

Chapter 2

Electronic Health Records Technology: Policies and Realities

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Abstract This chapter begins with a succinct review of the history of electronic health records (EHRs) in the U.S., including recent efforts by the federal government to encourage the use of them through their Meaningful Use program. It then discusses the low participation in this program by mental health providers and the reasons for the general lack of acceptance of EHRs by them. In fact, in 2012 only 7.1% of psychiatrists participated in the Meaningful Use program. The chapter next proceeds to discuss various efforts to increase the use of EHRs in the mental health field, including those by the American Psychiatric Association, the Substance Abuse Mental Health Services Administration (SAMHSA), and the HL7 organization. The second part of the chapter provides in depth guidelines to selecting and implementing an EHR, beginning with making the decision whether to actually get one. Once the decision is made to do so, the chapter talks in great detail about the preparation process prior to the selection, followed by the steps involved in the actual selection and implementation processes. The chapter closes with a renewed emphasis on the need to do a thorough job prior to the implementation so as to avoid many problems after the EHR goes live, as well as the importance of including the ultimate users of the EHR in the entire selection and implementation processes.

Keywords Centers for Medicare and Medicaid Services (U.S.) • Cost of illness • Documentation • Expert systems • Health information management • Health Insurance Portability and Accountability Act • Information systems • Meaningful use • Medicaid • Medical informatics • Medical records • Mental health • Motivation • Psychiatry

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2.1 History

There are few industries where computer technology is needed as much as in healthcare. Yet, for a long time now and for a variety of reasons, it has been much more of a struggle to implement such technology than in other industries, such as banking, insurance, media, transportation, and others. Back in the 1970s, these industries began embracing computer technology quite successfully, because for the most part, they were composed of private corporations with the financial resources to devote to these efforts. As a result, they were able to build strong in-house IT departments who developed software to suit the specific needs of their own corporation by working very closely with the users of that software throughout the development cycle. They were also able to purchase the hardware needed to run this software, as well as build robust back-up systems.

With regard to healthcare, any efforts that were undertaken were primarily initially done by two groups: (1) Academic institutions affiliated with major medical centers. (2) Software vendors. With regard to academic institutions, as far back as the 1960s–1970s, there were some major early successes, including the work at Massachusetts General Hospital led by G. Octo Barnett, MD which led to the development of the Computer Stored Ambulatory Record (COSTAR) using the MUMPS programming language that was specifically developed for health information technology. Robert Greenes, MD, PhD, a co-developer of MUMPS, also made huge contributions to the field of medical informatics during this period. Homer Warner, MD, PhD of the University of Utah and Latter Day Saints Hospital was instrumental in developing the HELP system which first became operational at LDS Hospital in 1967. It eventually expanded into a full-blown integrated hospital information system with sophisticated clinical decision-support capabilities. William Stead, MD and W. Ed Hammond, PhD also began developing what became The Medical Record (TMR) at Duke University. Significant early work was also done at Stanford University by Gio Wiederhold, PhD, a computer scientist who did significant research on large scale databases and Edward Shortliffe, MD, PhD, who developed MYCIN, a medical expert system, in the 1970s [1]. Lawrence Fagan, MD, PhD and Terry Winograd, PhD began making important contributions to the field of health related computer science beginning in the 1970s at Stanford University, as well. During the 1970s, Clem McDonald, MD led the team at Indiana University's Regenstrief Institute which developed one of the first EHRs (RMRS) in the US. However, these efforts represented only a small fraction of the healthcare institutions in the U.S. With regard to mental health, Marvin Miller, MD, in his book "Mental Health Computing", describes a number of applications for specific mental health functions that existed during the 1990s which were primarily developed by small groups of academicians [3]. Since the 1980s, the National Library of Medicine (NLM) has provided significant funding to academic institutions for informatics related activities. One major program has been the Integrated Advanced Information Management Systems (IAIMS) Awards.

