARH staff will continue to monitor and measure the impact of future implementations through the following measures: reduction in medication errors; reduction in turnaround times for ancillary services; reductions in length of stay; better coordination of care; enhanced patient privacy and security; and overall better patient satisfaction which will be documented through patient surveys. Therefore, it is easy to see that the full benefit of this grant-funded electronic medical record implementation may not be felt for several years.

However, this project, by far, was the most wide-spread implementation ARH has ever experienced. The impact has been felt all around the organization. The primary lesson learned was that this organization could accomplish something like this, even with all the challenges and limited resources, ARH could make a difference in a big way to improve patient care through the continuum. It has been a real shot of confidence to all the staff in the facilities who either trained or were trained, including the medical staffs. There is no question that the success of the implementation of Horizon Patient Folder made possible through this grant funding has laid a strong foundation for the remainder of the clinical systems yet to be installed.

List of Publications and Products

Not applicable.