Implementing an Ambulatory Electronic Medical Record and Improving Shared Access

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Abstract

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Final Report

Purpose

     This project's purpose was to implement an ambulatory Electronic Medical Record (EMR) across multiple and varied healthcare settings in a medically underserved region of east central Illinois. Sarah Bush Lincoln Health Center (SBLHC), a not-for-profit community healthcare corporation, served as the fiscal agent and lead organization for a collaborative partnership to deploy an ambulatory EMR which improves patient safety and patient attitudes toward health information technology (HIT) by 1) providing shared access to patient records across hospital services, home health, hospice, physician practices and non-hospital provider settings, and 2) integrating electronic tools for prescription orders and management of medications. Project partners included Urology Associates (urology practice of Roger Rives, M.D. and David D. DiDomenico, M.D., D.O.) and the Health Services Division of Eastern Illinois University (EIU), a regional, residential university with a current total enrollment of 11,522.

     The purpose of this project was to offer providers and patients a seamless coordination of care across a continuum of services by sharing pertinent patient information between the emergency department, home health and hospice, family and internal medicine practitioners, and specialists throughout our rural community. The ambulatory EMR provides a means to share a longitudinal medical record which contains, at a minimum, a patient problem list, medication list, allergies, radiology images and data, laboratory data, and a patient care plan.

     The long-term goals of the partnership for the use of health information technology were set as follows:

1. Successfully deploy an ambulatory EMR with shared access to patient records across hospital services, home health, hospice, and employed and independent physician practice settings.

2. Use computerized provider order entry (CPOE) and clinical decision support systems to reduce medication errors and increase patient safety.

3. Provide a method to utilize the EMR for data collection, analysis and reporting of the number and types of medication errors and adverse events identified as well as the number and types of actual errors and adverse events that occur.

4. Conduct an evaluation of project effectiveness and changes in patient attitudes toward HIT.

Scope

Background

Sarah Bush Lincoln Health Center (SBL) was awarded a planning grant by AHRQ for the period 10/1/04 through 9/30/05. Subsequently, AHRQ awarded SBL a three year implementation grant for the period 10/1/05-9/30/08. At the close of the implementation grant period, SBL requested an extension of time to complete the project's objectives, based on delays in the project's timeline introduced by unanticipated changes by a software vendor. AHRQ approved the request for a 12-month extension.

Context and Setting

SBLHC is a 187-bed acute care facility fully equipped to handle a broad range of medical, surgical, pediatric, psychiatric, obstetric, and gynecological problems. The facility is located in rural Coles County, between the communities of Charleston and Mattoon, IL. SBLHC services include the Regional Cancer Center, a skilled nursing unit, and a 24-hour emergency department. The 146 active medical staff members represent 28 medical specialties. Of this number, SBLHC employs 71 providers, including physicians, physician assistants, and nurse practitioners. SBLHC is operated by Sarah Bush Lincoln Health System (SBLHS), a not-for-profit corporation which also includes the not-for-profit fundraising arm, Sarah Bush Lincoln Health Foundation. Each organization is governed by a community board of directors. Physician clinics operated by SBLHS extend services to the surrounding rural communities at nine separate locations: Arthur Clinic, Family Medical Center (Mattoon), Charleston clinic, Casey Clinic, Toledo Clinic, Sullivan Clinic, Neoga Clinic, Arcola Clinic, and Effingham ENT clinic. In addition, SBLHS operates home health and hospice services, and provides durable medical equipment to an extended service area.

SBLHS patients include individuals who receive care through visits to practitioner offices, emergency services, inpatients, and outpatients. This includes ancillary care, (e.g., physical/occupational therapy, dietary, etc.) and continuum-of-care services (e.g., hospice, home health, durable medical equipment).

SBLHC is licensed by the Illinois Department of Public Health, accredited by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and is affiliated with Voluntary Hospitals of America (VHA).

