



## **EHR Implementation in Ambulatory Care**

**A White Paper by the  
HIMSS Ambulatory Paperless Clinics Work Group**

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## **Introduction**

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The President's Executive Order issued in April, 2004 calls for widespread use of electronic health records for all Americans by 2014. Yet adoption rates for this technology remain surprisingly low. The CDC's National Center for Health Statistics announced in the summer of 2006 that while nearly one quarter of the nation's physicians (23.9 percent) reported using full or partial electronic health records (EHRs) in their office-based practice, just one in ten physicians (9.3 percent) used EHRs with the four basic functions (e-prescribing, computerized provider order entry, automated reporting of test results, and physician documentation) considered necessary for a complete EHR system.<sup>1</sup> Many researchers and groups, including the HIMSS Global Task Force, have examined existing barriers that hinder EHR adoption. In the United State and in other countries, four common barriers have been identified: communication, standardization, funding and interoperability.<sup>2</sup> This report offers differing experiences and perspectives of ambulatory care practices that have adopted, or attempted to adopt, health information technology into their daily medical practice. While some practices have clearly struggled to become paperless, others have enjoyed great success. It is from their stories and case studies that we can contribute to a larger body of knowledge that will ultimately help more medical practices successful adopt EHRs.

The different aspects of EHR implementation addressed in this paper include what to do with the paper record; choosing appropriate technology; project management; configuration needs; training needs; the case for quality; and return on investment.

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## **What to Do with the Patient Record**

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Planning for a new electronic patient record generally begins with a discussion about what to do with the old paper record. This is a complicated decision based on numerous factors. What follows is one clinic's innovative method for moving data from the paper record into an electronic one. Generally speaking, this is done via a mix of scanning and abstracting.

One of the obvious benefits of implementing an EHR is the elimination of the paper-based patient charts and all of the costs and inefficiencies associated with them. When Roswell Pediatric Center in Alpharetta, Georgia implemented the Noteworthy Medical Systems EHR in 2001, they worked with the implementation team to plan and execute a coordinated transition from paper-based to electronic charts for each of their 38,000 patients. Once the transition was complete, Roswell was able to ship all paper-based charts off site. Roswell now uses the EHR for each of their 90,000 patient visits annually.

Roswell's transition was carefully planned and coordinated. The first step was determining which information to enter by hand and which could be simply scanned into the EHR. To make this decision, the implementation team identified the information

necessary for the EHR to provide clinical decision support. A Critical Data Checklist (CDC) was created that listed the items to be hand-entered. Immunization history, allergies, current medications and growth histories, among other items made the checklist. It was important that these items be hand-entered into the Noteworthy EHR and stored in structured database format so that Roswell could take full advantage of well-care reminders, immunization forms, and growth graphs that had been set up in the system.

To enter the designated information into the electronic chart Roswell brought in six part-time employees to help. While most of these employees had no clinical training, they did have prior experience on Roswell's front desk and were therefore familiar with their paper-based patient charts. Each day they would enter the information for patients with checkups the following day according to the Critical Data Checklist. When the patient arrived for their checkup, Roswell staff would route the paper-based chart to the practitioner for comparison with the newly created electronic chart. When inconsistencies were found, the practitioner corrected them during the encounter so the paper-based chart could be retired.

Once the practitioner was convinced that all pertinent information had been hand entered, he or she signed the Critical Data Checklist and from that point on, only the electronic chart was used for that patient. In total, the process of pulling paper-based charts prior to patient check-ups and use of the Critical Data Checklist lasted several months. Ultimately, Roswell's approach began to pay dividends as patients returned for additional well-child checkups and the patients' electronic chart was complete. After six months, the six part-time employees were no longer needed and the front desk personnel had enough time to enter patient history according to the CDC as sick-child visits were scheduled.

In an effort to remain paperless, Roswell began scanning incoming clinical documents shortly after go-live. Many of the 1,500 paper documents received each day are now scanned into the patient's electronic chart after being reviewed and signed by a practitioner. Roswell also scans much of its administrative documentation into the EHR as well, making the practice completely paperless.

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## **Appropriate Technology**

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Other critical decisions made early in the life of the project concern the type of technology that will support the EHR. Most clinics will require the help and expertise of an information technology professional to ensure that the office network is of sufficient quality to support the EHR and to establish safe and secure practices for maintaining highly confidential patient data.

