

# CHAPTER 10

## Electronic Medical Records, Electronic Prescribing, Mobile Technology and Practice Management Software

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### INTRODUCTION

Physicians today are facing a variety of daunting challenges, most of which don't seem to be directly related to patient care. From the Affordable Care Act to ICD-10, the physician can barely keep up.

Adoption of electronic medical records (EMRs), however, may be the most overwhelming. Although the number of medical practices using electronic health records (EHRs) has increased measurably over the past decade, use of EHRs is still far from universal. The National Ambulatory Medical Care Survey, conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS), is an annual, nationally representative survey of patient visits that includes office-based physicians and collects information on the adoption and use of EMRs/EHRs. According to the CDC, 54% of physicians in office-based practices were using EHRs in 2012. That being said, many physicians who have purchased EHRs are still in the early adoption and implementation stage.

EMR/EHR adoption rates among allergists have increased as well. A "Needs Assessment Survey" released by the AAAAI in early 2011 ([www.aaaai.org/practice-resources/running-your-practice/practice-management-resources/health-information-technology/ehrs.aspx](http://www.aaaai.org/practice-resources/running-your-practice/practice-management-resources/health-information-technology/ehrs.aspx)) revealed that of the 864 respondents, 60.9% utilized EMRs in their professional practices, with 45.5% using them constantly. Preliminary data from a 2011 survey of allergists from AmericanEHR revealed similar numbers, with 53% of respondents using an EHR in their primary work location and another 4% having purchased but not yet implemented an EHR system.

So what is still holding almost half of all physicians back from adopting, and many more from fully implementing, electronic medical records? If you have just started the process, can you still catch up?

## TECHNOLOGIES TO CONSIDER BEFORE AN EMR

If you are just starting to automate your office, you may not be ready to jump right into purchasing a full EMR system. There are many steps you can start on to begin your journey. The following list is adapted from McNickle as reported in Healthcare IT News in October 2011. ([www.healthcareitnews.com/news/10-technologies-embrace-emrs](http://www.healthcareitnews.com/news/10-technologies-embrace-emrs))

### Technologies to Embrace Before EMRs

1. e-Prescribing — This is important enough to warrant its own section later in this chapter.
2. e-Mail — If you aren't already doing it, e-mail and internal office messaging are great ways to get your office staff more comfortable working with their computers.
3. Microsoft Office 365 and Google apps — These are simpler formats that can be used for managing contacts and scheduling appointments.
4. "Clinical groupware" — This is a new category of software that allows you to collaborate with colleagues on your higher acuity patients.
5. Patient registry and clinical content repository (CCR) bulletin board — These can help manage patient summaries and are helpful for chronic disease management.
6. Document imaging — Imaging allows for scanning and storing of your paper documents.
7. CCR — This centralized repository enables researchers and healthcare professionals to easily search, cross-correlate, share and update patient data. It is also a good clinical and research tool.
8. Electronic lab result delivery — This can automate lab results through a web-based lab reporting system.
9. e-Transcribing — e-Transcribing can help you by maintaining an optimal, popular dictation interface, creating a document-sharing system among multiple locations and reducing transcription expenditures by reducing the number of lines transcribed.
10. Speech recognition — Speech recognition software can do more than pure dictation. Most systems can be used to manage e-mail as well as speed up information turnaround and protect employees from repetitive stress injuries. Additionally, the software can be integrated with most EMRs. This can be a good conversion for physicians in the practice of dictating but ready to adopt an EMR system. There have been tremendous advances in this technology in the last few years, and it can process your speech and deliver results to the screen in real time.
11. Mobile computing and mobile applications — Use of apps on your smartphone, iPad, and the like can allow for clinical decision support at the point of care. There are many physician-directed apps such as CARD (Contact Allergen Replacement Database), Epocrates®, Medscape, and others.

## EMR TERMINOLOGY

Extensive knowledge of computers and programming is not needed to make a wise and informed choice about an EMR system. However,

understanding certain concepts and terminology is helpful in choosing among the various options. (A useful glossary can be found on EMRconsultant.com, <http://goo.gl/8YscYM>). The term electronic medical record, or EMR, is generic for any clinical computing system that includes features beyond simple document storage. It differs from a practice management (PM) system, which typically handles billing, insurance claim filing, financial reporting and, sometimes, scheduling and patient reminders. The term EMR also differs from the broader concept of a computerized chart, the simplest form of which is a medical document management system. In a computerized chart, the patient’s chart is represented by organized text files describing patient encounters and by scanned images of outside records, including laboratory results and other test results, as well as the medical history. The terms electronic medical record and electronic health record often are used interchangeably. However, they are distinct entities (<http://goo.gl/9Ewum>). An EMR system is typically confined to a single organization. The term electronic health record, or EHR, is more properly defined as an electronic record containing information about a patient that is integrated across multiple systems or healthcare organizations. In other words, an EHR is an EMR that includes data from multiple sources, such as data from an EMR in an ambulatory practice

and data from an EMR in a hospital. This definition of an EHR would require the existence of a Health Information Exchange (HIE). HIEs are responsible for electronic movement of health-related data among organizations using standards that are nationally recognized (<http://goo.gl/M5tdsp>).

## TYPES OF EMRs

There are four main types of electronic medical records, categorized based on where the data is stored. The first is one in which you own the software and the hardware on which it runs, including the server (in layman’s terms, the “main computer”), the terminals or workstations used to access the server, and the printers, scanners and other computer hardware. Everything would most likely be located in one of your offices. This is a physician-hosted system, sometimes referred to as the “server model.” The other three types of electronic medical records can be categorized as remotely hosted systems. Here, the electronic patient data is stored remotely on servers that belong to another entity. The first type of remotely hosted system is known as a subsidized system, where the costs of the EMR are subsidized by the other entity. A common example is where the physician enters into an agreement with a local hospital or healthcare system.

Term	Definition
EMR (Electronic Medical Record) System	Any clinical computing system that includes features beyond simple document storage
PM (Practice Management) System	Handles billing, insurance claim filing, financial reporting, and sometimes scheduling and patient reminders
Computerized Chart	Medical document management system
EHR (Electronic Health Record)	An electronic record containing data about a patient that is integrated across multiple systems

Some prominent EMR systems are available to ambulatory practices only by this means; they are not marketed to ambulatory practices directly. Note that although allergists are usually treated politely by the staff of hospitals and integrated healthcare systems, strong relationships with allergy practices may not be valued as much as those with providers who admit more patients and perform more procedures. As you may know, the Centers for Medicare and Medicaid Services (CMS) has created an exception to the Stark Laws (laws that restrict gifts to physicians by other providers) that allows hospitals and other providers to **give** EMR systems to physicians. An important criterion of this exception to the law is that the EMR software must be certified.

The second type of remotely hosted EMR system is the dedicated host system. Here, electronic patient data is stored on the vendor’s servers.

The final type of remotely hosted EMR system is the cloud system. The electronic patient data is stored on the Internet, or cloud, by the vendor. In this model, the vendor is known as a software as a service (SaaS) provider (formerly known as the application service provider (ASP) model).

