

Selecting an Electronic Medical Record System for Small Physician Practices

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Abstract

Background: While electronic medical record (EMR) systems have demonstrated the potential to improve quality of care and reduce medical errors, relatively few practitioners have implemented EMR systems. This article presents a case study that explores the process by which small physician practices may select an ambulatory EMR system.

Methods: We assessed the appropriate criteria small practices should use in selecting an EMR system and then evaluated a range of commercially available EMR systems according to cost, functionality, and interoperability with existing systems.

Results: The process for selecting an EMR system starts by creating a budget for start-up costs and monthly maintenance expenses. Next, a practice should evaluate its strategic objectives and current computer infrastructure. The group should then define the appropriate functionality requirements specific for their practice. Finally, a certified ambulatory EMR system that interfaces with existing office systems can be selected.

Limitations: This case study explores the process of EMR selection for rural, solo physician practices. The ability to generalize the process described herein to broader types of physician practices, such as multi-specialty group practices or to those practices with larger budgets for EMR systems, may be limited.

Conclusions: Multiple critical and often competing factors—including cost and interoperability with existing systems, as well as organizational goals and obstacles—influence the selection of an EMR system for small physician practices. However, by following a standardized process for selecting an EMR system, small physician practices will find EMR selection to be a relatively straightforward process.

Keywords: electronic medical record; family medicine; rural community; small physician practices

The Bush administration developed a goal to have the US health care industry adopt electronic medical records (EMRs) by the year 2014; with only five years to go, that seems less and less likely.¹ Proponents of EMRs anticipate they will generate long-term cost savings, reduce medical errors, and promote greater health system efficiency.²⁻⁸ In a survey of 2,758 physicians in September 2007 and March 2008, only 4% of physician practices had a fully functional EMR.³ For rural physician practices these numbers are thought to be even lower.⁹ While most physician practices use electronic practice management systems for billing, the adoption of clinically functional EMRs has been quite slow.¹⁰ Initial start-up costs, lack of interoperability with existing systems, lack of national standardization of information technology, and lack of

motivation to learn a new system are a few of the barriers to purchasing an ambulatory EMR system.¹⁰

Many small physician practices and small hospitals that lack their own information technology staff hire consultants to select an EMR system for them. Choosing an EMR system may be one of the major impediments to the broader adoption of EMRs. Critical objectives include finding a vendor that can meet a practice's individual needs and selecting a system that will be easy to learn and cost effective for the practice. This paper presents a case study describing the process by which a small, rural physician practice in Smithfield, North Carolina, selected an ambulatory EMR system that was recommended by the authors of this article—students and faculty of the University of North Carolina Gillings Schools of Global Public Health. This

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process can be used as a model for other similarly-situated practitioners to follow in adopting EMRs in their own practices.

Methods

The physician practice in this case study decided to purchase an ambulatory EMR system to meet their goals of creating a paperless and more efficient practice. The owner did background research on what type of EMR her practice needed, created a budget for the practice's start-up costs and monthly maintenance fees, and provided a list of priorities for a suitable EMR system. She also gained staff buy-in before meeting with the authors of this study. The authors' task was to select an EMR system that would meet the practice's budget and internal priorities and interface with recently purchased practice management software (see Table 1).

The EMR selection process began by evaluating ambulatory EMR systems certified by the Certification Commission for

Health Information Technology (CCHIT). An initial list of CCHIT certified vendors were identified and then the search was narrowed to vendors who were frequently used in North Carolina because interfacing with the existing EMR systems of local hospitals and local referring physicians was important to this practice. The remaining EMR vendors were assessed by their ability to provide web-based EMR services. Finally, data relating to cost and user satisfaction were evaluated in the final stages of the selection process.

Practices that had adopted EMRs were contacted by one of the authors (DK) and asked about their satisfaction with the EMR. Calls were made to three physicians and one practice administrator. The telephone surveys asked the informants to describe the advantages and disadvantages of each user's individual EMR system, their opinion of their EMR system, and their overall satisfaction with their system. In addition to these telephone surveys, we analyzed published customer satisfaction surveys and weighed the published survey data results more heavily than our informal telephone survey findings when assigning user satisfaction scores to each EMR system. We then narrowed the field of EMR systems to two systems that best met these priorities and presented this list to the owner of the practice.

Results

Practice Budget

The current EMR market has many vendors and finding a system suitable for a practice with a single provider is time-consuming and can be tedious. Solo practitioners usually have few staff in one office location, a condition that may affect the usability of an EMR. Deciding to purchase an EMR system includes creating a budget, detailing available funds for start-up costs and monthly EMR maintenance expenses, determining whether an application service provider (ASP) model or a client server model best fits the practice's needs, and choosing an EMR that interfaces with existing office systems (see Figure 1).^{11,12}

