

# **Evaluating and Selecting Electronic Medical Record Systems**

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Process Identification and Analysis

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What is the best EMR? Which EMR should I buy? These are two very popular questions; Each usually posed by someone who has suffered through one too many sales talks and glossy brochures. However, as always, real life is not simple. And the answer to both questions is a definite “it depends...”

If you have decided that it is time to invest in an electronic medical record system (EMR) then take heart--selecting a system is not as haphazard as you might think. The important point to remember is that you are looking for the best system to meet your clinical, business, and administrative needs. Think about this a little more. What is the best car, best soft drink, or best vacation spot? The answer to these questions, much as those posed concerning EMRs, is a highly individual one. Now let us take a new approach to the EMR purchase issue; one which is more likely to result in a purchase decision which is based upon the true needs (clinical, business, and administrative) of the purchasers.

The clinician who asks which EMR to buy has obviously recognized some need for better information management. This is the point at which many begin the search for the “best” system. Unfortunately, at this juncture, there is little understanding of how these newly discovered information management needs are related to day-to-day operations. The consequences of the desire to do something without a clear idea of what that “something” should be, are often practice disruption and loss of capital.

Just as having a restful, satisfying vacation requires a good deal of introspection and data gathering in order to avoid a disaster, selection and implementation of an EMR requires attention to detail and an intimate understanding of practice processes. Therefore, once the idea that an EMR is needed has taken hold, the first step should be to

determine, in detail, what problem(s) the system should solve, or more properly, which processes it is intended to improve. Once the switch is made from a “product selection mode” to process identification and analysis, a number of benefits will be realized. Just one of these will be the ultimate selection of an EMR product.

### **Process Identification and Analysis**

Why all the fuss about processes? Consider this. Ultimately, computers perform only one basic function--they speed things up. Whether one needs to gather data for analysis, calculate bills, find an article, or write a prescription; the hope underlying the use of computer technology is that these processes will be completed more effectively and faster than if done manually. Thus, proper use of computer technology requires an intimate understanding of the processes slated for improvement. High-level processes are easily identified: patient registration, encounter form generation, creation of the progress note, etc. Each of these processes consists of a number of steps any one of which may be made more efficient by computer technology. It is important to keep in mind that people are an essential part of each of these processes. This may seem obvious, but failure to include the human element when deploying computer systems is a painful and often fatal mistake. For example, if you implement a system which is expected to save 1 FTE, (full-time equivalent) how will employees react to the knowledge that they are going to be replaced? Fear of being replaced may lead to sabotage or resignation and disruption of the practice. Therefore, a plan for handling employee concerns must be part of the planning for a new system.

Process identification should be an iterative activity. First identify a high-level process. Next delineate all the steps and personnel involved. Once you are certain that all aspects of the process are known, the search for ways to bring about improvements can begin.

All processes have a few things in common. They have inputs and outputs. They

require a certain amount of time, have particular data requirements, and they should have a mechanism which permits evaluation of their efficacy and efficiency on a continual basis. Enough theory, let us use a practical example—writing a prescription.

### **Process Characteristics – Prescription Writing**

Writing a prescription is a common, time-consuming process. If done properly, one must determine the presence of allergies, select a medication, determine the dosage, check interactions, consider cost to the patient, consider whether the insurer will permit the drug selected, educate the patient, write the prescription, and finally get it to the pharmacy.

If one is interested in improving this process using an EMR, then it will be important to select an EMR package which supports as many of the steps in the process as possible. Therefore, the ideal EMR (at least from the point of view of prescription writing) should maintain formulary information by health plan, provide drug-interaction checking, allergy checking, and patient education. Finally, the EMR should print the prescription to paper, e-mail or FAX it to the pharmacy. If all important office processes are listed and analyzed in this manner the EMR selection process will be much more fruitful and less stressful.