The software in this case is on a server — a larger, more powerful computer than a typical PC (workstation) — that is located away from your office, often in a data center that even may be in another city. PCs in your office with printers and scanners are connected to the faraway server via the Internet. The advantages of the cloud model are that software updates do not have to be installed in your office, backups of your data can be handled elsewhere and you require less computer expertise in your own practice. Your practice also may

require substantially less expensive computer hardware. The principal disadvantage is that you are dependent on a reliable high-speed Internet connection.

<b>Types of EMRs</b> ( <a href="http://goo.gl/w6vh3H">http://goo.gl/w6vh3H</a> )
Physician-hosted system
Remotely hosted system
Subsidized system (hospital or healthcare system model)
Dedicated host system
Cloud system (SaaS model)

### Allergy-Specific EMR Features

Most of the EMR features that are essential or desirable to an allergy practice are similar to those of an EMR system for any ambulatory practice. However, no single EMR system is likely to include all of these features. You first should decide which features are most important to your practice, and rank them in order of preference. Some features, such as growth charts, may not be important to all practitioners. Features unique to an allergy practice include allergy skin test documentation; incorporation of extract ordering and preparation; immunotherapy protocol management; immunotherapy dosage customization and immunotherapy administration, management and documentation. Other features that are specialty related, but that are not unique to the specialty of the allergist, include outcomes assessment with tools for quality-of-life assessment, and interface with a pulmonary function testing system.

<b>EMR Features Unique to an Allergy Practice</b>
Allergy skin test documentation
Incorporation of extract ordering and preparation
Immunotherapy protocol management
Immunotherapy dosage customization
Immunotherapy administration, management, and documentation

<b>EMR Features that are Specialty-Related but not Unique to an Allergy Practice</b>
Outcomes assessment with tools for quality-of-life assessment
Interface with a pulmonary function testing system

Only a few of the several hundred EMR systems currently available have any specific features for an allergy practice. One option is to purchase a stand-alone software module that addresses the unique needs of an allergy practice and purchase an interface with your EMR and/or PM system. The availability of these allergy modules, however, is even more limited and interfaces can be costly. The need to update the interface when either the EMR or the PM system is upgraded, even with routine updates, further increases the expenses. Deciding at the outset whether to limit your consideration of EMR systems to the few that include allergy-specific features is one way to streamline the EMR selection process, but may make it harder to meet meaningful use (MU) and interoperability requirements.

## CHOOSING AN EMR SYSTEM

If you are nervous that you haven't yet purchased an EMR system, as more than half your colleagues have, don't rush out just yet. One essential element to making your implementation successful is to make sure you and your practice are ready. AmericanEHR has developed a readiness assessment tool ([www.americanehr.com/ratings/ehr\\_ratings/readiness-assessment.aspx](http://www.americanehr.com/ratings/ehr_ratings/readiness-assessment.aspx)) to assist you in evaluating your preparedness for EHR implementation. (AmericanEHR was developed by Cientis Technologies and the American College of Physicians to provide physicians, state and federal agencies, vendors and funding organizations across

the United States with the necessary tools to identify, implement and effectively use EHRs and other healthcare technologies. The AAAAI is a partner organization.) Once you determine you are ready, you may start the selection process. Realistically, the process of selecting and implementing an EMR system takes many months, and a year or two is not an unreasonable time frame.

It is also important to involve the end users in the EMR selection process. Too often, an EMR system is selected by the clinic management staff and not the providers who will be using it the most. This can lead to blame and resentment if the provider is not happy with the selection. A survey released by AmericanEHR in October 2011 revealed the overall satisfaction with an EMR system was highly correlated with whether the respondent was involved in the selection process.

It is tempting to ask which is the best EMR system for an allergy practice, but there is no simple answer to this question. The answer differs among practices and among regions of the United States. Many consultants say that the single biggest error made is to shop for an EMR system before carefully analyzing the practice and its needs. The features of an EMR system displayed and touted in vendor exhibits and promotional materials are the most exciting bells and whistles of a system. However, many of these features may not be relevant to the needs of the practice, and may not be cost-effective in their eventual implementation.

One decision to make early in the process is whether to hire a consultant to assist in the selection of an EMR system. Several factors should influence this

decision. One important factor is the availability of an experienced consultant who has no affiliation with any EMR vendor. Individuals with experience and training in medical information technology are scarce, because there is such a high demand for their skills. The recent growth of the ambulatory EMR field makes PM consultants who have significant experience scarce as well. Nevertheless, some practitioners may wish to assign the task of selection and implementation to someone outside of the practice, while keeping in mind that it is unlikely that the consultant will be familiar with the unique needs of an allergy practice. A consultant can be used for certain aspects of your process such as helping you with your request for proposal (RFP) or comparing quotes from different vendors. When selecting a consultant, it is best to ask for details of their past experience, including a list of clients (categorized by practice type and size) and the vendors considered and chosen.

With more than 550 certified complete ambulatory EHR products, how do you narrow the list? This selection process begins with recommendations from a consultant and recommendations from other practitioners in your area and other allergy practices.

<b>Resources for Choosing an EMR System</b>
AmericanEHR Partners Vendor Directory <a href="http://www.americanehr.com/ratings/ehr_ratings/EHR-Products.aspx">www.americanehr.com/ratings/ehr_ratings/EHR-Products.aspx</a>
Ohio State Medical Association's EMR Standards of Excellence Program <a href="http://www.osma.org/files/documents/tools-and-resources/hit/ehr/ehr-standards-of-excellence/ehr-soe.pdf">www.osma.org/files/documents/tools-and-resources/hit/ehr/ehr-standards-of-excellence/ehr-soe.pdf</a>
EMR Consultant <a href="http://www.emrconsultant.com">www.emrconsultant.com</a>

An excellent resource for starting the process of choosing an EMR system is AmericanEHR's vendor directory. Other helpful vendor neutral sites are the Ohio State Medical Association's EMR Standards of Excellence Program ([www.osma.org/files/documents/tools-and-resources/hit/ehr/ehr-standards-of-excellence/ehr-soe.pdf](http://www.osma.org/files/documents/tools-and-resources/hit/ehr/ehr-standards-of-excellence/ehr-soe.pdf)) and [www.emrconsultant.com](http://www.emrconsultant.com). EMR Consultant is a free, web-based tool to match your clinic profile to specific EMR systems. Many other professional organizations and state medical associations have useful tools to help with EMR selection. You want to make sure that the EMRs you are looking at have been certified by an Authorized Testing and Certification Body (ATCB) of the ONC (Office of the National Coordinator) ([www.healthit.gov/providers-professionals/faqs/what-onc-authorized-testing-and-certification-body-onc-atcb](http://www.healthit.gov/providers-professionals/faqs/what-onc-authorized-testing-and-certification-body-onc-atcb)).

Once the list of EMR systems is narrowed to your top 3-5 vendors, the next step is to contact these vendors and invite live demonstrations in your practice. Most have a well-scripted demonstration featuring the highlights of their system. You should also prepare two or more scripts of your own that represent scenarios of situations commonly encountered in your practice. These scenarios should not include typical patients but patients that best test the most desired features of the system. This allows a more meaningful comparison of the various systems. This should help you narrow your choice further to your top two to three systems. These are the vendors you want to receive your RFP. American EHR offers an online form to use to request proposals ([www.americanehr.com/ratings/ehr\\_ratings/ehr-proposal-request/step-1.aspx](http://www.americanehr.com/ratings/ehr_ratings/ehr-proposal-request/step-1.aspx)).