Cockerell and McIntosh Pediatrics is a two-office pediatric clinic in the Kansas City metro area. The practice is made up of seven physicians and three nurse practitioners, providing pediatric and adolescent care to over 25,000 patients. Cockerell and McIntosh Pediatrics provides on-site laboratory and radiology services, allergy and asthma care, and an urgent care clinic during evening and weekend hours. In 2003, Charles F. Cockerell, MD, began researching EHRs and decided to purchase Misys EMR. The following text outlines some of the hardware considerations that are associated with the implementation of an electronic medical record (EMR).

### **Infrastructure**

Cockerell and McIntosh Pediatrics houses seven servers at its primary office located in Blue Springs, Missouri. The remote site connects to the primary office via a T1 line. Two Citrix servers host the Misys EMR and Tiger applications as well as all other software applications used in the office. This type of environment, known as a thin-client environment, involves installing all applications on a centralized server and accessing the servers with a thin-client device or “dumb-terminal.” Management of a thin-client environment is very efficient, as there is no need to load the EMR on every user’s device. Instead, the application is loaded one time on the server and is immediately accessible to all users who log on to the server. This can result in considerable cost and time savings. Thin-client devices generally cost less than PCs, and there is less time spent loading every application on every device.

### **Client Devices: Providers and Nurses**

Cockerell and McIntosh Pediatrics has always been a point-of-care provider, and the practice decided to continue using that method for inputting data into an EMR. The practice briefly considered setting up dumb terminals in every patient room; however, the risk of children tampering with the equipment was too great. Instead, each user (providers and nurses) carries a tablet PC from room to room. The PCs connect wirelessly to the network, allowing the providers the freedom to move throughout the office without having to log on and off the system. The tablet PCs are loaded with Microsoft Windows XP-Tablet Edition, which includes built-in handwriting recognition. The users use a stylus to select items from the EMR templates and handwrite additional information when necessary.

### **Client Devices: Administrative Personnel**

Most of the users in the billing and patient services departments access the system via dumb terminals. However, even in a thin-client environment, it is sometimes necessary to use regular PCs. For example, the scanners that are used to scan patient insurance cards must be connected to a PC, or “fat-client” device.

### **Client Devices: Scanning Stations**

Cockerell and McIntosh Pediatrics currently employs two full-time employees to scan in paper correspondence and existing paper records. Between the two offices there were approximately 28,000 paper charts that needed to be scanned into the system. The two scan station computers are regular PCs, each one containing a high-volume scanner. The

computers are be loaded with the EMR applications and have sufficient RAM to handle the high volume of scanning. It was important that the practice consider the amount of paper that would be scanned so that the servers would contain adequate disk space. In addition, the scan stations needed to be located at the primary office location, as scanning large amounts of data over the T1 would use up considerable amounts of bandwidth, dramatically slowing down the network for all users.

### **Routine Upgrades**

It is helpful and necessary to budget and plan for routine software upgrades to keep the EHR current. The Care Group in Indianapolis, Indiana reports being several versions behind in their software upgrade process. This limits the features and functions that are available to them such as e-prescribing, voice recognition, EMR-based messaging and tasking, and interfaces (such as lab, diagnostic equipment, and billing). The Care Group is in the process of upgrading to a newer version of GEMMS so that are they are no longer “self limiting the value that can be achieved with EHR.”

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## **Project Management**

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Project management skills are required to manage the complexity of changing a practice from paper to EHR. Often, large practices designate or hire a short-term project manager, and equally as often, small practices ask an office manager or eager staff member to take on the assignment. Depending on the volume of work that the team member has to do, this may or may not be a successful strategy.

Florida Neurological Group in Ft. Myers, Florida attributes the success of their Mysis EHR implementation to the full-time project manager who was dedicated to driving the implementation process. This person was completely focused on all issues relating to the needs of the practice from technology to training to conversion. They felt, and still do, that this was a key success factor.

Consider the multitude and variety of tasks that an EHR project manager focuses attention on during the implementation. The following list is in no way exhaustive.

- 1. Development of a scanning/abstracting policy.** The Florida Neurological Group converted established patient records first by asking the supervising physician to review the paper chart. Only files deemed essential for patient care were converted (scanned) into the new EMR. This process took about four months to accomplish. During this transition period, the practice maintained both paper and electronic records for patients.
- 2. Create a shared need.** The project manager must gain “buy-in” from all physicians and staff members. Often, this is not an easy task, as there is generally some resistance on the part of certain physicians and staff members who are less than comfortable with computers and technology.

Nonetheless, it is considered by many to be a critical success factor in implementing EHR.