SBLHC services include:

- Regional cancer center certified by the American College of Surgeons

- 24-hour emergency department

- 15-bed Skilled Nursing Unit

- Lincolnland Home Care home health services

- Lincolnland Hospice

- Durable medical equipment

- Behavioral health services, including a 20-bed inpatient unit, outpatient counseling, partial hospitalization program, employee assistance program

- Obstetric services, including a Level II perinatal unit and labor epidural services

- Surgical services, including outpatient surgery and ambulatory care

- Critical Care Unit

- Adult Care Unit

- Orthopedic services

- Occupational health program

- Cardiopulmonary services

- Cardiac catheterization laboratory

- Reference laboratory services

- Cardiac rehabilitation

- Lithotripsy

- Women's and Children's Services

- Physical medicine and rehabilitation services, including physical therapy, occupational therapy, and industrial rehabilitation

- Radiology and imaging services, including magnetic resonance imaging, nuclear medicine studies, computerized axial tomography scans, single photon emission computerized tomography, ultrasound, mammography (including mobile mammography), echocardiography, bone density scans, vascular studies

- Health and nutrition center

- Pharmacy services, including inpatient pharmacy and in-house retail pharmacy

- Lifeline personal emergency response system

- Speech and hearing services

- Community Health Education Program and Speakers Bureau

- Physician referral service

Participants

- Michael A. DeLuca: Principal Investigator, Vice-President Information Systems, CIO

- Beth A. Evermon: Project Assistant, Director of Applications—Information Systems

The Information Systems department staff and System Practices administration, clinical, and professional staff contributed to the success of this project.

Offices of the independent physicians of Urology Associates provided a setting for implementing and evaluating aspects of the project in a clinic not administered by SBL, and the Eastern Illinois University Health Services' participation in the project supported the exploration of questions of interchangeability.

Incidence and Prevalence

SBL has valued health information technology for many years. In 2002, the organization began using Meditech's Enterprise Medical Record module. Caregivers adopted the practice of retrieving results from the computer system rather than receiving paper result notifications. CPOE was already in use on the inpatient units and electronic nurse documentation as well as an electronic medication record was in place. The implementation of an ambulatory clinical system was the next logical step.

Methods

Study Design

The implementation of the ambulatory electronic medical record at SBL became possible due to a research grant provided by AHRQ. The Information Systems and System Practices departments visited many healthcare systems that are using ambulatory electronic medical records prior to the implementation at SBL. After much research, SBL implemented the software and built it to meet SBL's specifications. From there, the software was piloted in the organization's ambulatory clinic at Neoga, IL.

Data Sources/Collection

During the pilot, the Information Systems team analyzed what worked well with their plan and what needed improvement. Everything from the training manual format to the training environment to the follow-up support was dissected.

Since the pilot clinic, the training manual format has been changed. Initially, the Information Systems team thought it was important to include as much detail as possible in the training manual. After several clinic implementations, the team learned that the manual was overwhelming to the users. It was not easy to locate instructions quickly and therefore was not a tool that the users embraced. The manual has since been streamlined and divided into sections that allow for easier reference.

All of the clinics implemented to date were trained in their own clinic environment except for one. We learned during the pilot clinic's training, that it was detrimental to their learning to have the patient phone lines open. At the time, the thought was that we could not be completely unavailable to the patients during business hours. After the pilot clinic, we asked the clinic directors to either forward the patient lines to the answering service or provide additional resources not involved in the training to answer the phone lines. Training the users in their clinics helped them cope with huge change to their workflow. We did have one Internal Medicine clinic that asked to be trained outside of their clinic. This group preferred a classroom setting in which to learn. The Information Systems team found that training the users in an outside location was beneficial. The users appeared to concentrate more on the training and therefore retained more of what was taught. Unfortunately, due to the varying size of clinics and the time of the year in which they are trained, not all clinics have the benefit of training outside of the clinic. The information Systems team will continue to recommend training outside of the clinic, but will work within the users' limitations to ensure that training occurs in a timely manner.