## Large vs. Small Vendors

There are currently more than 550 EMR products; some vendors have only a handful of systems installed, whereas others have thousands. Company size usually varies accordingly, with the exception that some vendors are relatively small divisions of massive corporations. Large or small, it is important to choose a vendor that has some presence in your geographic region. The costs and availability of support, particularly in the implementation phase, are likely to be high if the vendor is remote. A list of currently certified EMR systems can be found at <http://onchpl.force.com/ehrcert/CHPLHome> (current).

Although you may want to use a smaller vendor, there are inherent risks in purchasing an EMR system from a small vendor. Their support staff may be stretched thin, and critical knowledge may reside in a single individual, who may one day leave the company. However, with the evolution and rapid expansion of EMR systems in recent years, even a large vendor may have a critical shortage of qualified support staff. This is not something the vendor is likely to reveal during purchase negotiations. Financial capital has proved to be critical to the survival of vendors many over the past decade, as was the advent of ambulatory EMR certification in 2006.

Large vendors also can have several drawbacks. Most of them market multi-million-dollar EMR systems to hospitals, and the value of a smaller ambulatory EMR system clearly pales in comparison. The commitment of such vendors to the development and support of such a system is thus clearly less than their commitment to their larger clients. Recently a multi-billion-dollar corporation abandoned its EMR

division entirely, because profits were too small to warrant continuing it. Some EMR systems are sold by the sales force of the vendor, whereas others are sold by value-added retailers (VARs) that operate usually locally or regionally. These VARs have come to include Wal-Mart, Sam's Club and Costco as well as others. Many VARs also take on the role of implementation consultant with obvious bias.

## Budgeting and Return on Investment

The initial cost of an EMR system should not be the most important consideration when deciding which system to purchase. However, it is usually one of the primary determining factors; 66% of survey respondents cited cost of hardware and software as their top concern with EHR adoption (CDW Healthcare Physician Practice EHR Price Tag December 2010; <http://webobjects.cdw.com/webobjects/media/pdf/Newsroom/CDW-Healthcare-Physician-Practice-EHR-Price-Tag.pdf>). Twenty-five percent of allergists questioned cited cost as the main reason for not using an EMR system. Hardware and software costs, however, make up only about 12% of total EHR adoption costs. The total cost, including lost revenues in the first year, can total up to \$120,000 per physician. There is typically a recurring cost of up to \$30,000 per physician per year. Once fully implemented, however, systems have been shown to improve patient workflow and result in a return on investment of up to \$150,000 per physician in annual revenue. When considering cost, be sure to include costs of interfaces, patient portals, training and support, in addition to the software/hardware costs and loss of revenue. The Maryland Health Care Commission has developed an Electronic Health Record Product Portfolio to

provide evaluation and comparison information on electronic health records ([http://mhcc.dhmh.maryland.gov/hit/ehrVendors/Pages/EHR\\_Porfolio.aspx](http://mhcc.dhmh.maryland.gov/hit/ehrVendors/Pages/EHR_Porfolio.aspx)). Additional considerations when pricing an EHR are found on AmericanEHR’s website (<http://www.americanehr.com/ehr-resources/ehr-pricing.aspx>). The costs can vary widely. There are even “free” EHRs available, but you may get what you pay for.

## ANALYZING PRACTICE WORKFLOW

The first step in re-engineering the practice for the EMR system is to analyze current workflow patterns. An EMR system can help with office efficiency, but only if the benefits are used to re-engineer office workflow. Forcing the EMR system to fit into your current paper-based workflow will make you less efficient. Analyzing your current workflow and determining how it will fit into an electronic-based system is essential and should not be skipped. When performed early in the process, the workflow analysis can provide insights on what to look for in the new EHR product. A completed workflow analysis will inform the physician practice of detailed descriptions of current office workflow; provide detailed workflow maps of key office processes; identify current inefficiencies, bottlenecks and opportunities for improvements; provide a high-level outline of desired future workflow redesigns after EMR system implementation; and provide a list of changes that can be made even before an EHR product is selected. The physician has two options for analyzing workflow. The first is to hire an outside information technology consultant who will perform functions such as interview key physicians and staff, create workflow descriptions and maps, analyze the results, review findings with the practice

and develop recommendations. The second option is for the practice to perform the workflow analysis. Currently, a variety of tools exist on the Internet such as the Agency for Healthcare Research and Quality’s (or AHRQ) Health IT Adoption Toolbox, the Doctor’s Office Quality-Information Technology (or DOQ-IT) Operational Redesign Workbook and the Physician Information Technology Office (or PITO) Needs Assessment, all of which can be used as guides for charting the practice’s workflows.

Tools for Performing an Office Workflow Analysis
The Agency for Healthcare Research and Quality’s (AHRQ) Health IT Adoption Toolbox <a href="http://goo.gl/94qF8T">http://goo.gl/94qF8T</a>
The Doctor’s Office Quality-Information Technology (or DOQ-IT) Operational Redesign Workbook <a href="http://mhcc.dhmh.maryland.gov/hit/ehr/Documents/sp.mhcc.maryland.gov/ehr/cmsdemo/work_flow052610.pdf">http://mhcc.dhmh.maryland.gov/hit/ehr/Documents/sp.mhcc.maryland.gov/ehr/cmsdemo/work_flow052610.pdf</a>
The Physician Information Technology Office (or PITO) Needs Assessment <a href="http://goo.gl/a7ena0">http://goo.gl/a7ena0</a>

## CONTRACTING AND PURCHASE

Like any large purchase, an EMR system involves a complex purchasing contract. This aspect, perhaps more than any other, is an area in which legal advice or the advice of an independent EMR consultant is valuable. Standard purchase contracts often include provisions that are disadvantageous to the purchaser, and these should be avoided. Among these are:

- Restriction of assignment – you can sell your practice, but the EMR cannot be sold with it.
- Ownership of data – the vendor, not the practitioner, may own the data.
- Access to data – the vendor may have a right to mine your data without your permission.



- Loss of computer code if the vendor fails – computer code should be backed up in case the vendor fails; otherwise the practitioner may lose all access to the data.
- A trial period – get a money-back guarantee that extends for some period after implementation.
- Confidentiality – contract provisions may prohibit the buyer from discussing problems or failures with outside parties; these are so-called “gag clauses.”
- Hold-harmless clauses – the buyer may be held liable for any injury or harm to patients caused by defects in the software.
- Specification of annual support and maintenance fees, and guarantees that all potential costs and expenses are included in the contract – so there are no hidden costs.
- Future upgrades and modifications to comply with government mandates or programs should be covered by annual fees – this is not always clearly stated in the contract, but it should be.

This is not an exhaustive list, but is intended to highlight important aspects of the purchase contract. It is extremely important to get any promises made by the sales team in writing as part of the contract. Other important costs often not referenced in standard contracts but that might be considered for inclusion are the cost of training and the cost of interfaces that may be anticipated, such as interfaces with laboratory systems, PM systems, and HIEs. An in-depth list of contracting guidelines for EHR purchase can be found at [healthit.gov](http://healthit.gov) (<http://goo.gl/VzNFrg>).

