

Electronic Medical Records and the Development of Electronic Health Records and Electronic Patient Records

Marjorie A. Satinsky, MA, MBA
President, Satinsky Consulting, LLC



Ms Satinsky

Electronic medical records (EMRs) are high on most physicians' lists of potential practice enhancements. Currently, there are many more interested physicians than actual users, but I expect the number of purchasers to increase dramatically.

Interest in EMRs is increasing for many compelling reasons. As EMR technology evolves, new vendors are entering the market and lowering their prices. (In fact, as I write this article, EMRs, the current state-of-the-art, are quickly moving toward more advanced technology, such as electronic health records [EHRs] and electronic patient records [EPRs]. I'll say more about this evolution below.) Medical school graduates are very comfortable with information technology and are likely to set up their practices with EMRs, not paper medical records.

Large private and public purchasers already set expectations for health care providers and reward those hospitals and physicians that can demonstrate a high quality of care, practice efficiencies, and lower costs. For example, General Electric, Verizon, IBM, and CISCO, all national companies with North Carolina locations, collaborate with other leading employers to hold providers accountable for what they do.

Like the private sector, the public sector is also interested in promoting the use of information technology. At the federal level, Medicare's e-prescribing initiative is expected to accelerate electronic prescribing for all patients. "Interoperability" in health care information technology is a public priority for President Bush. The Department of Health and Human Services recently appointed its first national coordinator for Health Information Technology to work with the public and private sectors. In late July, that coordinator, David Brailer, MD, PhD, announced federal support for community-based collaborations among providers using IT products that are certified as having a base-level of desirable features.

Here in North Carolina, the North Carolina Healthcare Information and Communications Alliance (NCHICA) has both public and private support. Along with a number of its professional society and association members, NCHICA has passed a resolution endorsing a secure, paperless, person-centered

health record by the year 2010. NCHICA is also encouraging North Carolina employers to hold health care providers accountable. I agree with NCHICA and believe that within 10 years, EMRs (or their next manifestations) will be in most physicians' offices. In those communities and practices that are particularly forward-looking, the change will occur even sooner. That said, I encourage you to work thoughtfully rather than quickly so that you purchase systems that suit your needs, that are standards-based, and that are priced within your budget.

I encourage practices that are exploring EMRs to address 10 important questions.

- What's the philosophy behind EMRs?
- How has the technology of EMRs evolved, and what is the future direction?
- What functions/capabilities can most EMRs bring to medical practices?
- What are the potential benefits of EMRs and, equally important, are they measurable?
- What's the cost of introducing EMRs into your practice?
- What steps should you take to get started?
- What are the keys to successful implementation?
- What are recommended resources for information on vendors and their products?
- What questions should you ask vendors?
- What are good sources of additional information?

What's the Philosophy Behind EMRs?

The philosophy of EMRs is straightforward. EMRs capture data on the clinical status of individual patients, and they allow users to view in new ways data that have been previously stored. For example, EMRs can capture data from within and outside a physician's practice. Visit notes, rationales for clinical decision making, reports from physicians in other practices, lab and X-ray results, information from hospitals, pharmacies, and other health care institutions, and information from state and national databases are examples of the kinds of data that can be drawn into a single database. Physicians and other users can then view information on both individual patients and groups of patients.

All EMRs have common building blocks (Carter, 2001). First, they have a database management system. Second, they allow data input in a variety of ways, such as pen, voice-based technology, and scan-

"NCHICA has passed a resolution endorsing a secure, paperless, person-centered health record by the year 2010"

ning of paper records. Third, EMRs network through a LAN, Internet, or wireless system. Fourth, they offer security through a combination of one or more mechanisms, including passwords, tokens, biometrics, and/or encryption. Fifth, they allow messaging, and, sixth, they store clinical information in a way that permits movement from one system to another.

Evolution and Future Direction of EMRs: CPRs to EMRs to EHRs and EPRs

As I noted earlier, the technology of EMRs is rapidly evolving. Early work that began in the 1960s at Massachusetts General Hospital, at Duke University Medical Center, and at Indiana University set the stage. By 1970, there was some capability to document clinician-patient interactions and enable clinician alerts. In 1991, the Institute of Medicine (IOM) issued an important report called *The Computer-Based Patient Record: An Essential Technology for Healthcare*. The report grouped 180 features divided into 12 attributes of what was then called computer-based patient records (CPRs). The IOM updated its report in 1997. CPRs were longitudinal records that captured paper-based records for later use.