In terms of cost, a practice should determine how much they can afford to spend on an EMR system. The total cost of an EMR system includes the cost of hardware, software, EMR implementation, technological support, and temporary loss of practice productivity.¹³ Published reports describe the total initial cost of an EMR system ranging from \$15,000 to \$30,000.^{8,14} Annual maintenance fees run from \$1,500 to \$5,000 per provider per year.^{8,14} Other costs that should be specified in the budget are technological upgrades necessary to fully implement the EMR system. These technical upgrades include the technical and interfacing requirements needed to ensure that workstation computers have enough functional memory, the correct internet connections [e.g., T1/T3 or digital subscriber line (DSL)], hard disk space, interface cards to execute the software, and a single workstation for a fax server. Most offices can meet these interfacing requirements without any additional costs. Despite these high initial startup costs the return on investment is positive. There are potential cost

Table 1.
Selection Criteria Worksheet with Functional Requirements Based on One Practice's Priorities

Primary

Manage diagnostic studies results

Order diagnostic tests

Support secure electronic communication

Write prescriptions

Secondary

Assess clinical guidance

Capture patient history

Drug, food, and allergy interaction checking

Enable printout of information when necessary

Enforce patient privacy and confidentiality

Ensure integrity, data retention, and availability

Manage medication lists

Manage patient reminders

Manage patient-specific care plans, guidelines, and protocols

Manage problem lists

Online patient portal

Order referrals

Patient-specific dosing and warnings

Provide secure authentication

Summarize health record

Tertiary

Capture external clinical documents

Capture variances from standard care plans, guidelines, and protocols

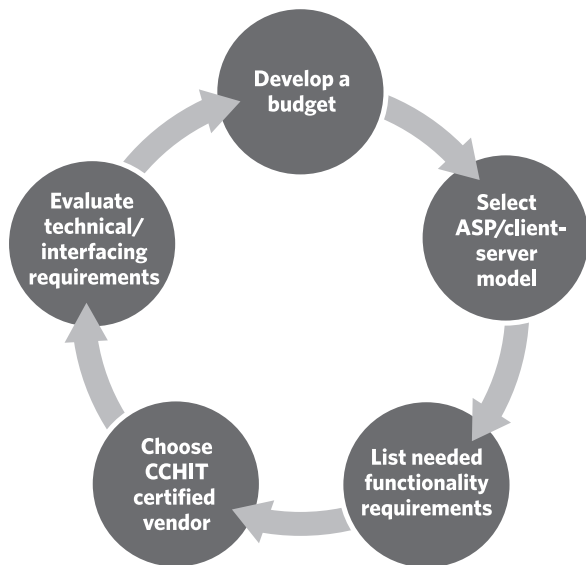
Manage clinical documentation

Manage consents and authorizations

Manage medication formularies

Provide patient-specific instructions

Figure 1.
Process for Selecting an Ambulatory EMR for a Physician Practice^{11,16,26}



savings from improved provider and staff efficiency, reduced transcription costs, fewer prescribing errors, reduced maintenance of paper charts, reduced coding errors, and increased charge capture.^{8,13-15}

Application Service Provider vs. Client-Server Model

The practice in this case study wanted an EMR system based on an ASP system. The ASP model is a web-based EMR system that has many features similar to online banking. The ASP model is ideal for small practices who want to outsource the maintenance, storage, and security of their EMR systems (see Table 2, page 402).¹⁶ Conversely, the client-server model is ideal for large practices that have internal information technology departments and can maintain their own server. Of the two, the ASP model offers lower start-up costs. Once a practice has selected an ASP model or a client-server model system and the budget has been determined, the practice should decide what it needs the EMR system to do.

Functional Capabilities

There are many different types of EMRs with different functional capabilities. Most EMR systems have more capabilities than a small physician practice needs, but each practice should articulate the functionalities they need so the most appropriate EMR system is selected.

Certification Commission for Health Information Technology Certification

Given a practice's functional requirements, an EMR search should be narrowed to include only ambulatory EMR systems that are certified by the Certification Commission for Health Information Technology. CCHIT certification ensures that baseline functionality requirements are met. Founded by the

American Health Information Management Association, the National Alliance for Health Information Technology, and the Healthcare Information and Management Systems Society, CCHIT is a nonprofit organization that offers voluntary certification to EMR vendors who have the functionality, interoperability, and security requirements to meet current industry standards.¹⁷ CCHIT certified vendors have the following functionality: (1) maintaining patient records that include medication, demographics, and problem list management; (2) summarizing the health record; (3) managing clinical documents; (4) ordering medication and managing drug interactions with pharmacy communication; (5) ordering diagnostic tests (including imaging and laboratory tests); (6) managing patient directives and care plans; and (7) presenting disease management and wellness alerts.¹⁸ Beyond these criteria, CCHIT certified vendors should be assessed regarding their cost and overall fit for a physician's specific practice environment.

Case Study

The small, rural family medicine clinic that served as the case study for this analysis is owned and operated by a single physician. The practitioner sees 25-30 patients daily and has a staff of one registered nurse and two office assistants. The practice's current technological infrastructure includes three computers running an ASP-based practice management software and Microsoft Office 2003. The clinic previously purchased a practice management system that performs scheduling, demographic capture, claim filling, billing tasks, and reporting. The practice needed an EMR that could interface with its practice management software and function without an on-site server.