### **A Reasonable Approach to Process Analysis**

The task of analyzing clinical and business processes may initially appear to be overwhelming. However, it need not be. Think of this as an opportunity to better understand your practice and your clinical practice style. Many practices are often stymied by difficult to pin-point inefficiencies. For example, why are charts frequently difficult to find? What accounts for the lag-time between a patient's arrival and placement in an exam room? Where is the report for the chest –x-ray done 3 weeks ago? How much time is required to handle patient calls for prescription refills? The answer to each of these questions can only be answered by a thoughtful review of the procedures involved. Often the lack of sound administrative oversight (in the form of an up-to-date office and clinical policy and procedure document) is a significant part of the underlying problem.

A “Manual of Office Policy and Procedures” is rarely considered an important document in many practices. However, if properly written, it can act as an indispensable resource when new employees are trained, new procedures are created or old ones are changed. This manual should contain the key information on how things are done in the practice. If your practice does not have one, process analysis and by association EMR, implementation will be much more problematic. Thus, a bit of advice. If you have a policy/procedures document use it as a means of identifying common processes. Next see how closely actual daily operations match the written description of these activities.

Study all discrepancies thoroughly and use this information to revise, add, or delete ineffective and inefficient policies and procedures. Having gone through this process, you will be in a much better position to understand how an EMR might improve your practice environment. If your practice happens to be one of the many which has not bothered to formalize the administrative details of common office and clinical processes, then stop evaluating EMR products and turn your attention to your practice.

Assuming that a process analysis has been completed, the next step is grouping process information into lists similar to those found in the below and in the “Product Criteria” section. Next compare your process list elements with the product criteria provided, noting where product features either match or are very close to your process improvement needs and any significant gaps. After completing this task, create a check-list of *your* “product criteria” which details the features needed to match your information management needs (i.e. your ideal product).

Once you have generated a “personalized” of product criteria. Use the list to contact vendors for product information, demos, and site visits. The knowledge gleaned from direct interaction with EMR products, vendors, and current users can then be used to create “request for proposal” (RFPs). RFP generation will be covered later.

### **Common Office Processes**

#### **Business**

Appointments

Billing

Insurer

Walk-away (Self Pay)

- Patient Intake
    - Encounter Form Generation
    - Demographics
    - Insurance
  - Benefits Determination
  - Clinical**
    - Laboratory/X-ray
      - Order
      - Review
      - Abnormal follow up
      - Patient Education
    - Telephone
      - Triage
      - Clinical advice and Follow up
    - Referrals
      - Set up
      - Follow up
      - Preferred Sites/Providers
      - Patient Education
    - Medications
      - Allergy Check
      - Interaction
      - Patient Education
      - Prescription Writing
    - Patient Examination
      - Recording of History and Physical
      - Vital Signs
      - Use of Guidelines/Protocols
      - Use of Knowledge Resources
      - Preventive health requirements alerts
- ]

## Evaluating Electronic Medical Records Products and Vendors

Evaluating EMR products is never easy. A major impediment is the sheer number of available products. At last count, more than 200 companies offered products in this category. A sound evaluation policy should occur on two levels. The first level involves the analysis of clinical and business processes. The second level addresses issues related

to product features and vendors. If proper time and attention are given to the evaluation process, then a successful implementation should result. This document is aimed at practitioners who wish to buy an EMR system but have no idea where to start. No technical knowledge is assumed. For those who desire a more in-depth discussion, a bibliography is included.

### Practice Traits Which Influence EMR Purchase Decisions

Practice size is an important factor in guiding EMR selection. A solo practitioner will have a much easier time with process analysis, EMR selection and implementation than a group of 30. Likewise a group located at a single site will find it easier than one which has multiple sites. The complexity of ironing out competing needs and preferences can completely derail an attempt at EMR implementation. For example, a multi-site group might have to standardize a number of procedures which other wise would not have been disturbed (patient id numbers, lab, radiology facilities), in order to make EMR implementation feasible. Aside from practice-related issues, there are technical EMR matters which must be considered (wide area network capability, availability of a data repository, multi-site log-on procedures) when large groups or multiple sites are involved. The information needs of different specialties will emerge as a major issue no matter the size of the group. Management of potential problems is best approached through a FORMAL administrative body which has representatives from ALL potential types of users (i.e. doctors rarely understand what makes an appointment system functional).