Further developments saw CPRs move toward the current generation of electronic medical records (EMRs). EMRs capture structured and unstructured data from paper and from disparate computerized systems, including documentary imaging systems, and then manage the information. Users can view the information that has been captured by the EMR in a variety of ways, depending on their needs. EMRs are usually maintained by one organization such as a hospital or medical practice. Although their interactivity and access is superior to that of CPRs, EMRs are limited by both their organization or practice-centered location and their focus on capturing information primarily from a patient encounter.

EMRs are expected to evolve into electronic health records (EHRs) that can capture information from multiple sources and then into electronic patient records (EPRs), lifetime records that patients, not organizations or medical practices, control. EHRs and EPRs will capture information from patients themselves, from a wide variety of demographic and clinical databases, and, with patient authorization, from multiple providers. They will both have great potential for enhanced clinical decision making, since input won't be limited to information obtained at the time of a patient visit. Event-based triggers (eg, blood pressure reaching a particular level) will facilitate clinical decision support, and physicians will be able to customize practice guidelines and protocols to meet the needs of particular patients.

As EMRs evolve into EHRs and EPRs, one of the challenges that must be addressed is standards for interoperability. It's all well and good to talk about bringing data from multiple systems into a single data-

base, but only if different systems and vendors speak a common language. At this year's important annual conference, Toward an Electronic Patient Record (TEPR), several organizations that are working on the continuity of care record, a potential clinical standard, were well-received by vendors that took great interest in the interoperability issue (Featherly, 2004).

Functions and Capabilities of EMRs

As you begin your investigation of EMRs, take an a la carte approach to your decision making. You'll be looking at systems with multiple optional functions, and you can select the features that you want and combine them with other information technology applications in your practice.

Most EMRs allow physicians to perform up to 15 functions (Barrett, 2003) depending on user need. I have listed the common EMR functions in an order that I think makes sense for most physicians. If your vendor allows you to phase-in the implementation of the different functions, pick a sequence that best meets your needs.

EMRs let you:

- **view** problem lists, medications, allergic reactions, test results, and other information that is related to a patient visit;
- **document** what happens during a patient visit and the rationale for clinical decision making;
- **identify** clinical issues using red flags that alert and remind physicians (eg, alerts can remind physicians of drug allergies and reminders can suggest age and sex specific prevention and screening);
- **decide** clinical issues using comprehensive and reliable databases and references (eg, an oncologist might want to check current information from the American Cancer Society);
- **manage prescriptions** by accessing formularies, consulting drug utilization databases, and e-prescribing by routing new scripts and renewals directly to pharmacies;
- **order** lab tests, imaging, and other procedures;
- **communicate** securely with medical colleagues within and outside the practice, with patients in a standard and structured way, and with public health agencies;
- **code** by matching ICD and CPT codes with details in the visit notes, by using an E & M coding tool, and by integrating SNOMED clinical vocabulary;
- **comply** with privacy and security rules;
- **aggregate** data on individual patients into longitudinal records;
- **manage** the chronic conditions and diseases of individual patients;
- **standardize** disease management goals for subgroups of chronic disease patients (eg, pul-

“As EMRs evolve into EHRs and EPRs, one of the challenges that must be addressed is standards for interoperability”

monary physicians with asthma patients could customize this module to include disease-specific goals);

- **query** the system for reports on clinical issues for both individuals and groups;
- **conduct** research, registry, and clinical trial activities;
- **incorporate** information that comes from the patient by direct input and/or by medical devices.

Potential Benefits of EMRs

Practices vary in specialty, size, and operations, so EMRs don't produce the same benefits for all users. Studies of practices that have already implemented EMRs identify three benefits that may result if, and only if, the practice pays attention to factors other than the technology itself. I'll talk about keys to successful implementation a bit later.

The three potential benefits of EMRs are improvements in quality of patient care, in financial position, and in practice operations. Let's look at each benefit separately.