Three of the authors (ND, DK, and JG) served as unpaid consultants to the practice. The EMR selection process outlined here served as a class project for a health care informatics course taught at the University of North Carolina at Chapel Hill Gillings School of Global Public Health.

After meeting with the physician in Smithfield, North Carolina, we evaluated the practice's needs and developed a list of functionality requirements that would meet their goals. The practice budgeted \$500 a month for the EMR system so vendors costing more than this amount were excluded. This budget was a predetermined amount the practice felt it could afford to spend on an EMR. The list of functionality requirements were ranked according to the practice's priorities. We then narrowed the pool of potential EMR vendors to four. All four vendors offered ASP models at a monthly rate, based upon either the number of providers or the number of users. The costs for the four vendors ranged from \$50 to \$450 per provider per month. Additional costs not included were interfacing fees (these involved connections between LabCorp and the practice management system) and maintenance fees. After further examination of the costs and functionality for these four vendors, the field was narrowed to the two vendors who had the highest reviews in user satisfaction surveys. We

Table 2.
Differences Between the Application Service Provider (ASP) and Client-Server Based Electronic Medical Record Systems¹⁶

EMR Characteristics	ASP Model	Client-Server Model
Ideal practice size	Small practices or practices with multiple locations	Large practices
Secure data center	Designed to meet HIPAA security rule requirements	Physician must build and maintain a secure data center
Data storage	Provided	Not provided
Help desk	24/7 operating support provided by vendor	Physician provides own technical support
Customized EMR functionality	Customized EMR functionality support is provided	Customized EMR functionality support is provided
Remote access	Access provided by internet-based system	Limited off-site access
Software	Often included in EMR	Purchased separately
Speed of data access	Slower than client-server model	Speed of data acquisition is faster than ASP model
Cost	Monthly fee for secure data center Lower start up costs	Higher start up costs Higher maintenance costs Server purchased separately
Type of internet connections	T1/T3 connection required	Business class DSL connection needed
Limitations	Access to records may be lost if EMR company goes bankrupt	Remote access to EMR is limited

presented these two vendors to the practice and allowed the physician to choose the system for purchase. We also recommended that portable tablet personal computers or small laptop computers be placed in each exam room to aide patient flow during clinic hours. The practitioner chose to purchase one of the recommended systems. To date, her experience has been good. She likes the product she chose and is currently working with one of the authors (DK) to incorporate a new billing system into her EMR to replace her practice management system.

Discussion

A recent survey of over 400 members of the American Academy of Family Physicians ranked EMRs used by family practitioners.¹⁹ This study analyzed functionality, ease of use, customer service support, cost, interoperability, security, and overall satisfaction through a survey posted on the Family Practice Management website. KLAS, an independent research organization that evaluates health care technology, also provides an annual list of top EMR systems in its KLAS Top 20 Report.²⁰ We used the KLAS and the results reported by Edsall and colleagues¹⁹ in conjunction with our own informal telephone survey as one criterion in the selection process for this case study. Using survey and opinion-based methods provide poor inter-rater reliability, but while the customer survey data is biased, several vendors had consistently high user satisfaction scores.

The selection of a single EMR product is fraught with difficulty because practice needs vary by geographic location, practice size, and the need for interoperability with preexisting

systems. These challenges prevent standardization of the electronic medical record system in the United States.

Small, rural physician practices present organizational obstacles to the selection and implementation of an EMR system that larger group practices may not experience. The office staff of a rural practice may have limited time to plan for and participate in the selection and implementation of an EMR system due to its small size and may lack the organizational capabilities to adequately implement an EMR so that all of its functionalities are fully utilized.^{21,22} There may be difficulties associated with the time required to conduct initial and ongoing training, particularly if the staff possesses limited technical inclinations and interest in learning the system due to inadequate buy-in during the initial stages of selection.²³ Scheduling EMR training during the lunch hour, on weekends, or by closing the practice to patients for a day, will help small practices find adequate training time. Also, going live on a slow day may offer the least interruption to a practice. Finally, rural practices face limited budgets for information technology and may struggle to adequately fund an EMR system, but long-term cost savings can be realized in primary care settings.¹⁴

There are many factors influencing the selection of an ambulatory EMR system for a small rural practice. The primary criteria should include CCHIT certification, interoperability with current systems, and cost. EMRs have demonstrated the ability to increase practice and staff productivity by streamlining processes and reducing inefficiency.¹³ The broader adoption of EMRs in ambulatory settings is expected to improve the quality of health care by improving patient safety. Improvements in patient safety have already been realized with computerized physician order entry.^{2,13} Using medical alerts incorporated into

the EMR system provides better adherence to clinical practice guidelines. Medical errors are reduced when clinicians have better access to patient data. Moreover, computerized physician order entry reduces prescribing errors with drug-drug and drug-allergy checking systems.^{2,8,13,14,24,25} When practitioners use EMRs to their fullest capability medical errors will be reduced.

The process by which an EMR is selected is straightforward and can be easily accomplished by solo practitioners. Practices who have limited understanding of EMRs may find going through a step-by-step process beneficial. **NCMJ**

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