In July 2013, The Office of the National Coordinator for Health IT issued its first guide to help buyers and users of EHRs to better understand vendor contracts (<http://goo.gl/fY0AZw>). Contract terms addressed in the guide (<http://goo.gl/ymonHx>) include:

- Indemnification and hold harmless clauses
- Confidentiality and nondisclosure agreements
- Warranties and disclaimers
- Limits on liability
- Dispute resolution
- Termination and wind down provisions
- Intellectual property disputes

## **IMPLEMENTING THE EMR SYSTEM/ BARRIERS TO IMPLEMENTATION**

The key to success of your EMR system lies in implementation. There are many podcasts, blogs, articles and other resources that address this in depth. AmericanEHR has a resource page devoted to implementation ([www.americanehr.com/education/education-resources/implementation.aspx](http://www.americanehr.com/education/education-resources/implementation.aspx)) that includes a link to the Texas Medical Association’s Electronic Medical Record Implementation Guide and “A Beginner’s Guide to Selecting an EHR” put together by Welch Allyn. MGMA has an EMR implementation checklist ([www.mgma.com/WorkArea/DownloadAsset.aspx?id=5670](http://www.mgma.com/WorkArea/DownloadAsset.aspx?id=5670)). The Health Information and Management Systems Society (HIMSS) also has a tremendous number of resources. Most require a membership, but the relatively low price might be worth one member of the practice (the IT person or “superuser”) joining. We will highlight herein a few of the most important issues.

### Barriers to Implementation

Knowing the most commonly cited barriers ahead of time can help you better prepare. According to a 2011 MGMA survey, the most cited barriers are expected loss of productivity during transition to the EHR system (78.3%), insufficient capital resources to invest in an EHR (71.7%), expected loss of productivity after the transition to the EHR system (67.4%) and insufficient expected return on investment from an EHR (56.9%) ([www.mgma.com/press/default.aspx?id=1248514](http://www.mgma.com/press/default.aspx?id=1248514)). A recent national study published in late 2013 in the journal *Medical Care* examined challenges reported to regional extension centers. Most of the challenges fell under the category of practice issues, with provider engagement, vendor selection, administrative practice issues, delays in implementation and practice workflow being the main problem areas ([www.ncbi.nlm.nih.gov/pubmed/24309669](http://www.ncbi.nlm.nih.gov/pubmed/24309669))

Common Barriers to EMR Implementation
Expected loss of productivity during transition to the EHR system (78.3%)
Insufficient capital resources to invest in an EHR (71.7%),
Expected loss of productivity after the transition to the EHR system (67.4%)
Insufficient expected return on investment from an EHR (56.9%)

<http://www.mgma.com/press/default.aspx?id=1248514>

Overall, the most common barriers remain cost, lack of knowledge, workflow challenges and lack of interoperability.

### Physician Champions, Superusers and the Implementation Team

The physician champion in a small- to medium-sized allergy practice is likely to be the project manager for the entire implementation. For several reasons, a new practitioner may be the best person to fulfill this role. This person is likely to be responsible for the process of practice workflow analysis, EMR selection, and planning for practice re-engineering. The term “superuser” was coined in the informatics field to designate someone who is a daily user of a software system, and who plays the lead role in implementation of the system. This person encourages and educates the other users, answers questions for new users and provides or facilitates training in the use of the system. In most practices, even small ones, this role would not be played by the physician champion, but rather by a nurse or medical assistant, office manager or billing manager. Everyone is on the implementation team. As noted earlier, it is important to include all users from the outset, not when implementation is imminent. Having input from all users is essential. One major reason for EMR system failure is a lack of input from all of the users. An EMR system should not be chosen solely by the practice manager or physician(s) and then forced on the other users.

### Identifying the Computer-Challenged

Equally important as identifying the champions of implementation is identifying the computer challenged and the skeptics (aka anchors). The computer-challenged need to be identified at the outset, and issues must be addressed from the beginning, not at the time of implementation.

Assigning the computer-challenged individuals projects such as data input into existing computer systems and/or even taking typing or technology related classes at local technical schools are two useful approaches.

Skeptics and naysayers have been stumbling blocks for many EMR implementations. Their concerns should be identified and addressed, and these individuals should be brought into the implementation process. Their investment in the process may be key to its ultimate success. It is almost universally agreed that a hybrid office, where some practitioners are users of an EMR system and others are not, will never be successful. Furthermore, hoping to bring skeptics on board after others in the practice have adopted it and shown its value also is never a successful approach.

**Hardware and Interface Devices**

EMR vendors may make recommendations for computer hardware and interface devices, but this issue should be addressed carefully during workflow assessment and planning. Computer hardware requirements must be part of the RFP (Request for Proposal), and be subject to later modification. The consideration of input devices and

their implementation in the clinical setting should begin as early as possible in the conversion process, preferably at the same time as the initial planning and selection steps. The office’s extant computer network and high-speed Internet connection should be compatible with the EMR system selected. Whether you are planning to use notebook computers, tablets, or PC workstations in the exam rooms, be sure to acquire one of each device being considered and give it a thorough trial. This sort of hands-on experience will prove invaluable and will help you avoid unnecessary hardware problems later on.

Dictation using speech-recognition software is another often-mentioned area for computer use in the clinical setting. Investing the necessary time to train the software is critical in making speech recognition successful. Interfaces between radiology departments and laboratories are helpful. Some systems allow for bidirectional interfaces (order and receive results in the EMR system), whereas some only allow for unidirectional interfaces. Interfaces often may be paid for by the laboratory or radiology group wanting your business. Interfaces with office spirometry and vital signs machines are also possible and should be part of your RFP. Patient portals are

<b>Tips for EMR Hardware and Interface Devices</b>
Hardware requirements should be part of the RFP (Request for Proposal)
Hardware requirements should be made subject to later modification
Consider and implement input devices in the clinical setting as early as possible
The EMR system selected should be compatible with the existing office computer network and high-speed Internet connection
Acquire one of each EMR computer input device being considered (notebook, tablet, or desktop) and give it a thorough trial
Investing the time necessary to train speech-recognition software is critical to its success
Interfaces between the EMR system and radiology departments and laboratories are helpful
Interfaces with office spirometry and vital signs machines are possible and should be part of the RFP
Patient portals are usually available to link with most EMRs but often cost more

available to link with most EMRs but are usually an additional expense. Some states have set up HIEs (health information exchanges) that allow multiple providers on different systems to interface with each other through the HIE to allow for easier interoperability.

### **Implementation Timing**

A common reason for failed EMR implementations is not allowing enough time for planning, selection, training and implementation. For example, one EMR consultant will not accept a contract with any practice that insists on a timetable of less than six months to begin implementing a system. A survey by AmericanEHR Partners revealed that at least three to five days of devoted EHR training were necessary to achieve the highest level of overall satisfaction, but nearly half (49.3%) of respondents indicated that they received three or fewer days of training ([www.acponline.org/pressroom/physician\\_training\\_ehr.htm](http://www.acponline.org/pressroom/physician_training_ehr.htm)).

After initial training, it is time to “go live.” Preparing for this phase is just as important for training. Most practices find it necessary to decrease their usual schedule for the first couple of weeks. It is often easier to decrease the patient load initially and open it up more when providers are ready, than to find yourself behind and being tempted to give it up and reach for the old paper record. Many practices will decrease the schedule by 50% the first week or two, 25% the following week or two, then be back up to a full schedule. This allows some flexibility for users that may adopt more quickly.