Quality of Care:

EMRs can have a positive impact on the quality of care you deliver to your patients. The software eliminates illegible handwriting. It organizes notes from patient visits and test results. You can retrieve lists of patient problems, medications, and preventive protocols more easily than when all information is hand written and placed in paper files in random order. You can also access patient information from locations other than your main office. For example, if you need patient information when you are in a satellite office, the emergency room, or your home, you can easily get what you need. EMRs can facilitate the management of patients with chronic health problems, reduce medication errors, and eliminate duplicate lab tests.

Financial Position:

Financial position depends on revenue and expenses, and EMRs can impact both. With respect to revenue enhancement, EMRs can reduce the percentage and amount of erroneous claims submitted by flagging erroneous codes or data omissions. If you decrease the time spent on chart documentation, you can see more patients per hour and generate more revenue. Coding modules can help you code more accurately and with more confidence. EMRs can also provide information on quality of care that you can use in negotiating managed care contracts.

EMRs can also improve your practice's financial position by reducing operating expenses. For example, practices that embrace EMRs as a replacement for costly transcription can save on that item. Other common cost savings can be the reduction of staff time for chart pulls and prescrip-

tion renewals and a decrease in dollars spent on paper supplies. Some malpractice carriers offer reduced rates to practices with EMRs because the new systems lower the risk of errors.

Don't expect to see the financial benefits from EMRs right away. Short-term financial gains are offset by significant start-up costs that include not only dollars paid to the vendor, but also the costs of staff time and training. In some practices, physicians reduce their patient loads — and therefore their revenue — while they focus on EMR implementation. In other practices, administrators that are heavily involved in EMR selection and implementation require additional support while they focus on the special project. Still other practices engage an external consultant to manage the EMR project.

Practice Operations:

With respect to practice operations, think about the processes that you now use to enter patient information in a paper record. Your front desk captures demographic information at patient registration. Your nurse interviews the patient and adds clinical information, and then you have a face-to-face visit with the patient. Results from laboratory and other tests, hospital discharge notes, information from other physicians and from public health agencies come from other sources. Requests for prescription renewals come directly from patients. Let's be honest: in most practices, the processes for gathering and organizing all that information may be cumbersome and error-prone, and EMRs can make a big difference.

Measuring the quality, financial, and operational improvements from EMRs is challenging. Practices make many changes over time, and it's hard to isolate those that are a direct result of EMRs. The authors of a 2003 study sponsored by the California HealthCare Foundation found a wide variety of financial benefits ranging from \$0 to more than \$20,000 a year (Miller, Sim, and Newman, 2003). Quality improvement can be easier to measure, since many practices go from no measurement at all to very careful monitoring of patient care. Physicians like the existence of monitoring although they cannot always place a dollar value on its worth.

What Do EMRs Cost?

I think the cost question is complex. I hesitate to give you a specific dollar figure because you have so many choices, but I am comfortable identifying the cost items that you should consider. I'll also give you a word of advice: you should be making the first of many decisions, not a final decision, so don't assume that once you purchase your first EMR you are finished forever. You should expect to revisit the EMR question repeatedly.

You'll need to know the cost of both the products

“Measuring the quality, financial, and operational improvements from EMRs is challenging”

and services you are buying from your vendor and your internal start-up. Even when you have this information, the cost can vary widely.

You have a choice between purchasing your own server and selecting an application service provider (ASP). Some practices presume that buying their own server will give them control and reliability. In my experience, these assumptions are not always valid. The purchase approach means higher up-front capital costs. The ASP approach costs less both at the outset and for ongoing maintenance. Just as you might lease a car, you can pay a fixed monthly rate to “rent” the software that is hosted by the vendor or by a third-party Internet provider. The practice also pays for network communications that support data transmission. (Rake Report, July 2002).

For a group of 20 surgical specialists in a single practice with 11 locations that purchased its own server, the typical costs included the following.