After several clinic implementations, the Information Systems team found it necessary to provide more timely support to the users. The clinic staff work directly with patients and generally always have a patient with them. When a user has a problem with the ambulatory electronic medical record system, he or she often needs immediate assistance in order to move forward with the patient's care. The Information Systems team began using mobile phones for support rather than their desk phones. Now, users can call one telephone number and reach one of three specialists during clinic hours. The users have been encouraged to call the mobile phone number if they need immediate help or have an emergent issue. Users can email the Information Systems team directly or use the AEMR mailbox for less urgent issues. SBL recently hired an AEMR liaison that operates out of the System Practices administrative office. The liaison is responsible for ensuring that the clinic staffs are using the software as it was designed. This is yet another layer of support for the clinic users.

Interventions

The SBL administration has had to intervene on occasion. Physicians and mid-level providers are not as accepting of the software as we had expected. Although it was not marketed as a time-savings, many physicians and mid-level providers disapprove of the time it takes to enter data into the computer system. To these providers, the benefits of complete and more accessible patient information to all caregivers does not outweigh the increased time it takes to build the patient's initial electronic record. In discussions with the physicians and mid-level providers, they acknowledge that the implementation of electronic records is inevitable, but would prefer to delay change as long as possible.

Measures

We measure the success of the system based on direct feedback from the users.

Results

We have found that our Emergency Department caregivers benefit from having access to the patients' ambulatory medications electronically. Inpatient caregivers are also benefiting from access to patient medication lists. Overall, physicians, mid-level providers, and nursing staff in the clinics have come to the conclusion that the system will not increase their productivity up front. Efficiencies will be appreciated by the users once the charts are more established, but creating the electronic chart from the information in the paper chart can be overwhelming in busy clinics. Although the users do not view the system as an ideal system, it is unlikely that they would choose to return to paper charts. The users would be happier seeing some of the system's short-comings enhanced rather than revert to their old processes.

Outcomes

The following providers were implemented:

Table 1.

Physician/Mid-Level Provider	AEMR Live Date
Iven Boehm, PA-C Neoga: 895-2222	October 2007
Shirley Dallmier, PA-C Arcola: 268-4444	July 2008
Robert Dougherty, PA-C Casey: 932-4061	April 2008
Sherri Howell, DO Neoga: 895-2222 Toledo: 849-3151	October 2007
Jan Stierwalt, NP Toledo: 849-3151	July 2008
David Stoltz, MD Charleston: 345-7700	May 2008
Julian Vassay, MD SBL: 258-2110	July 2008
David Winograd, DO SBL: 238-4310	March 2009
Mark Emenecker, DO Charleston: 345-7700	June 2009
Kevin Stephens, MD Charleston: 345-7700	June 2009
Michele Kinder, NP Charleston: 345-7700	June 2009
Michelle Fulton, NP Charleston: 345-7700	June 2009

Conclusions

It is important for SBL to share the successes and challenges of this project with those who may consider implementing an ambulatory electronic medical record. Whether organizations are implementing the same software as SBL or another vendor's solution, our lessons learned will be valuable.

An organization cannot expect to make such a huge change in physician practices without experiencing some challenges. Below are some of the hurdles that SBL experienced:

Scanning Paper Charts. Prior to the first clinic implementation, a group of providers met and determined what portions of the paper chart should be scanned into the new electronic system. It was decided that anything that did not exist within the Enterprise Medical Record should be scanned into the system. Below are the scanning guidelines that were set by the group of providers:

Table 2. NON SBL documents

Items	Is this information in the EMR?	Do you want us to scan the report into the ambulatory electronic chart?	Do you want us to scan the image into the ambulatory electronic chart?	How many years' worth of reports/images would you like scanned into the ambulatory electronic chart?
Cardiology: EKG's	No	Yes	Yes	2 years- with baseline and most recent
Stress test	No	Yes	Yes	2 years-with baseline and most recent
Cath report	No	Yes	No	2 Years-with baseline and most recent
Echocardiograms	No	Yes	No	2 years-with baseline and most recent
Radiology Reports: MRI's	No	Yes	No	2 years
CT's	No	Yes	No	2 years
Ultrasound	No	Yes	No	2 years
X-Rays	No	Yes	No	2 years
Consultation /Referral Reports:	No	Yes	N/A	2 years
Lab Reports:	No	Yes	N/A	2 years
Misc. Procedure Reports: Colonoscopy	No	Yes	No	2 years or last 2 recent
Endoscopy	No	Yes	No	2 years or last 2 recent
ER Records:	No	Yes	N/A	1 year
Inpatient Dictated Reports: H&P's	No	Yes	N/A	1 year
Discharge Summary	No	Yes	N/A	1 year
Operative Reports	No	Yes	N/A	2 years