### Uses of the Medical Record

Proper evaluation of EMR products requires an understanding of the different purposes that the paper chart serves. The Institute of Medicine Report on computer-based patient record systems divides these uses into two large categories: primary and secondary. The act of taking care of a patient, looking up an old EKG result, checking a medication list, etc. are primary uses. Primary uses are those which involve direct patient care. Therefore, features which support primary uses are those on which most clinicians tend to focus. Secondary uses may be thought of as non-clinical analytical uses (outcomes analysis, cost studies, regulatory reporting, etc.). Secondary users tend to be researchers, educators, and regulatory bodies.[Secondary issues are more important now because of reporting of preventative measures and justification for diagnostic studies] When using paper records these various users have specific forms or processes which they use to maximize the value of the chart to them. Thus, if a doctor wishes to record more preventive health data, a form is added to the chart and a protocol for using the form is created. Researchers take the same approach when doing chart reviews.

Obviously, the paper chart with all of its failings is quite flexible and useful. Unfortunately, the ease with which one can expand the uses of the paper chart can make it difficult to appreciate its true complexity. It is exactly this failure to appreciate the true complexity of the paper chart that makes selecting and using EMR products so problematic. A good EMR product makes allowances for the needs of both primary and secondary users of the medical record. Since adding new features is not so simple, a good deal more forethought is necessary to build a good product. Similarly, selecting a product will be difficult unless *all* potential users have a good understanding of their needs and can articulate those needs sufficiently to vendors, consultants, or information systems professionals. Below is a list of primary and secondary uses of the medical record which should aid in formulating a good conceptualization of the various uses of the EMR.

### **Primary User and Required EMR Features**

- Access to Progress Notes in a readable form (text)
- Problem List
- Drug Information/Rx Management
- Preventive Health Support
- Referral and Telephone Documentation
- Guidelines, and Protocols
- Patient Education

### **The EMR and Secondary Uses**

- Provider Profiling
- Patient Utilization
- Quality Report Cards
- Performance Reviews for Practice Guidelines, Protocols, and Pathways
- Outcomes analysis
- Population-based research

## **Product Criteria**

The evaluation criteria provided are divided into 3 categories: chart features, managed care, and communications and infrastructure. Chart features cover most of the primary medical uses and the remaining 2 categories address secondary uses.

### **Using the evaluation criteria** (Minimal features appear in regular type; *advanced features in italic*)

The product evaluation criteria provided below are not based upon any formal study or document from any authoritative body. They are derived from two sources: feature lists of currently available products and a review of common office and clinical processes which appear amenable to computerization. It is important to realize that no regulatory body exists which has the authority to test vendor claims, product features, adherence to

standards, etc. Caveat Emptor.

The criteria offered in this document are intended to act as a guide to understanding which features are: available, useful and are worth wishing for.

Product features which are deemed to be essential are marked in regular type, Wish list items appear in italics. Each set of criteria is accompanied by a brief discussion of meaning and significance.

## Medications

Medication management is an important part of clinical practice. At a minimum, an EMR package should provide the ability to maintain a medication list and an allergy list, write prescriptions, and automatically alert the practitioner to any drug allergies. If a prescription writer is present, then automatic drug interaction checking would be a very desirable additional feature. Note that if this feature is available, one must ensure that the feature can be enabled and disabled by the user and that the number and types of interactions reported are adjustable. Advanced medication features would be: formulary tracking by insurance plan, provider-specific medication lists, the ability to e-mail or Fax to pharmacies, and on-line drug information concerning side effects, adverse reactions etc., and the ability of the user to add new drugs/prescriptions to the system. Provider-specific medication lists allow each provider to create a list of drugs and dosages which he/she uses most often. This saves time by removing the need to scroll through long lists of medications each time a prescription needs to be written. Minimal report capability should offer the ability to search by patient, drug, and provider. Finally, a link to an online PDR or other drug databases for reference would be a desirable feature]