- 3. Analyze workflow.** They began by mapping out the entire practice workflow and, with some help from their vendor, decided on how the new system would work in their practice. Workflow studies can be used to train on the new system. This was an ongoing process involving everyone in the practice.
- 4. Develop an implementation plan.** The Florida Neurological Group implemented the EHR in “phases.” The practice first brought the most enthusiastic physicians live with the EHR. These doctors were more forgiving of the issues that are inevitable in a new system. After the system was in use and the “kinks” were eliminated, the remainder of physicians was brought on board.
- 5. Facilitate third-party interfaces.** The EHR system at Florida Neurology Group supports interfaces for lab, PACS, several diagnostic devices, and their practice management system. They use Microsoft Outlook extensively with their EMR for communication with referring providers, pharmacies, hospitals, etc. Contracting for building, testing, and maintaining these interfaces requires tremendous attention. Future functionality will include e-prescribing, patient email and patient portal access.
- 6. Template development.** Most (85-90%) of physician note entry is template driven. These templates were modified from the initial vendor-supplied material or developed by the practice themselves. There are no provider-specific templates as these would be too cumbersome to maintain, rather the five-member group had to come to complete agreement as to what the templates would look like.
- 7. Training.** Every person in the medical practice is affected by the EHR and must be trained to do their work differently. A good project manager will develop in-house training material for the practice to use well beyond go-live, as team members join and leave the practice. The project manager at Florida Neurology Group taught the medical assistants to take and document a simple patient history and vitals directly into the EHR. The only paper currently used is a “Review of Systems” worksheet that the patient completes in the exam room while waiting for the physician. The provider then enters all data directly into the EMR using PCs located in every exam room and only dictates the HPI and comments when needed with voice recognition tools (Dragon Medically Speaking 9.0). There are times when patient leaves exam room with transcribed notes in their hand.

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## Configuration

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Many medical practices are completely unaware of the amount of time they will spend configuring their new EHR. The dictionary defines “configuration” as:

- The act of changing software by changing the settings;
- To set the basic parameters; and
- To design, arrange or set up for a specific use.

Basic EHR configuration tasks include, but are not limited to:

- Importing a list of local pharmacies (addresses, telephone and fax numbers) and referring physicians;
- Modifying (adding, changing or deleting) the chief complaint or reason for visit descriptors to match your practice or specialty type;
- Defaulting common ROS questions and answers (sometimes building a “short” and “long” ROS list for different types of visits);
- Defaulting a common physical exam (sometimes building different types of exams; for example, a “short” and “long” or “male” and “female” exam, “well woman” or “well child”);
- Building protocols filled with common order sets;
- Scanning paper notes from the patient’s longitudinal paper record;
- Abstracting key data points for the physician’s ease at go-live (for example, medication and allergy list, problem list and past medical and family/social history);
- Building the descriptive tags for a lab or radiology interface;
- Scanning physician signatures for the bottom of notes and prescriptions; and
- Determining and building security settings, meaning which user logons have access to which parts of the patient record and also, which logons can perform what functions within the EHR (for example, who can “write” a prescription, sign a note, delete a record, change a template?)

Depending on the EHR product you have purchased and the degree of customization you desire, the customization process can take days or many months to complete. Many physician practices are astonished to learn that the “training and implementation” fees they pay the vendor according to the EHR contract cover only the time the vendor spends teaching the practice how to configure their own system. The software vendor does not actually configure the system for you.

Bailey Family Medical Care is a two-doctor family practice located in Scottsdale, Arizona. They successfully implemented the practice management portion of an integrated EHR product in November, 2006.

Configuration training for the EHR took place in early December, immediately before the holidays, during the busiest clinical time of the year. The training was delivered by the vendor EHR implementation specialist for the two doctors and took three days to complete. Both physicians felt completely overwhelmed with what they describe as “twenty four hours of minutia detail” and became angry when they realized that they would have to either give up every moment of spare time they had, or just stop seeing patients in an effort to configure the system. In the office manager’s words, “They were being asked to learn and enter data at such a small, detailed level. This is very hard to do without a ‘big picture,’ without knowing what it will look like on the other end. There was no hand holding offered; it was just ‘get in there and do it.’ Going electronic is not going well for family physicians. We need help!” The implementation specialist left the doctors alone to configure the EHR and checked in with them just days before their go-live training was scheduled in mid-January.

Bailey Family Medical Care made a decision at that point to spend even more money on their EHR project to hire a nurse-consultant who could help the doctors configure their system clinically. To date, they are on track for a September 2007 implementation, eight months after it was initially scheduled.