## **PRIVACY, SECURITY AND LIABILITY**

The Health Insurance Portability and Accountability Act of 1996 (HIPAA, Title II) addressed the security and privacy of healthcare data. Details of the provisions of HIPAA are included at the CMS website (<http://goo.gl/enKSCX>). Security involves the protection of protected health information from unauthorized release or theft. For electronic records, this includes not only physical security but also electronic security. The standards include password protection, periodic password changes, restriction of data access to only that required for the performance of assigned tasks, and network security. The American Recovery and Reinvestment Act (ARRA) of 2009 expanded some HIPAA requirements. Most notably, it created a requirement that patients be notified of any unauthorized release of their protected health information. Electronic security would be expected to be part of the EMR system, and also to protect the computer network to which it is connected. Compliance in implementing and using these security mechanisms remains the responsibility of the physician practice. It is prudent to ensure that the EMR vendor is contractually obligated to incorporate these security measures into the system you purchase, and to include training in their use in the initial training. Your practice may need to expand its general liability insurance coverage to protect your new EMR system. Be sure to check with your general liability carrier and EMR system vendor. AmericanEHR Partners has a section devoted to privacy and security (<http://goo.gl/iezXma>).

## EMR CERTIFICATION AND MEANINGFUL USE

In October 2009, the 111th Congress passed the ARRA (aka “The Stimulus Act”). This was intended to create jobs and promote investment and consumer spending during the recession. ARRA included the Health Information Technology for Economic and Clinical Health (HITECH) Act. This authorized incentive payments through Medicare and Medicaid to clinicians and hospitals when they use EHRs to achieve specified improvements in healthcare delivery. This allows for incentive payments totaling up to \$27 billion over 10 years. The goal was not to just encourage adoption but MU (meaningful use) of EMRs. The Secretary of Health and Human Services was charged to develop the MU objectives. The incentive programs are run through Medicare and Medicaid and will provide payments to eligible professionals (EPs), eligible hospitals and critical access hospitals, or CAHs, as they adopt, implement, upgrade or demonstrate MU of certified EHR technology. Eligible professionals who do not achieve MU will be subject to penalties.

There are three main components (stages) to MU: **use** of a certified EHR in a meaningful manner, **use** of a certified EHR for electronic exchange of health information to improve quality of health care and **use** of a certified EHR to submit clinical quality and other measures. Stage 1 in MU objectives sets the baseline for electronic data capture and information sharing. Stages 2 and 3 will continue to expand on this baseline and be developed through future rule making. A decision was later made to delay implementation of Stage 2 until 2014. The Medicare and Medicaid EHR Incentive Programs are staged

in three steps with increasing requirements for participation. All providers begin participating by meeting the Stage 1 requirements for a 90-day period in their first year of meaningful use and a full year in their second year of meaningful use. After meeting the Stage 1 requirements, providers then will have to meet Stage 2 requirements for two full years.

Stages of Meaningful Use (MU)
Stage 1: use of a certified EHR in a meaningful manner
Stage 2: use of a certified EHR for electronic exchange of health information to improve quality of health care
Stage 3: use of a certified EHR to submit clinical quality and other measures

As of May 2012, a total of 62,226 eligible professionals had attested to MU under the Medicare program. This accounted for ~12% of eligible professionals in the U.S. Family practitioners had the highest number of attestations, with primary care providers overall comprising 44% of all attestations (<http://www.nejm.org/doi/full/10.1056/NEJMc1213481>).

Some providers, especially allergists who see both pediatric and adult patients, may qualify for both the Medicare and Medicaid Programs. You have to choose one program but have the option to switch once during the program if needed. Check out [www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html](http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html) for more information and to determine for which program you are eligible. Incentive payments are based on individual practitioners, not practices. Hospital-based professionals (≥90% of services are in a hospital inpatient or ED setting) are not eligible for incentive payments.

Use of a “certified EHR” is required. The standards and certification criteria are set by the Department of

Health and Human Services. You can access a list of certified EHR products at <http://oncchpl.force.com/ehrcert>. Ensure that the product you purchase is certified, even if you don't think you will participate in the incentive program. A vendor unable to meet certification is unlikely to survive long term.

A September 2013 CDC Data Brief reported a 2011 Physician Workflow Survey; in the brief, 76% of physicians with EHR systems had systems that meet meaningful use criteria, 15% were not certain, and 8% did not ([www.cdc.gov/nchs/data/databriefs/db129.htm](http://www.cdc.gov/nchs/data/databriefs/db129.htm)). Physicians with EHR systems that met meaningful use criteria were more likely to report that their system provided time savings than physicians with systems not meeting meaningful use criteria. Those with MU HER systems also were more likely to report enhanced confidentiality and less disruption in their interactions with patients, but were no more likely to report financial benefits and selected clinical benefits than those with systems not meeting meaningful use criteria.

**Medicare Incentive Program**

The Medicare EHR Incentive Program began in 2011. Through this program, EPs (Eligible Providers)

can receive up to \$44,000 over five years, with a cap of 75% of approved Medicare charges. To get the maximum benefit, participation in the program had to begin by 2012. For 2015 and later, Medicare-eligible professionals who are not successful participants will have a payment adjustment in their Medicare reimbursement. Eligible providers in the Medicare program include doctors of medicine, osteopathy, dental surgery, dental medicine, podiatry, optometry and chiropractic. Registration information is available at [www.cms.gov/EHRIncentivePrograms/20\\_RegistrationandAttestation.asp](http://www.cms.gov/EHRIncentivePrograms/20_RegistrationandAttestation.asp).

**Medicaid Incentive Program**

The Medicaid EHR Incentive Program is voluntarily offered by individual states and also began in 2011. Through this program, EPs can receive up to \$63,750 over six years. There are no payment adjustments under the Medicaid program. EPs in the Medicaid program include physicians, nurse practitioners and others. To qualify, EPs must have a minimum 30% Medicaid patient volume or 20% if they are a pediatrician. Children's Health Insurance Program patients do not count toward the Medicaid patient volume criteria. The definition of "pediatrician" is determined by the individual state.

<b>Medicare</b>	<b>Medicaid</b>
Federal government will implement	Voluntary for states to implement
Penalties begin in 2015	No penalties
Must demonstrate MU year 1	Can merely adopt, implement or upgrade year 1
Max incentive is \$44,000 for EPs	Max incentive is \$63,750 for EPs
Consistent MU definition	States can adopt additional MU requirements
Last year to initiate 2014; last year to register 2016; payment adjustments begin 2015	Last year to initiate 2016; last year to register 2016
Only physicians	Five types of EPs

**Regional Extension Centers.** Regional Extension Centers (RECs) have been set up in accordance with the HITECH Act to offer technical assistance, guidance and information on best practices to support providers to become meaningful users of EHRs. Approximately 70 RECs have been established to serve a defined geographic area. A full list can be found at [www.americanehr.com/ehr-resources/recs.aspx](http://www.americanehr.com/ehr-resources/recs.aspx). Most RECs give priority to primary care practices, but some offer support for specialists as well.