## Medication Features

Medication list

Long-term

Per episode

Active/inactive

*Failed after trial*

Allergy list

Automatic allergy warning

Prescription writer

*e-mail or FAX to pharmacy*

maintains Rx history

*Maintains formulary information  
by insurance plan*

Drug interactions

multiple drug-drug

*Practitioner specific medication list*

*Drug information*  
*side effects*  
*adverse reactions*  
*overdose*  
*dosages*  
*forms supplied* Reports by  
Patient  
Medication  
Provider

### **Laboratory/X-ray/Pathology**

Perhaps the most useful and most difficult feature to obtain in an EMR is automatic downloading of labs and other types of test reports from outside facilities. In this regard, providers who work in integrated systems sometimes have an advantage. However, some major independent laboratory companies offer an automatic download feature. The minimal Lab/X-ray/Pathology features set consists of test history by provider and patient, automatic flagging and tracking of abnormal results [panic and delta checks], and the ability to create specific test panels. Advanced features in this setting provide more decision support during the ordering process, alerts for redundant tests, guidelines-based ordering, and the ability to generate reports by patient, provider, and test. Test information profiling which provides information on indications and significance of results is a rare but very useful feature.

### **Laboratory/X-ray/Pathology Features**

Maintains test history  
Patient  
Provider  
*Permits automatic data download from outside facilities*  
*Permits uploading of orders to other facilities (ex: lab orders)*  
Maintains profile of available tests/indications  
Flags abnormal results  
Permits tracking of abnormal lab follow up  
*Permits creation of panels*  
*Disease specific*  
*Patient specific*  
*Population specific*  
Alerts for redundant testing  
*Guideline aware[?] order entry*  
Reports by  
Patient  
Test  
Provider

### **Telephone Calls**

Telephone call management features are geared to improving documentation. These features are increasingly found in many EMR products. However, if present, they are very useful and can do much to reduce potential liability risks. A good call management system can aid in reducing unnecessary office visits while helping to monitor patients via tracking functions.

### **Telephone Call Features**

Maintains call history

Patient

*Site*

*Provider*

*Number called from*  
*automatic dialing*

*Captures call reason and action taken*

*Provides alerts and reminders for required follow up*

Report by

Patient

Provider

Call reason

Call action

### **Diagnosis Features**

The problem list is the most important feature in this area. The ability to list and view long-term problems separate from those which are acute and limited is a potential time saver. Guideline-based advice or access to decision support (QMR, Iliad) and other forms of clinical knowledge resources (e.g. electronic textbooks) are advanced features.

### **Diagnosis Features**

Problem list

Long-term

Per episode

*Guideline-based advice*

*Access to knowledge resources*

*Internet*

*Practice Guidelines*

Report by

Patient

Provider

Diagnosis

### **Referrals**

Referral management features can greatly increase practice productivity. Aside

from providing the ability to monitor patients' adherence to referral advice, features which provide insurance plan-specific referral guidance are particularly helpful in managed care environments. All systems should provide a list of referral sites and providers. Insurance plan features and provider preferences constitute advanced capabilities.

### **Referral Features**

- Maintains list of referral sites/Providers by
  - Specialty
  - Reason for referral
  - Location
- Maintains referral history
  - Patient
  - Provider*
  - Site*
  - Reason/Diagnosis*
- Maintains list of approved providers/sites by*
  - Insurance plan*
  - Provider preference*
- Report by
  - Patient
  - Provider
  - Reason/Diagnosis
  - Referral Site/Provider
  - Reports by email attachments;*
  - Store and forward technology for images]*

### **Preventive Medicine**

Managed care has made preventive medicine features a major reason for buying an EMR. Patient intervention histories (list of all interventions done for the patient to date), provider-defined alerts, and the ability to create user-defined protocols by age, sex, and disease state are essential. Similarly, reporting in this area has to be fairly sophisticated and should provide multiple reporting views. Protocol-based reporting (e.g. a listing of all patients undergoing a standardized treatment process or patients being treated with a locally or nationally created practice guideline or protocol) and support for SF-36 (a standardized instrument for determining health status such as ability to perform activities of daily life) and other measures of health status should be considered advanced features which few EMRs provide.