Table 3. SBL documents

Items	Is this information in the EMR?	Do you want us to scan the report into the ambulatory electronic chart?	Do you want us to scan the image into the ambulatory electronic chart?	How many years' worth of reports/images would you like scanned into the ambulatory electronic chart?
Cardiology: EKG's	Yes @ hospital No @ clinic	Yes	Yes	2 years
Stress test	Yes	Yes (just report)	Yes	N/A
Cath report	Yes	No	No	N/A
Echocardiograms	Yes	No	N/A	N/A
Radiology Reports: MRI's	Yes	No	N/A	N/A
CT's	Yes	No	No	N/A
Ultrasound	Yes	No	No	N/A
X-Rays (done in office)	Yes	No	No	N/A
Consultation/ Referral Reports:	Some	Yes	N/A	2 yrs.
Lab Reports:	Yes	No	No	N/A
Misc. Procedure Reports: Colonoscopy	Yes	No	No	2 yrs. or most recent 2 exam reports
Endoscopy	Yes	No	No	N/A
ER Records:	Yes	No	N/A	N/A
Inpatient Dictated Reports: H&P's	Yes	No	N/A	N/A
Discharge Summary	Yes	No	N/A	N/A
Operative Reports	Yes	No	N/A	N/A
Provider Office Progress Notes:	Yes—if we begin attaching the transcription in the EMR this summer.	Yes—all progress notes that are not available in the EMR.	N/A	3 years

It is difficult to know if the providers access the scanned images on a regular basis. We hope to capture this data in the future. We do know, however, that scanning is extremely labor intensive. We recommend that a scanning team begin the scanning process in the clinic to be implemented well in advance of the implementation date. If you have the ability for your transcriptionists to type directly into the ambulatory electronic system, we recommend that you begin this process immediately---even if the clinic will not be electronic for some time. In January, 2010, we will make this change in our own transcription process. This change will eventually lead to a limited scanning process as the transcribed reports will already be in the system as opposed to a paper chart which requires scanning.

Training. The implementation team created an implementation recipe that would be used at each clinic. The recipe was enhanced as lessons were learned with each individual implementation. It has become apparent that training sessions must be customized to each clinic rather than following a standard recipe. The dynamics of each clinic are varied. Some clinics are comprised of very computer savvy individuals while others are not. Some clinic staffs learn better in their own clinic environment while others struggle to stay focused if they are not in an

off-site training room. Through pre-implementation meetings, clinic shadowing, and working with the clinic directors, the implementation team schedules training based on what will be most successful for that particular group of users. Our advice to other organizations is to be flexible with the training. Consistency with the material being taught is of utmost importance; however, the manner in which the clinics are trained should be customized to meet their needs. We also lengthened the time that the implementation team spent in the clinic after the clinic was back up to their full schedule. This was something the users told us they needed, so the process was enhanced.

Another area in which we struggled is the fact that our test and live systems differ greatly. I.T. professionals will tell you that there are tests and experiments going on from all aspects of the system in the test ring. It is almost impossible to keep a test and live system synchronized. This can cause confusion during trainings of any sort. Because the implementation of an ambulatory electronic medical record is so extreme, we recommend that organizations do their best to minimize differences between their test and live rings prior to training.

Education to Patients about the Change from Paper to Electronic Records. The implementation process will not be seamless. The more notification that can be given to patients about the changes happening within the clinic, the better. We recommend standardized scripting for receptionists so they can inform the patients when they schedule appointments that additional staff from I.T. will be in the clinic working on the day of their appointment. It is also important to have standardized scripts for questions that arise from patients about the security of their electronic medical records.