## **INTEROPERABILITY AND HEALTH INFORMATION EXCHANGE**

Much of the promise of improvement in patient safety, outcomes and efficiency of care from the adoption of EMR systems lies in the ability to exchange health information between systems. Realization of those potential benefits has largely not been possible to this point because of the lack of interoperability between systems. The lack of interoperability is due to the lack of adoption of standards for clinical data that would enable this objective. A significant part of the intent of the EHR incentives programs discussed previously in this chapter is to enable health information exchange. We practice every day with missing information: for instance, the prescription a patient received elsewhere, but cannot remember the name of; the laboratory test done in another clinic that we do not have access to; and the imaging study done in another state before the patient moved to our city. The result is that we often make a decision with incomplete information, since obtaining that information requires an impractical effort or would delay our decision so much that it would not be of benefit. Or we repeat a costly test to replace the

missing information. How much better would our care be if we had immediate electronic access to that missing information to inform our decisions? And how much better will our care be if we can communicate electronically to coordinate the care of patients and to provide the patients themselves with electronic access to their information and to education about their conditions and treatments? Health Information Exchange allows health care professionals and patients to appropriately access and securely share a patients' vital medical information electronically.

Large integrated systems like those at Kaiser Permanente and the Geisinger Clinic in Pennsylvania have demonstrated the value of having information available across many settings of care. These organizations have been able to demonstrate improvements in patient safety, outcomes and efficiency of care. However, having availability of this information at the point of care requires an HIE network, with many associated challenges.

The Office of the National Coordinator for Health Information Technology has awarded \$16 million in grants to encourage innovations for HIE. [HealthIT.gov](http://HealthIT.gov) offers a five-part series of web-based training modules to help explain the use of HIE, specifically related to meeting Stage 2 MU data exchange requirements, at [www.healthit.gov/HIE](http://www.healthit.gov/HIE).

## **ELECTRONIC PRESCRIBING**

Electronic prescribing (e-prescribing) refers to the exchange of both prescription and medication history information among prescribers, pharmacies and insurance payers/pharmacy benefit managers.

e-Prescribing can be done using an EMR system, web-based programs or e-prescribing software. Pharmacies also can send e-refill requests back to the prescribing provider. e-Prescribing gives physicians and other prescribers the potential to access and use information such as patient medication history and prescription benefit information to support clinical decisions about drug therapies. Prescribers can use this information to perform more robust drug-drug and drug allergy interaction alerts, and to prescribe medication that complies with a patient's drug benefit. By having more comprehensive and accurate information at the time of prescribing, the practice can improve the quality of care, potentially increase adherence, and reduce the number of call-backs from the pharmacist to clarify prescription information. By managing the prescription refill authorization process electronically, practices can save time and improve efficiency while allowing medication to be delivered in a timelier manner to patients. This and more information can be found at [www.americanehr.com/education/ehr-resources/e-prescribing.aspx](http://www.americanehr.com/education/ehr-resources/e-prescribing.aspx).

## **MOBILE TECHNOLOGY**

Mobile technology is transforming health care. Mobile health, or m-health, is probably the fastest growing area in HIT. While the term “mobile health” does not have a strict definition, it has come to mean the entire spectrum of mobile devices, most of them portable and even handheld, and the software applications they enable. These devices and applications are seeing rapid adoption by healthcare professionals, patients and healthcare consumers. m-Health has spawned the development of new organizations and conferences focused only on this

area. The HIMSS, the membership organization for HIT professionals, for example, now has an entire section for m-health, called mHIMSS. Mobile health has grown to the point that the U.S. Federal Government has become involved. On September 24, 2013, the FDA announced the Mobile Medical Applications Guidance for Industry and Food and Drug Administration Staff (<http://goo.gl/cvYBp>). The FDA has determined that for purposes of regulation, a mobile medical app is a medical device that is a mobile app, meets the definition of a medical device, and is an accessory to a regulated medical device or transforms a mobile platform into a regulated medical device (<http://goo.gl/HKunbn>). As of the end of November 2013, there were 103 FDA-regulated mobile medical apps (<http://goo.gl/Lb8DEF>).

Paul Jacobs, closing keynote speaker at the 2011 mHealth Summit, called the wireless system “one of humanity's greatest achievements.” As of mid-2013, over half the population of the U.S. had smartphones (<http://goo.gl/EdHbd>). By the end of 2013, an estimated 1.4 billion people, or one in five people globally, were using smartphones (<http://goo.gl/UOTCuo>). Mobile devices not only will help doctors manage patients, but help patients play a larger role in self-management of their chronic diseases. The FDA estimates that by 2015, 500 million smart phone users worldwide will be using a healthcare application (<http://goo.gl/HKunbn>, <http://goo.gl/84632>).

The mobile devices market was originally limited to a PDA or Pocket PC. The PDA has essentially disappeared from the market, predominately replaced by smartphones. Smartphones include the



popular iPhone, Android phones, Blackberry and Windows Mobile devices. The iPhone currently has the widest selection of medical applications.

Mobile devices also include tablets such as the iPad and Android tablets. Although the tablets don't have a phone, they can offer Internet access and smartphone applications, but on larger screens. Many applications are written specifically for the tablets to take advantage of the larger screen and higher resolution. Most EMRs can be accessed from tablets through a remote connection back to the server the EMR is on. Many, however, have created applications native to the tablet that can serve as an extension of the EMR system's functionality. Drchrono is one EMR app specifically created for the iPad and has a free version that physicians can use (<https://drchrono.com>).

A Combined Report published by American EHR in 2013, "Tablet Usage by Physicians 2013" and "Mobile Usage in the Medical Space 2013" (<http://goo.gl/Dxl6Gq>), showed that 75% of physicians who use an EHR use a smartphone, and 33% use a tablet. Time spent on tablet use was 66% greater than the amount of time spent on a smartphone. 51% of tablet users accessed their EHR system with it on a daily basis, whereas only 7% of smartphone users accessed their system with their smartphone.

These mobile devices can be used in multiple ways to help physicians. Many applications are used to help you organize your life and business. From easy access to calculators, calendars, to-do lists and your e-mail, to your basic office computer programs like Word, Excel, PowerPoint, Pages, Numbers and Keynote, you can take your computer with you.

With applications like GoToMyPC you can actually connect to your computer from your smartphone or tablet. Applications like Evernote and Dropbox can be used to store files, articles, photos, and the like to access from the Internet, tablet or smartphone. Note-taking applications such as Notability, Notetaker and Auditorium are useful to use during lectures or other presentations to take notes and even record the presentation. Portable document format (PDF) readers allow you to save PDF files and even highlight and take notes in the document.

These devices also can be used in direct patient care. As of July 2013, Apple had approximately 20,000 medical apps available, and the Google Play store listed approximately 8,000. Windows and Blackberry do not list a separate medical category, just health and fitness, making it more difficult to assess the number of medical apps they offer (<http://goo.gl/kdhu1C>). Although most medical apps are not directly targeting physicians, that number is growing. iTunes has created a section of their store titled "Apps for Healthcare Professionals." This can be found at [www.itunes.com/healthcareprofessionalsiphoneapps](http://www.itunes.com/healthcareprofessionalsiphoneapps).