### **Preventive Medicine Features**

- Maintains patient intervention history
- Permits design of intervention protocols by*
  - Sex*
  - Age*
  - Disease state*
  - Insurance Plan*
- Permits guideline-based protocols*

*Provides user-defined alerts*

Report by

Patient population

Patient

Provider

Diagnosis

Protocol

*Health Status reports*

*SF-36*

### **Clinical Encounter**

Capturing the results of the clinical encounter is without a doubt the most problematic issue in EMR selection. Two very important needs collide here: creating an accurate description of the encounter in a readable form (primary use) and creating a searchable description of the encounter which can be easily analyzed (secondary). Most EMR systems handle progress notes as plain text, which is not suitable for analysis. Notes may be typed into the system or imported after transcription. Even systems which permit voice or pen-based input usually capture notes as plain text. Templates provide a boost in productivity for those who are comfortable with their use. Ideally, a number of templates for common problems should be provided with the system. Also, creation of templates by providers should be supported as part of the basic product. Disease-based guidelines/protocols and coded, searchable notes are advanced features found in very few products.

### **Clinical Encounter**

Progress note

Plain text

*Encoded and searchable*

*Vital signs*

*Clinical findings*

E&M Templates

*Defined by end-user*

*Specialty specific*

*Disease-based guidelines/protocols*

*Defined by end-user*

*Specialty specific*

### **Patient Education**

Patient education materials, especially drug information, can be very useful in a busy practice. If patient education materials are provided with a system, make sure that they are derived from an authoritative source and are updated frequently. All materials provided should be modifiable by the user.

### **Patient Education Features**

- User definable
- Preloaded
- Updated regularly
- Web access to educational materials

## **Managed Care**

The information needs associated with managed care spring from the need to analyze population-based patient data. In order for a system to provide usable data analysis capabilities, it must be designed with certain features. Foremost among the required features is a database, preferably relational, which stores discrete coded data items. Note that the presence of a relational database alone is not sufficient to guarantee that a system is able to conduct useful analysis. In addition, the data must be coded using a standard vocabulary and the database must capture the true relationships that exist between items in the database. For example, if one wishes to analyze the cost of antibiotics for the average patient diagnosed with bronchitis, the database must contain links between various combinations of these items. Unfortunately, it is not possible during a demonstration or site visit to determine if the underlying architecture of the system is able to support a full range of analyses. In order to determine if the system that you are considering is capable of performing useful analyses, it is best to request a demonstration using data from your practice site or discuss this issue with other practices already using the system. Another approach is to obtain a working copy of the program and use it for a brief period of time to see if it performs as desired. The features listed below should be considered essential for all but the most basic EMR systems.

### **Managed Care Features**

- Provider profiles
- Medications
- Labs
- Referrals
- Preventive health
  
- Site Profiles
- Medications
- Labs
- Referrals
- Preventive health
  
- Outcomes by*
- Guideline/Protocol*
- Provider*
- Disease*
- Site*

*Pre-defined reports*  
*HEDIS*  
*JCAHO*  
*Cost Analysis*  
*Medications*  
*Labs*  
*Disease*  
*Protocols*  
*Referral*  
*Patient*  
*Provider*

## **Communications and Infrastructure**

The technical issues involved in selecting an EMR can be somewhat intimidating. However, it is often not as difficult as it may seem. There are in fact, a relatively limited number of acceptable options, so knowing what they are and why they are important is not difficult to learn.

### **Communications**

Remote access allows one to access a computer without being physically present (e.g. calling into your office computer from a computer in your den. . . Remote access is a very desirable feature and along with e-mail, FAX, and Internet capability, greatly increases the value of an EMR system. For practices which desire to conduct in-depth analyses of data, the ability to export data to statistical analysis programs or other systems is an essential feature.

Data repositories and warehouses are very large database systems which may have links to EMR systems and help to support patient care and data analysis. Both systems are suited for only the most sophisticated information systems environments. The ability to import data is also very important. This may be especially true during the initial phase of implementation when lack of importation features may result in having to retype old data into the new system.