While challenges are to be expected, we are also pleased to report several successes as a result of this project. Below are some areas in which we've experienced positive outcomes:

Easy Access to Information and Speed of Results. Clinic staff and providers agree that access to pertinent patient information is much easier when it is electronic. Paper charts and sticky notes are too easily misplaced in busy clinics. The organization of the electronic chart is a plus for our users. Additionally, lab results are pushed directly from our lab system to the providers' desktops. This process results in quicker turnaround times for patients to be notified about their tests and this leads to quicker treatment.

Easy Access to the Implementation Team. SBL uses a pocket phone system (cordless phones that work throughout the building). Each implementation team member carries a pocket phone. Users just need to remember one telephone number to call for assistance. It is important to resolve issues with the users as soon as possible to prevent the patients from experiencing delays. By having immediate access to the implementation team, calls can be answered on the spot and the caregivers can get back to patient treatment.

Monthly Newsletters. Our users appreciate the monthly newsletter that is sent to them electronically. The newsletter is an excellent way to communicate upcoming process changes as well as to reeducate users on processes. We have had very positive feedback on our newsletter.

Compensation Plan. Our providers are compensated based on Relative Value Units (RVUs). During the first four weeks of a clinic implementation, patient schedules must be reduced. It would be difficult to maintain pre-implementation patient levels while learning a new system.

Our providers are compensated for the number of RVUs that they would have earned during the four week period had their schedules not been reduced. Below is a table that shows our schedule reduction plan:

Table 4.

Week	Task
Week Prior to Go-Live	Enter historical medications and chronic problems for the following week's appointments. Double check dictionary setup. Core teams spend an hour with pilot physicians reviewing and training on functionality.
Week 1	Reduce schedule by 50% all week A member of the Implementation/Core team should be in the clinic all week
Week 2	Reduce schedule by 25% all week A member of the Implementation/Core team should be in the clinic all week
Week 3	Reduce schedule by 15% all week A member of the Implementation/Core team should be in the clinic all week
Week 4	Reduce schedule by 10% all week A member of the Implementation/Core team should be in the clinic all week

Physician Champion. SBL benefited from having a physician champion to help lead the project. Dr. Sherri Howell served as our champion. Her family practice clinic was the pilot clinic. Below is the job description to which Dr. Howell committed:

Ambulatory Electronic Medical Record Physician Champion Description. The success of the Ambulatory Electronic Medical Record depends on several factors: detailed project plans, intelligent and enthusiastic resources, support from all levels (administrative through clinic staff members), and provider acceptance and willingness to adapt to enhanced processes. Providers are more likely to accept a major project if it is championed by one of their peers. Because the Provider Champion will be a practicing Sarah Bush Lincoln physician, he or she will be affected by the project in the same manner as his or her peers, therefore providing a true representation of the medical staff as a whole.

Physician Champion: Employment Status and Terms.

- Be a Sarah Bush Lincoln Health System employed provider

- Have completed one year of employment with the organization at the time of acceptance

- Have demonstrated attention to the values of SBLHS in his or her practice

- Have a history of leadership roles within the organization (preferred, but not required)

- Have credibility with all Employed Providers of Sarah Bush Lincoln Health System

- Commit to fulfilling the role of Physician Champion for a minimum term of two years

- Support the members of and work as part of the Ambulatory Electronic Medical Record team and core team. Serve as a mentor to the groups

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Physician Champion: Project Implementation Requirements.

- Support and adhere to the dates outlined in the Project Plan

- Not be required to be an expert in the field of computer technology, but will engage in obtaining a basic understanding of the software as a means to promote and build the system

- Utilize the proper software terminology in order to effectively communicate with the Information Systems staff and software vendor, yet have the knowledge and ability to communicate effectively with his or her peers

- Travel will be required

- Attend planned conference calls with the vendor

- Attend scheduled vendor training

Physician Champion: Leadership Expectations.