**The lesson learned?** Do not underestimate the amount of time that is required to configure an EHR system to your specifications. Generally speaking, this configuration work must be done by the practice clinicians, and is therefore one of the more costly aspects of EHR implementation.

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## **Training Needs**

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After spending two months configuring their EHR and one week of staff training, All Family Care, in Phoenix, Arizona went live with eClinicalWorks in August, 2006. This solo family physician was motivated to go electronic because of the promised improvements in patient care and the obvious problems with the paper system.

This rapidly growing family practice is pleased with the EHR, citing numerous examples such as (1) the ability to attach a photograph to the patient’s record, which is helpful for telephone interactions with the patient such as prescription refill requests; (2) the ability to reference charts from anywhere, home or hospital, which is helpful for after-hours or on-call issues; and (3) the enhanced accountability for staff that comes with electronic tracking of messages and tasks. The practice administrator explains that there is no more “blaming” because it is obvious which employee did what task, when.

The one week of vendor-facilitated training covered issues such as billing and coding, dictation and transcription (using a voice dictation product), messaging and tasking, documenting phone messages and clinical encounters, and using e-prescribing and

electronic ordering of tests such as labs and radiology. Office medical equipment such as an ECG machine, spirometer and vital sign machine were interfaced with the EHR.

All Family Care cites a supportive training environment and responsive support-desk team with their success at implementing the EHR.

*Knowing is not enough; we must apply.  
Willing is not enough; we must do.  
-Goethe*

Contrast their experience with that of Pinnacle Cardiology in Scottsdale, Arizona. Pinnacle Cardiology went live with the practice management portion of their integrated EHR product in May, 2006 when the practice first opened its doors. It has yet to go-live on the EHR primarily because of the lack of time available to configure the system, as previously discussed. One of the main reasons that this task has been postponed is attributed to the time spent in training.

The solo-cardiologist office has a part-time office manager, one full-time RN, one full-time medical assistant, and a full-time front desk person. Billing and transcription services are outsourced. Over the course of the last year, all of the positions have been replaced at least once. The time spent recruiting, interviewing and hiring office staff is consuming, but add to that a full day of computer training on an electronic and highly technical system for each new employee, and there is greater cause for concern. Highly technical and electronic offices require additional training for new employees and physicians alike. The one or two days a month that have been devoted to recruiting and training new office staff could have easily been spent configuring the EHR system for go-live.

Vendor training is expensive. Not only are practices charged highly competitive consulting rates for the training provided (currently ranging between \$135-\$260 per hour), they are frequently charged for travel and lodging expenses that the trainer incurs while visiting the practice. Practices actively searching for EHR products should ask for a comprehensive training plan upfront so that they can compare training packages with other vendors. Additional services or fees such as after-hours support desk calls, travel expenses, on-line training materials and videos, additional copies of training manuals (often the practice is only given one paper copy, which can be limiting), and no-cost web-ex seminars can be negotiated along with the purchase price.

The experience of Pinnacle Cardiology suggests that medical offices ought to plan for training and re-training costs in the EHR budget and seek to employ staff who are comfortable and willing to work with computer and health information technology. Using a “train the trainer” model is helpful in larger practices and also in practices with high staff turnover. In this model, the vendor shares training materials, techniques and expertise with practice staff who, in turn, train other practice staff, leaving behind an experienced product trainer within the group.

It is generally thought that the more time practice staff, including physicians, spend training on the system prior to “go –live,” the more comfortable and faster they will be during a real-time clinical encounter. A period of reduced productivity, when patient appointments are scheduled for longer-than-usual time periods, can last for a few days or for several weeks, depending on the provider’s comfort level with the technology. The Care Group in Indianapolis, Indiana explains that this period of reduced productivity was considered a “short-term revenue hit” and yet it was an expected part of the cost of EHR implementation. Each of two practice sites with 25 cardiologists at each, cut back patient appointments only for the first few days to allow staff to become comfortable with the new system and workflow processes.

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## **The Case for Quality**

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Organizations are driven to EMR investments for various reasons. Two reasons commonly cited are increased efficiency and improved quality of care. Mid Carolina Cardiology in Charlotte, North Carolina, transitioned from paper to GEMMS’ electronic health record, and has implemented a benchmarking process to help them improve clinical outcomes.