### **Operating Systems**

For most of the history of the EMR market, Unix and Novell have been the dominant operating systems. Windows 95[98] and Windows NT are rapidly gaining ground and most new systems are appearing first on these platforms. Client/server is a mode of computing in which the database and applications reside on a central computer (server) and other computers (clients) make requests to this server to either save or retrieve information. Each type of computing component is referred to as a “tier”. Most systems consist of two tiers—the client computer, with which the user interacts directly, and the server, with which client computers interact. Sometimes the efficiency of client/server operations can be improved by adding a second server. In this case, the database resides on one server and the rules for using the database and other applications reside on the second server. This type of set up is referred to as a “three-tiered”

client/server environment. Three tiers are best suited to larger practice sites (i.e. hospitals, very large group practices).

### **Data Types and Storage Formats**

Although not essential to EMR functioning, the ability to store sound, video, and graphics may increase the utility of an EMR product for some practices. If these types of data are accepted by an EMR, be sure that they can be searched and indexed as easily as text data. Files are stored on disk using a very specific format. The format used is chosen by the product's designer who may or may not make the details of that format public. Your ability to move data between programs is limited by the file format that the program uses. Be sure to clarify with the vendor their policy concerning their willingness to let others know the details of their file format. Vendors may use their file format to prevent you from migrating to another product in the future. Be very careful when asking about this matter.

### **Standards**

A number of attempts have been made to make the sharing of medical information easier. Health Level-7 (HL7) is a standard promoted as a means of permitting easier communications between computer systems. Any EMR system under consideration should support this standard. ICD and CPT codes are standards for billing and recording diagnoses, and represent the most widely used coding standards. Common Object Request Broker Architecture (CORBA) is a new standard for handling objectuse by software programs sharing a common environment. CORBA technology is only now beginning to appear in EMR systems. It is not essential that a system utilize this technology at present, but it should be considered a plus if it is included. MEDCIN and Read codes are vocabularies for recording the information which appears in the progress note. They offer hope to the notion of creating progress notes which are fully encoded, indexed, and searchable.

### **Interfaces**

Pen-based computers and voice recognition systems may prove to be a boon to those who cannot type with enough skill to use a computer as part of the patient encounter. Pen-based systems no longer attempt to recognize handwriting as their main data input mechanism. Instead, more often they act as pointing devices with the same functionality as a mouse. The most important feature of pen-based systems is their portability. Many palm-top systems fall into this category.

Voice recognition systems have improved significantly over the last few years, in particular during the last year, with the appearance of clinical systems which accurately recognize continuous speech. Voice recognition, despite recent advances, is still very sensitive to accents and other individual speaking traits. The best advice in this area is to try the system out under normal work conditions (background noise, different users) before deciding that it will work for you. Voice recognition systems are relatively inexpensive and worth evaluating. Should you decide to try a pen or voice-based system, inquire about the availability of medical dictionary or spell-checker add-ons. They will make the job of correcting mistaking less time consuming and frustrating.

## Security

Putting data into electronic form always raises the possibility that it may be tampered with or misused. In order to assure proper security for patient information, a practice must implement a combination of office policies and procedures to complement intrinsic EMR security features.. Passwords are the most common security feature found in EMR packages. Passwords are only as secure as people permit them to be.. They offer an acceptable level of security when properly handled. If your office plans to use passwords, then a few precautions may help. First, put policies into place making misuse of passwords a serious offense. Next insist that your EMR package offers multi-level password access. Multi-level passwords offer additional protection by restricting access to data files based upon the “need to know” (this should be explained). In such a system, each type of file is coded to permit access to certain classes of passwords. The password class for billing clerks would be different than that for doctors allowing the systems administrator to easily restrict access to lab data to clerks while permitting unencumbered access to physicians. At a minimum, a system should restrict access to files based upon job type.

Audit trails provide an additional security measure. They maintain a record of all file access attempts and permit the systems administrator ( the person in charge of maintaining the computer system) to determine if anyone has tried to gain unauthorized access. Authorized users are also logged. Many EMR packages permit the audit trail feature to be disabled- this is a bad idea. Buy a package with automatic audit trail activation which cannot be disabled. Recent gains in computer technology have made user-validation more reliable and may make passwords obsolete. Biometrics, the use of biologically unique markers, to provide secure access, has made significant gains recently. Fingerprint, face print, and voice pattern recognition systems are available, relatively inexpensive, and make unauthorized access to data files nearly impossible.