- Software licenses: \$200,000 — \$300,000
- Electronic data interfaces (EDI priced at an hourly rate): \$10,000 — \$40,000 for consultation, installation, and maintenance
- Conversion from paper to EMR: \$5,000 — \$15,000
- Hardware, including on-site server and secure virtual private network: \$85,000 — \$200,000
- Maintenance of EMRs and interfaces: \$70,000 — \$130,000 a year
- Implementation and training: \$70,000 — \$220,000 (some vendors include training for the first six months and then make it available as needed at an hourly rate; some vendors vary the costs for these items by the group size)
- Outside consultation to manage vendor selection and implementation: paid on an hourly basis
- Total first year costs: \$200,000 — \$1 million
- Subsequent years: ongoing maintenance
- Customized programming: variable, at \$100 — \$125 an hour

Getting Started with EMRs

I recommend you get started with EMRs by taking the following steps in the order listed here.

- Set realistic expectations about your time frame and process. Allow 18 months from the beginning of your investigation to implementation. The process will be long and hard.
- Start with your practice, not with the technology. Set up an internal EMR task force that represents physicians, other clinicians, and administrative staff. Assign task force members to teams that concentrate on particular aspects of EMR implementation, such as capturing demographic and clinical information, patient process, and billing. You want to ensure buy-in for what you are doing, not acceptance of a solution that a handful of people crafted behind closed doors.

- Profile your practice operations. Identify what works well and what needs improvement before you delve into the solutions that EMRs offer.
- Begin your investigation of EMRs so you understand what they can do. Talk with professional organizations, colleagues in other practices, and vendors themselves so you understand what’s on the market.
- Achieve consensus on your practice’s priorities. You want technology to help you, and you don’t want to purchase technology for technology’s sake.
- Invite several vendors into your practice to make preliminary presentations.
- Convert a statement of your needs into a formal request for a proposal (RFP) that you send to vendors. At the same time you develop the RFP, list the decision criteria and weighting that you will use to evaluate responses.
- Review the proposals that you receive, shorten your list of potential vendors, and make site visits to those you think can meet your needs.
- Make more site visits — this time to other practices that are using the product. The vendors generally accompany you on these trips, and I encourage you to visit still other users without the presence of vendors. Shadow the physicians as they use the technology and observe how EMRs impact the physician-patient communication.
- Select the vendor.
- Incorporate the terms on which you have agreed in a formal agreement. Be sure to include language on termination and ownership of the data. Include the vendor’s proposal as an attachment to the contract.
- Develop an implementation plan that includes the transition to EMR, interconnectivity, evaluation of what you have done, and ongoing maintenance.

Keys to Successful Implementation

Information technology is only half the picture; the success or failure of any technology depends on people. EMRs that are a phenomenal success in one practice may be a costly failure in another. Here are keys to successful implementation.

- Identify a *physician champion* who is not only interested in introducing EMRs, but who is able and willing to coach his or her peers through the transition process. The champion will test the software on his or her own patients, work with the EMR and other vendors, and then work with colleagues and other staff to get it right.
- Enlist the *commitment of all physicians* in the practice, including those who are comfortable with technology and those who are not. EMRs should be a practice enhancement, not a tool that

“Information technology is only half the picture; the success or failure of any technology depends on people”

“EMRs and their expected evolution into EHRs and EPRs have great potential to improve the clinical, financial, and operational aspects of your practice”

one or two technologically savvy physicians use while others retain their dependence on paper.

- Agree on *timing that suits your practice*. Some vendors permit practices to purchase a comprehensive EMR software package and phase-in the implementation of different modules. Others allow the separate purchase of each module. Still others are inflexible and require all clients to purchase and implement in a way that meets vendor, not purchaser, needs.
- Pay attention to the *relationship between EMRs and other systems*. There are no current standards governing the interconnectivity of EMRs and practice management systems, Web-based communication, lab, and other systems. Smooth working relationships won't be automatic. For example, can the demographic and billing information in your practice management system be imported into your EMR? Can lab results from an external vendor be linked to data that you enter following a patient visit? You need to know what interfaces are possible, who is implementing them, and who will maintain them. Be cautious about vendors that require you to purchase all of their products and that are unwilling to collaborate with other companies.
- Purchase *the level of support* that is suitable for your practice. Even if you have your own information technology specialists, you may need outside help from one or more vendors. Ask about initial installation, availability of the help desk, software fixes and upgrades, and deals on hardware, software, and Internet connectivity.