Vendors also started developing software for the healthcare marketplace. Again, as early as the 1960s, several companies, including two aerospace companies,

Lockheed and McDonnell Douglas, began developing software to fully automate medical records for large hospitals. The aerospace company involvement was in response to government inducements to develop software for the healthcare field. Their healthcare software divisions subsequently became known as TDS and HBO, respectively. During the 1970s, software to support patient billing and admissions, discharge, and transfer functions for hospitals became prominent. During this time, IBM developed the Shared Hospital Accounting System (SHAS) followed by the Patient Care System (PCS) in conjunction with the work Dr. Stead and his team were doing at Duke University. It evolved into an application generator tool which allowed for additional clinical software applications to be incorporated. Another early leader was Shared Medical Systems (SMS) which began in 1969 and was eventually acquired by Siemens in 2000. Niche software for certain clinical functions, primarily radiology and the laboratory, began appearing, as well in the late 1970s-early 1980s [2]. During the early 1980s, Cerner developed a lab system which was progressively expanded into a comprehensive EHR and other supporting health information technology. Throughout the 1990s and early 2000s, the percentage of hospitals implementing computer technology slowly increased, but they still represented a minority of healthcare institutions. During this time, vendors began developing software for office practices, especially primary care and a small number of such practices began using it. Increasingly more robust EHRs also began making their appearance.

However, at the same time, it started becoming apparent that there are significant problems and complexities within healthcare which have been hindering the more widespread adoption of computer technology. First, most hospitals have not had sufficient IT staff to manage these projects and ensure that not only the software truly satisfies their requirements, but that other needs, including training and documentation are also being met. This problem has been compounded by the software, itself. As vendors understandably try to market their software to the largest number of customers, it becomes impossible to fully satisfy each customer's requirements.

Second, the healthcare environment is extraordinarily diverse with patient care occurring in a variety of settings by many different providers and ancillary staff, potentially involving the use of multiple software applications needing to communicate with one another. Governmental reporting requirements also impose the need for interoperability with these systems. In addition to the complexity of having disparate software products from multiple vendors communicate with one another is the added burden of privacy and security issues and the need to ensure compliance with HIPAA and other governmental privacy/security laws.

Over the years, various efforts have arisen to help overcome some of these difficult challenges. The Health Level 7 (HL7) organization was established in 1987 and as per its website, it is a "not-for-profit, ANSI-accredited standards developing organization dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing, and retrieval of electronic health information that supports clinical practice and the management, delivery and evaluation of health services. HL7's 2,300+ members include approximately

500 corporate members who represent more than 90% of the information systems vendors serving healthcare”. In recognizing the importance of involving healthcare professionals in their work, they have recently established a category of membership for them.

Other organizations that have played a large role in supporting the use of computer technology in healthcare include the Healthcare Information Management Systems Society (HIMSS), the American Medical Informatics Association (AMIA), and the American Health Information Management Association (AHIMA). HIMSS was started in 1961. During its earlier years, it was focused more on IT and healthcare management/administrators. In fact, its membership statistics for 1977 included Management Engineering (37.9%), Hospital Administration (23.1%), Health Care Consultants (14.8%), Information Systems/Data Processing (11.5%), Health Care Planning (4.7%), Financial Management (3.5%), University Professors (1.9%), and Other (2.6%). Clinicians were not even mentioned. However, over time, it has evolved into a multi-disciplinary organization representing all of the major players involved in HIT, including clinicians. In 2005, they hosted a Physicians’ Symposium for close to 300 physicians and other healthcare professionals from both the inpatient and outpatient community. It has also been working collaboratively with other professional organizations.

According to their website, “AMIA is a professional scientific association that was formed by the merger of three organizations in 1988: the American Association for Medical Systems and Informatics (AAMSI); the American College of Medical Informatics (ACMI); and the Symposium on Computer Applications in Medical Care (SCAMC). AMIA’s program and services are centered around core purposes to:

- advance the science of informatics
- promote the education of informatics
- assure that health information technology is used most effectively to promote health and health care
- advance the profession of informatics
- provide services for our members such as networking and opportunities for professional development.”