Security issues are not limited to unauthorized access. Data validation is equally important. For example, does a system check data input for unlikely values (e.g. temperature of 300F, of BP of 400/300)? All data which are stored in an EMR should be subject to some type of validation process—insist on it! Since patient information may be shared between sites or with other business entities, some form of encryption should be available either within the EMR package or as an add-on utility. Automatic encryption of files saved to disk is a valuable form of data protection and systems which provide this feature are worth a very close look.

A final security matter is that of file preservation. Here again, office policy comes into play. Back up, file storage, and disaster-recovery procedures must be set by the systems administrator. This is an area where many businesses fall short with painful results. Select an off-site storage location for all data files. Back-ups should be done at least once each day, and in busy environments, multiple times throughout the day. Look for EMR packages which permit on-line back-ups (i.e. copies of all files stored on the computer’s disk drives can be copied for storage while the computer is being used). Other measures such as mirrored backup (using two separate drives to hold identical data) and fault-tolerance are found at the level of the operating system. These measures

help to keep your practice up and running through many types of computer problems.  
Give serious consideration to making them a part of your EMR set up.

## Communications and Infrastructure

Remote access  
FAX support or linkage  
Word processor support or linkage  
*Provides e-mail support or linkage*  
*Internet*

*Decision support*  
*Statistical Analysis*  
*Knowledge Resources*  
*MEDLINE*  
*Internet*

*Permits Data Export*  
*Support for Clinical Data Repository*  
*Data Warehouse*  
*Statistical Analysis packages*

Supports varied data formats  
*Sound*  
*Video*  
Graphics

File Format  
Proprietary  
Commercial Standard (Oracle, Sybase, etc.)

Standards    HL-7  
*CORBA*  
SNOMED  
ICD  
CPT  
*MEDCIN*  
*READ Codes*  
*LOINC for lab data*

Interface  
*Pen*  
*Voice*  
Keyboard  
Graphical  
User modifiable

Security

- Audit trail
  - Permits audit trail analysis
  - Automatic activation
- Passwords
  - Biometric*
    - Face*
    - Voice*
    - Fingerprint*
  - Multiple levels by user type

Data validation

Back-up process

*Encryption*

Operating Systems

- Unix
- Macintosh
- Windows 95/98
- Windows NT
- Novell
- Internet Based
- Client/Server
  - Number of Tiers

Technology

- Database
  - Relational
  - Object*
  - Multi-dimensional*
- SQL support

**Vendor Criteria**

The Electronic Medical Record market is growing rapidly. Each year new, innovative companies enter the market with good products. This state of affairs is wonderful if you are waiting for just the right product to catch your eye. On the other hand, few stable, proven products are available. Even large companies such as HBO&Company are new to this market and have no better track record than smaller start-ups. There are approximately 250 companies in this field so your choices are fairly broad. One thing is certain - the age of the company does not necessarily translate into a good product or a safe buy.

### **Company Profiles**

Evaluating a company requires asking lots of questions and insisting on clear, verifiable answers. Years in business, annual revenues, and business form are good issues to start with. Public corporations have the most easily verifiable financial data and I would start with this as the requirement. New companies may have little in the way of revenues. In such cases, capitalization is a good measure of long-term viability. Look for companies with backing from major corporations (e.g. a pharmaceutical company) and strong lines of credit with a major bank. Determine how many systems have been sold and whether sales are increasing or decreasing for the last few years. Get a list of customers similar in size to your practice and contact as many of them as is practical

### **Product Information**

It is a good idea to get a feel for the market segment the vendor is focusing on. If you are a six-person group, you may have trouble getting reliable service if most other customers are large independent practice associations (IPAs). Determine the maximum number of users that can log onto the system at once—and get proof! Depending upon your practice environment, interfaces can be the “make-or-break” issue. In a small practice an interface to your lab services provider may be all that is required. For a large IPA, however, interfaces to hospital systems, multiple labs, other sites, and accounting/billing systems may be an absolute requirement. If interfaces are required, make sure that they: 1) exist for the systems with which you must interface, 2) the full costs are given up front, 3) updates and upgrade costs are agreed upon in advance, and 4) at least some of this is included in the yearly maintenance contract.