Medscape is the most popular app for medical professionals, available on both iPhones and Android phones. The top free iPhone apps for medical professionals, per the iMedicalApps team, were compiled by iMedicalApps and published June 19, 2013 (<http://goo.gl/yTWdi>). The list is topped by apps such as Medscape, Micromedex, *New England Journal of Medicine*, Epocrates® and various medical calculators. Currently, there are few allergy/immunology-specific apps. More apps are being developed that patients can use to aid in chronic disease management, including numerous

asthma apps that patients can use to track their peak flow readings, medication usage and symptoms. The recently released CARD (Contact Allergen Replacement Database, [www.preventice.com/CARD/](http://www.preventice.com/CARD/)) allows patients with contact dermatitis to find products free of their specific allergens.

Peripheral devices also have been created that can attach to your smartphone to turn it into a medical instrument. Such devices can turn your phone into an otoscope, single-lead ECG reader, blood glucose monitor and even one that can read sodium and glucose levels transdermally.

As noted above, in the U.S., the FDA is now regulating mobile medical apps. Mobile health applications and devices bring with them issues of privacy and security that need to be considered in communicating with patients and when protected health information is included in any transmission, particularly in the United States, where there is the need to comply with HIPAA regulations. What is technically possible may not always be permissible from a privacy and security standpoint. This includes taking pictures of patients (for example, rashes) with smartphones. Innovative use of texting that has been revolutionary for care in some other countries may not translate to the United States, because although secure texting is possible, the standard text messaging in use is not secure. Remote access to EHR systems, even wireless access within a facility or institution, brings with it privacy and security requirements that may be difficult to meet on some existing devices and applications.

## **PRACTICE MANAGEMENT SOFTWARE**

Practice management (PM) software is the software that deals with the day-to-day management of an office practice. Today such software typically captures and stores patient demographics, including insurance coverage information and charges, creates insurance claims and files these claims electronically, and then generates patient billing statements. Many such systems also include appointment scheduling, can generate reports for accounting and PM purposes and can store insurance fee schedule information (<http://www.ama-assn.org/resources/doc/psa/select-pms-vendor.pdf>).

PM systems exist in three forms. The simplest form usually constitutes desktop systems with software on a single PC and access by one individual. Most systems operate in a client-server arrangement, with software on a single computer, a server, but the data stored there are accessible from multiple terminals or multiple workstations on a network. A few systems operate as SaaS providers (cloud-based), with the software and stored data located on the Internet or on a server outside the practice that serves multiple practices. The data for different practices is strictly and securely kept separate. Over the last few years, mobile device support for PM software has also become more popular. PM software that is web-based tends to have a lower upfront lower cost than a PM solution that is purchased and brought in-house. However, the ongoing costs are typically higher (<http://goo.gl/s0ciCU>).

Unlike practices with EMR systems, some practices utilize a third-party service provider or billing service in place of PM software. Patient demographic

information, charges and associated diagnoses are forwarded to a third-party billing service, which takes care of charge entry, insurance claim filing, patient billing, and collections from insurance payers and patients. In some cases the patient demographic information, charges, and diagnoses are entered by personnel in the practice, with the remaining functions carried out by the third-party billing service. Third-party billing services offer the advantages of decreased hardware costs for the practice, more efficient use of personnel trained in medical coding and billing, and more cost-effective updating of software, insurance fee schedules and claims-filing rules. The unique coding requirements for procedures and diagnoses that are outside the usual scope of primary care or other specialty practices, however, may offset these advantages if the third-party billing firm is unfamiliar with allergy coding, or is inaccurate or inefficient in such coding.

There are two federal mandates that affect PM systems: The conversion from ICD-9 to ICD-10 billing code set (which goes into effect October 1, 2015) and the 5010 health care transaction standard (which went into effect January 1, 2012). The 5010 format allows the use of the longer diagnosis codes that are part of ICD-10. Whichever PM system you choose, it must be able to handle both the 5010 format and ICD-10 coding (<http://goo.gl/s0ciCU>).

### **Integration of PM Software with an EMR System**

Some may assume that EMR systems usually include the functions of a PM system, although this is not the case. Some EMR systems are integrated with PM software from the same vendor, with that additional functionality sold as an added module. Other EMR

systems do not include the option of PM software. Most practices at this point have adopted some sort of PM system. The investment of time and money in these systems is often considerable, and there is an understandable reluctance to abandon a PM system and to purchase and adopt a new system. However, practitioners face the choice of either linking a new EMR system with an existing PM system, or entering the same demographic, procedure and diagnostic information twice.

Linking an EMR system with a PM system is in most cases possible, but it can be challenging and expensive. There are more than 200 widely used EMR systems, and at least twice as many PM systems. Thus, there are thousands of possible pairings between existing EMR and PM systems, depending on which are currently being used, and each pair represents a unique linkage that must be created. The expense of this varies from \$10,000 to \$50,000 for most systems. In the future, expensive updates to either system may be required to maintain the linkage between the two. Assurances from a salesperson that this easily can be done should not replace a contract specifying a price and a deadline for doing so. Consultants in the area of EMR adoption have observed that many practices set out to find an EMR system that will link to their existing PM system. However, many of those practices, after considering the challenge and expense of linking a new EMR system to their PM system, instead choose an integrated EMR/PM system. This usually represents an expense greater than the EMR system itself, and a double implementation of the EMR and the PM software. As in the choice of an EMR system, no single solution will work for all practices.

Among the criteria for MU that have been recommended by the ONC are the ability of an EMR system to verify insurance eligibility and file claims electronically. These functions would heretofore have been functions of PM systems, and not necessarily part of an EMR system. It is unclear how to resolve the issues of certifying EMR systems for MU if they do not include these functions, but may be linked to PM software that does, and how to qualify physicians for MU incentive payments in this situation.

## SUMMARY

Over the last few years, the number of allergists using electronic records has dramatically increased. The passage of the HITECH Act in 2009 accelerated the growth, possibly faster than most physicians and vendors were prepared for. This is an exciting time for those ready to embrace what HIT has to offer us in caring for our patients. The potential of EMRs to help with clinical decision making and meeting quality standards is great. Finding the right tools to help you along your path is crucial for a successful outcome. The paradigm shift that is taking place toward team-based coordinated care and the evolution of payment based on outcomes rather than services will be an increasing driver for adoption of HIT and HIE. There have been many recent changes in healthcare, with many more to come. Practice as we have known it likely will fade, and thriving in the new paradigm and providing the best care for our patients will require successful adoption of EHR technology that enables interoperable exchange of information with other providers and with our patients.

## REFERENCES

(Sites accessed Dec. 15, 2013 through January 4, 2014)

AMA-MGMA *Selecting a Practice Management System Toolkit* (for AMA and/or MGMA members). Retrieved from [www.ama-assn.org/ama/pub/advocacy/topics/administrative-simplification-initiatives/pms-toolkit.page?page](http://www.ama-assn.org/ama/pub/advocacy/topics/administrative-simplification-initiatives/pms-toolkit.page?page).

American Academy of Allergy, Asthma and Immunology. *Practice management resources, Electronic health records*. Retrieved from [www.aaaai.org/practice-resources/tools-and-technology/practice-management-resources/electronic-health-records.aspx](http://www.aaaai.org/practice-resources/tools-and-technology/practice-management-resources/electronic-health-records.aspx).

AmericanEHR. Retrieved from <http://www.americanehr.com/Home.aspx>.