Recommended Resources on Vendors and Their Products

The question on EMRs that physicians ask the most frequently is: “Which vendor should I select?” There is no right answer, but there are good sources of information on both vendors and their products. I recommend that you look at the Web sites of the American Academy of Family Physicians (www.aafp.org), the California HealthCare Foundation (www.chcf.org), Health Data Management (www.healthdatamanagement.com), CTS Software Selection (www.ctsguides.com), and AC Group, Inc (www.acgroup.org), for lists and reviews. The Medical Group Management Association (www.mgma.com) and the North Carolina Healthcare Information and Communications Alliance (www.nchica.org) are also good resources.

Questions for Vendors

There are two parts to the vendor question: who do you contact and what questions should you ask? The resources that I've suggested above will give you guidance on the vendors. Here are my suggestions of questions to ask (Barrett, Holmes, and McAulay, 2003

and Rake Report 2002).

- How does each of the functions that the vendor offers work? Request a demonstration for each one and try it out.
- What is the method(s) by which information is put into the system?
- What is the vendor's approach to customization and what are the accompanying costs?
- Do the menus, screens, and categories make sense to you?
- How does the EMR integrate (or not!) with your practice management system, Web-based communication, and other systems?
- How do you access the EMR — remotely, by mobile device, etc?
- How does the product process, exchange, and store graphics and images?
- What customer support is available to the practice during transition from paper records, start-up, implementation, and after that?
- What is the cost?
- What options for financing are available?

Conclusion

I think EMRs and their expected evolution into EHRs and EPRs have great potential to improve the clinical, financial, and operational aspects of your practice. If you agree, approach the challenge with knowledge and foresight, rather than with resistance and fear.

References

- American Academy of Family Physicians. Press Release, November 12, 2003.
- American Academy of Family Physicians. *AAFP This Week*. January 29, 2003.
- Barrett, M.J., with Holmes, B.J., and McAulay, S.E. *Electronic Medical Records: A Buyer's Guide for Small Physician Practices*. California HealthCare Foundation, Oakland, CA. 2003.
- Carter, J.H. *Electronic Medical Records. A Guide for Clinicians and Administrators*. American College of Physicians, Philadelphia. 2001.
- Healthcare Informatics, Healthcare Information Programs*. Electronic Medical Records: Why Their Time Has Come. 2003.
- Featherly, K. TEPR '04, A Lot of Singing About Interoperability. *Healthcare Informatics*. July 2004. 10-14.
- Miller, R.H., Sim, I., and Newman, J. *Electronic Medical Records: Lessons from Smaller Physician Practices*. California HealthCare Foundation, Oakland, CA. 2003.
- Rake Report. *Electronic Medical Record Systems*. July 22, 2002. 10-15.

.....
The author gratefully acknowledges the assistance of W. Holt Anderson, executive director of the North Carolina Healthcare Information and Communications Alliance, Inc, in Research Triangle Park, NC, and Franklin W.

Maddux, MD, chief executive officer of Gamewood, Inc, in Danville, VA.

.....
Ms Satinsky is president of Satinsky Consulting, LLC. She earned her BA in history from Brown University, her MA in political science from the University of Pennsylvania, and her MBA in health care administration from the Wharton School of the University of Pennsylvania. She is the author of two books: *The Foundation of Integrated Care: Facing the Challenges of Change* (American Hospital Publishing, 1997) and *An Executive Guide to Case Management Strategies* (American Hospital Publishing, 1995). The *Forum* has published several articles by Ms

Satinsky, including Managing the Implementation of HIPAA and the Privacy Rule, in #4, 2002; How to Determine If Your Practice Could Use a Professional Practice Administrator, in #2, 2003; Using Information Technology to Improve Patient Care and Communication: A Practical Guide - Part 1, in #1, 2004; and Using Information Technology to Improve Patient Care and Communication: A Practical Guide — Part 2, in #2, 2004. An adjunct faculty member at the University of North Carolina School of Public Health, Ms Satinsky is a member of the Medical Group Management Association. She may be reached at (919) 383-5998 or margie@satinskyconsulting.com.