- Ensure that physician input is sought and reflected in decision-making

- Help quell and mitigate concerns voiced by his or her peers by listening, identifying true concerns, and sharing the concerns with the core team

- Serve on the Physician Advisory Committee

- Serve as leader of the Ambulatory Electronic Medical Record Physician Advisory Committee (AEMR-PAC)

- Be a role model and tutor

- Utilize the Ambulatory Electronic Medical Record and Computerized Provider Order Entry

- Continue to tutor after his or her term as Physician Champion is complete

Clinic Champion. Similar to the physician champion role, SBL had a clinic champion. Amy Carlen, LPN served in this role. Below is the job description to which Amy committed:

Ambulatory Electronic Medical Record Clinical Champion Description. The success of the Ambulatory Electronic Medical Record depends on several factors: detailed project plans, intelligent and enthusiastic resources, support from all levels (administrative through clinic staff members), and provider and clinic staff acceptance and willingness to adapt to enhanced processes. To be successful, this project must be led by System Practices providers and clinicians. Information Systems will provide the implementation experience, tools, and

organizational direction for the project. A Clinical Champion is necessary to assist Information Systems and System Practices Providers with the design, build, and process implementation required for this project.

Clinic Champion: Employment Status and Terms.

- Be a Sarah Bush Lincoln Health System employee

- Have a clinical background

- Have completed one year of employment with the organization at the time of acceptance

- Have demonstrated attention to the values of SBLHS in his or her daily work

- Have a history of leadership roles within the organization (preferred, but not required)

- Commit to fulfilling the role of Clinical Champion for a minimum term of two years

- Support the members of and work as part of the Ambulatory Electronic Medical Record team and core team.

- Have knowledge and experience with the administrative side of clinic operations

- Strong clinical experience in various practice settings

- Demonstration of improved clinic efficiency, cost-effectiveness, and staff retention

- Understanding of the psychology of change

Clinic Champion: Project Implementation Requirements.

- Support and adhere to the dates outlined in the Project Plan

- Not be required to be an expert in the field of computer technology, but will engage in obtaining a basic understanding of the software as a means to promote and build the system

- Utilize the proper software terminology in order to effectively communicate with the Information Systems staff and software vendor, yet have the knowledge and ability to communicate effectively with his or her peers

- Travel will be required

- Attend planned conference calls with the vendor

- Attend scheduled vendor training

Clinic Champion: Leadership Expectations.

- Ensure that physician and clinical staff input is sought and reflected in decision-making

- Help quell and mitigate concerns voiced by his or her peers by listening, identifying true concerns, and sharing the concerns with the core team

- Attend Physician Advisory Committee meetings

- Attend Ambulatory Electronic Medical Record Physician Advisory Committee (AEMR-PAC)

- Be a role model and tutor

- Utilize the Ambulatory Electronic Medical Record

- Continue to tutor after his or her term as Clinical Champion is complete

Importance of Nursing Staff Acceptance. Based on the work the implementation team has done to date, it is apparent that the nurses' acceptance of the change is extremely important. If the nurse can adapt well to the changes in software and processes, the provider is usually able to follow. As mentioned above, it is doubtful that users would be satisfied by reverting back to paper charts.

Importance of Ambulatory Data to the Emergency Department Caregivers. In 2006, the implementation team conducted a survey of our emergency department caregivers. The initial survey results indicated that the caregivers were not always able to obtain a complete list of medications for patients because the patients could not communicate or simply didn't understand their medications. We polled the emergency department caregivers again in 2009 to get a sense of how the ambulatory electronic medical record implementation has influenced their ability to provide care. All staff surveyed state that the ability to access patients' ambulatory medications has been an enhancement and they look forward to having more information available when the remainder of the clinics implement electronic records.

We consider this project to be successful even though we have not completed all of the clinic implementations. We look forward to improving existing clinic processes through information gathered during an audit process. We also plan to update our software in the spring of 2010. We appreciate the opportunities that AHRQ has provided us. SBL would be happy to talk with other organizations that are embarking on this type of project. We would not be where we are today without the support of grant funding and we sincerely appreciate this opportunity.