American EHR. Combined Report: “Tablet Usage by Physicians 2013” and “Mobile Usage in the Medical Space 2013”. Retrieved from <http://google.com/Dxl6Gq>.

American Medical Association. *A clinician’s guide to electronic prescribing*. Retrieved from [www.ama-assn.org/resources/doc/hit/ehi-ama-mgma-webinar-slides.pdf](http://www.ama-assn.org/resources/doc/hit/ehi-ama-mgma-webinar-slides.pdf).

American Medical News. *Need a practice management system? Here’s what to look for*. Retrieved from [www.amednews.com/article/20091102/business/311029994/4/](http://www.amednews.com/article/20091102/business/311029994/4/).

Aungst, Timothy. (2013) Apple app store still leads Android in total number of medical apps. July 7, 2013. [Imedicalapps.com](http://www.imedicalapps.com). Retrieved from <http://google.com/kdhu1C>.

- Centers for Medicare and Medicaid Services. *HIPAA — general information*. Retrieved from [www.cms.hhs.gov/HIPAAGenInfo](http://www.cms.hhs.gov/HIPAAGenInfo).
- Centers for Medicare and Medicaid Services. *Incentive programs*. Retrieved from [www.cms.gov/EHRIncentivePrograms](http://www.cms.gov/EHRIncentivePrograms).
- Centers for Medicare and Medicaid Services. *MU core and menu set measures*. Retrieved from [www.cms.gov/EHRIncentivePrograms/Downloads/EP-MU-TOC.pdf](http://www.cms.gov/EHRIncentivePrograms/Downloads/EP-MU-TOC.pdf).
- Denita Neal, JD. *Choosing an Electronic Health Records System: Professional Liability Considerations*. *Innov Clin Neurosci* 2011 June; 8(6) 43-45. Retrieved from: <http://goo.gl/w6vh3H>.
- Dolan, B. (2013). *Analysis: 103 FDA regulated mobile medical apps*. November 26, 2013. Retrieved from <http://goo.gl/Lb8DEF>.
- Dolan, B. (2011). *Apple helps MDs cut through medical apps clutter*. Sept. 15, 2011. Retrieved from <http://mobihealthnews.com/13254/>.
- Dolan, B. (2011). *Seven medical phone peripherals you should know*, July 22, 2011. Retrieved from <http://mobihealthnews.com/12062/7-medical-phone-peripherals-you-should-know/>.
- EMRconsultant.com. *Glossary and Acronyms of EMR / EHR Terminology*. Retrieved from <http://goo.gl/8YscYM>.
- Grossman, J. M., Cross, D. A., Boukus, E. R., Cohen, G. R. (2011). *Transmitting and processing electronic prescriptions: Experiences of physician practices and pharmacies*. *J Am Med Inform Assoc*, Nov. 18.
- Hartley, C. P., Jones, E. D. (2005). *EHR implementation: A step-by-step guide for the medical practice*. Chicago: American Medical Association.
- Heggestuen, John. (2013). *One In Every 5 People In The World Own A Smartphone, One In Every 17 Own A Tablet [CHART]*. December 15, 2013. Business Insider. Retrieved from <http://goo.gl/UOTCuo>.
- Hirsch, Maria.(2013). *ONC issues guidance on EHR vendor contract terms*. July 31, 2013. Fierceemr.com Retrieved from <http://goo.gl/ymonHx>.
- Hitechanswers: *HIT Terminology*. Retrieved from <http://goo.gl/M5tdsp>.
- Hsiao, C. J., Hing, E., Socey, T. C., Cai, B. (2010). *Electronic medical record/electronic health record systems of office-based physicians: United States, 2009 and preliminary 2010 state estimates*. National Center for Health Statistics Health E-stat, Dec. 2010.
- Hsiao, C. J., Hing, E., Socey, T. C., Cai, B. (2011) *Electronic health record systems and intent to apply for meaningful use incentives among office-based physician practices: United States, 2001–2011*. National Center for Health Statistics Data Brief Number 79. Retrieved from <http://www.cdc.gov/nchs/products/databriefs.htm>.
- Husain, Iltifat (2013). *The 20 best free iPhone medical apps for healthcare professionals*, edition 3. June 19, 2013. Imedicalapps.com. Retrieved from <http://goo.gl/yTWdi>.
- Jahns, Ralf-Gordon. (2010). *500m people will be using healthcare mobile applications in 2015*. November 10, 2010. Retrieved from <http://goo.gl/84632>.

- McNickle, M. (2011). *5 Mobile trends for 2012*. Retrieved from <http://www.healthcareitnews.com/news/5-mobile-trends-2012>.
- Maryland Health Care Commission. *Workflow analysis: Implementing electronic health records. May 2010*. Retrieved from [http://mhcc.dhmh.maryland.gov/hit/mso/Documents/ehr\\_vendors/guidelines\\_ehr.pdf](http://mhcc.dhmh.maryland.gov/hit/mso/Documents/ehr_vendors/guidelines_ehr.pdf).
- Medical Group Management Association. *Electronic health records: Status, needs and lessons—2011 report*. Based on 2010 Data Snapshot of an infrastructure under construction, 2011. Retrieved from [http://webcache.googleusercontent.com/search?q=cache:CQ61sK54o-EJ:www.mgma.com/WorkArea/mgma\\_downloadasset.aspx%3Fid%3D1371291+%&cd=1&hl=en&ct=clnk&gl=us](http://webcache.googleusercontent.com/search?q=cache:CQ61sK54o-EJ:www.mgma.com/WorkArea/mgma_downloadasset.aspx%3Fid%3D1371291+%&cd=1&hl=en&ct=clnk&gl=us).
- Ohio State Medical Association. HER standards of excellence program. Retrieved from <http://www.osma.org/files/documents/tools-and-resources/hit/ehr/ehr-standards-of-excellence/ehr-soe.pdf>.
- Pennell, U., Fishman, E. (2005). *Known pitfalls and proven methods for a successful EMR implementation*. Retrieved from [http://www.emrconsultant.com/emr\\_pitfalls.php](http://www.emrconsultant.com/emr_pitfalls.php).
- Compare Medical Practice Management Software. *Softwareadvice.com* Retrieved from <http://goo.gl/s0ciCU>.
- Texas Medical Association. (2009). *Electronic medical record implementation guide: The link to a better future (2nd ed.)*.
- The National Learning Consortium: *Contracting Guidelines and Checklist for Electronic Health Record (EHR) Vendor Selection*. Retrieved from <http://goo.gl/VzNFrg>.
- The Office of the National Coordinator for Health Information Technology. *EHR Contracts: Key Contract Terms for Users to Understand*. Retrieved from <http://goo.gl/fY0AZw>.
- Underwood, W. S., Brookstone, A. J., Barr, M. S. (2011). *The correlation of training duration with EHR usability and satisfaction: Implications for meaningful use*. A report from AmericanEHR Partners, Oct. 2011.
- U.S. Food and Drug Administration. *Medical Devices: Mobile Medical Applications*. Retrieved from <http://goo.gl/HKunbn>.
- U.S. Food and Drug Administration. *Mobile Medical Applications: Guidance for Industry and Food and Drug Administration Staff*. August 24, 2013. Retrieved from <http://goo.gl/cvYBp>.