In order to manage the voluminous data that is captured in the EHR, data must be captured in discrete fields in the EMR so reporting can be done without costly and time-consuming human intervention. A defined set of indicators is required so that the same indicators can be repeatedly measured over time. Mid Carolina Cardiology, for example, chose five distinct measures that they benchmark. This data is used internally and is also sent to external quality organizations. Feedback from the benchmarks is furnished to each provider so they know if they are providing care consistent with current guidelines. The feedback leads to performance improvement, which means that Mid Carolina Cardiology patients ultimately receive a higher standard of care, and in the best scenario, experience fewer clinical events requiring intervention.

Efforts to improve competitiveness are critical; the EMR is one tool to help enable the improvement. This organization made the commitment to do what was necessary to compete in an evolving consumer-oriented healthcare model by adopting techniques from other industry to continually and incrementally improve the services they provide. In this way they remain competitive and are considered leaders in their market.

Mid Carolina Cardiology also leverages the capability of the EMR to support their clinical research efforts. They perform about 35 studies a year, with 14 FTEs dedicated to the process. The EMR helps to identify potential candidates to include in planned studies. The provider is contacted to see if the candidate patient could be contacted about participating in the study. This has allowed the organization to identify research participants with much less burden and paperwork during the normal course of caring for patients.

There is still some debate about what record management model is better for the provider; paper or digital. There's really no debate about which model enables better care for the patient but it does require the providers to change the way they organize and access information. For some, that change is very hard to accomplish, but from those providers who have done it, they say it is worth the effort.

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## Return on Investment

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Although the practices interviewed for this paper were reluctant to share hard data on the financial aspects of EHR implementation, they were happy to share their pleasure at the cost savings they have achieved with EHR. Generally speaking, cost savings can be divided into the following categories:

- **Transcription.** The cost savings from transcription, especially in the specialist's offices were significant, often coming close to nearly one million dollars a year in large practices.
- **Medical records space.** Medical office building rent per square foot is costlier than other storage options, and the space no longer needed for storing charts can be used to generate revenue. For example, one practice turned over 1,000 square feet of former medical records space into a physical therapy clinic. In addition, there are frequently lower costs of rental storage and retrieval of off-site records.
- **Paper chart costs.** As anyone in a doctor's office today knows, the cost of supplies, particularly medical charts and tab, has increased dramatically over the years. Eliminating charts and chart supplies is a cost savings in itself.
- **Staffing costs.** Particular in large clinics, fewer clerks are required to transport, file and manage paper with EHR. Report writing and data collection becomes automated, billing practices are simplified. Smaller clinics are less likely to experience these benefits due to the highly efficient staffing models (and cross-functional employees) that are already present.

Finally, electronic medical practices enjoy revenue enhancement from the EHR and these can be categorized in the following way:

- **Coding enhancements.** Several clinics report that their office notes are more thorough and more adequately reflect the amount of time spent and degree of complexity required of clinicians, thereby increasing coding and eliminating under-coding.

- **Enhanced bargaining.** The savvy negotiator can pull data from the EHR to use during contract negotiations with payers. Physicians can easily demonstrate compliance with guidelines, insurance formularies, etc., and this may be helpful in generating higher fee schedules.
- **Research generation.** The sophisticated search and reporting functions in the EHR make it much easier to collect data on a specific patient population or problem and facilitate research. Research dollars can provide needed supplementary income for a practice.
- **Pay for performance.** Lastly, the federal government and various state payers are talking about “P4P” schemes and recently CMS, released a list of 66 quality measures in their newly named Physician Quality Reporting Initiative (PQRI).<sup>3</sup> Eligible Medicare providers may apply for a bonus payment that is equivalent to 1.5% of total allowed charges (provided from July 1<sup>st</sup> through December 31<sup>st</sup>, 2007).

Others have written about the return on investment for practices investing in EHR and have made conclusions similar to the practices interviewed for this paper., suggesting that the annual revenue enhancement can be as much as \$30,000 per physician.<sup>4-6</sup>

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## Conclusion

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With approximately 25% of the medical community claiming to have some implementation experience with EHR, learning about EHR options has become a lot easier over the years. The promises of EHR continue to be compelling: namely enhanced patient safety, improved provider efficiency, and increased enterprise productivity. While choosing the right product is definitely a critical success factor, we propose that choosing the right implementation partner is also critical to the success of the EHR project. As we have learned from our colleagues who generously shared their implementation experiences, purchasing a good product is not enough. One must go through the arduous task of preparing the technical infrastructure, managing a complex implementation, configuring the system to a physician’s exact specifications, training on a highly technical product, and finally, surviving “go live.”

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## **Acknowledgments**

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