### **Training**

Training is always an issue in system implementation. After all, a poorly trained staff will render your purchase useless and possibly even damaging to your business. Insist on on-site training and arrange for at least two of your staff to become expert in the use of the system; that way new employees can be trained at no cost in-house. Get the vendor’s estimate of the average time required to become proficient with the system. Use this estimate to set your implementation schedule.

### **General Hardware & Software Issues**

Obtain the required hardware specifications from the vendor. Some contracts require hardware to be purchased from the vendor. If this is the case, bargain gingerly. Hardware can be a major source of profit and may be overpriced. Get outside estimates for equivalent configurations. Get firm quotes for costs per user/workstation for software separate from hardware. Otherwise you may end up overpaying. Try to contract for the EMR software and required hardware separately.

### **Maintenance**

Believe it or not, many vendors make more money on the maintenance contract than on the initial sale. Knowing this, be a savvy buyer. Do *not* allow updates to be included as a separate cost item. Insist on having at least minor updates as part of the contract. This will be difficult because this is a high profit area for vendors. Next, ask for a “deductible” (i.e. the first “x” number of calls, visits, minor updates are included in the base contract). Have it clearly spelled out which services are included in the base contract. For example, you may find that basic maintenance includes only visits to check backups and respond to problems with the software, while simple adjustments (altering a

screen slightly, adding a new printer, redesigning a form) are charged at expensive hourly rates plus travel costs.

#### Vendor Criteria

##### Company

- Years in Business

- Annual Revenues

- Business form

  - Corporation

    - Public

    - Private

  - Partnership

- Capitalization

- Number of systems sold

- Number in current use

##### Product

- Maximum number of concurrent users

- Product focus

  - Solo practitioners and Small Groups (6 or less)

  - Medium groups (6-15)

  - Large Groups (>15)

  - Enterprise

##### Interfaces

- Laboratory Information System

- Hospital Information System

  - Pharmacy

  - Radiology

- Outside Providers/Sites

- Insurance

- Practice management system

- Cost accounting system

- Other clinical systems

- Office instruments

- Interfaces provided with system

  - Additional cost

  - Part of maintenance contract

##### Training

- Time required to proficiency

- Cost per user

- On-site vs. Vendor site

Hardware & Software

- Specific hardware requirements
- Cost per user
- Cost per workstation
- Upgrade frequency
- Upgrade part of maintenance contract

Maintenance

- Cost per year
- Cost per month
- Support
  - Local
  - National/Regional
  - Travel costs
  - Daily rate
  - Availability (i.e. 7/24 or 5/8)

## Resources

The list of publications and Web sites provided below are a good place to start when looking for information on buying EMR products.

### Publications and Web Sites

**Healthcare Informatics** - This is a very readable magazine-format journal which addresses a wide range of issues in the use of information technologies in health care. Two yearly issues are particularly worth reading: the December issue which contains the Annual Buyers Guide, and the June issue which contains a listing of the top 100 healthcare information technology companies..

[www.healthcare-informatics.com](http://www.healthcare-informatics.com)

**Health Data Management** - This is a very readable magazine which addresses a wide range of issues in the use of information technologies in health care. It provides a number of case studies addressing the use of information technology in health care entities of all sizes. Also, it has an Annual Buyers Guide Issue in December. The parent company, Faulkner & Gray, also publishes the Comprehensive Guide to Electronic Health Records, a very useful book-size publication which address EMR issues. It is aimed more at executives and information technology professionals than providers interested in advice on selecting a particular system. It is fairly expensive, but contains good discussions on legal issues, standards and security.

## GLOSSARY

CORBA

Database

    Relational

    Object

Fault-tolerance

(Suggestions)

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[www.computingforclinicians.com](http://www.computingforclinicians.com)