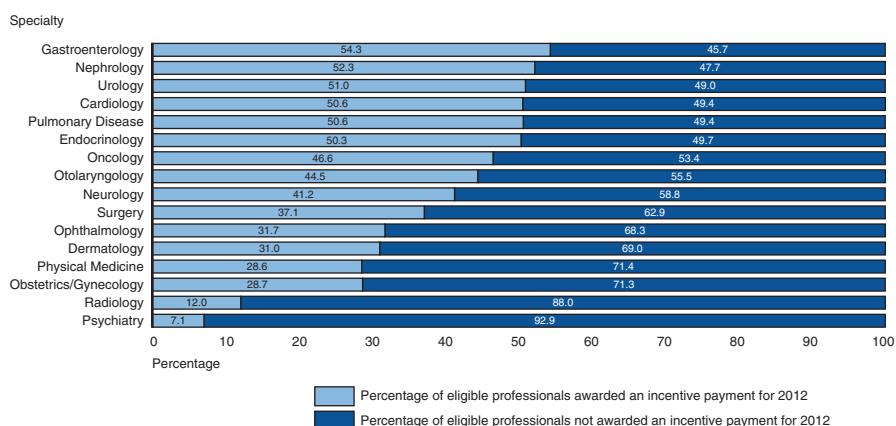
AMIA has traditionally been the home for more academically minded medical informatics professionals, especially clinicians. However, as with other organizations involved in the use of technology in healthcare, they have recognized the need to become more inclusive with other HIT professionals and collaborate with other organizations, including HIMSS.

AHIMA traces its history back to 1928 when the American College of Surgeons established the Association of Record Librarians of North America to deal with issues involving clinical records. In subsequent years, it changed its name several times as it expanded its focus to keep up with the changing landscape of health information and the increasing use of computer technology. In 1991, it began using its current name.

In 2004, the federal government stepped in with the establishment of the Office of the National Coordinator (ONC) for Health Information Technology by Executive Order. Five years later, it was legislatively mandated in the Health Information Technology for Economic and Clinical Health (HITECH) Act. Among HITECH's many efforts to promote the use of computer technology in healthcare has been the development of the Meaningful Use (MU) Program which provides monetary incentives for Medicare and Medicaid providers to implement EHRs which have been certified by ONC. ONC has worked with CMS to establish the criteria that must be satisfied by Medicare providers using the certified EHRs, while the Medicaid programs in each state have been overseeing the Medicaid incentive program. Medicare providers who fully participate in the program will be able to receive up to \$44,000 while Medicaid providers can receive a maximum of \$63,750. The program began in 2011 and ends in 2016. 2014 was the last year that Medicare providers could begin participation in the program and still receive incentive payments, but Medicaid providers have until 2016 to begin participation. Starting in 2015, there will actually be penalties to those Medicare providers who haven't yet implemented this technology unless they qualify for a hardship exemption, but Medicaid providers will not be penalized.

2.2 Status/Ongoing Problems

So, how much progress has been made? As of the end of 2013, 58% of hospitals had at least a basic EHR and some success with meeting the requirements of MU Stage 1, but only 5.8% were able to meet all of the Stage 2 criteria. With regard to individual physicians, the Fig. 2.1 shows the percentage of physicians by specialty



Source: GAO analysis of CMS data

Fig. 2.1 Percentage of specialty practice physicians who were awarded a Medicare EHR incentive payment for 2012, by selected specialty

who received a meaningful use incentive payment in 2012. Although a number of specialties reached the 50% mark, psychiatry ranked at the bottom with only 7.1% participation.

Other statistics from 2012 further illustrate the low participation of psychiatrists in the Meaningful Use program. Of the approximately 41,000 practicing psychiatrists that year, 55% accepted Medicare and 43% Medicaid. Yet, only 375 Medicare and 292 Medicaid psychiatrists received an incentive payment.

Why the low participation? First, 85% of psychiatrists are in solo private practice. Most do not have the time, manpower, and financial resources to embark on the selection and implementation of an EHR. Other psychiatrists work in mental health clinics or psychiatric hospitals, both of which are not eligible to participate in the Meaningful Use program. Second, as the Meaningful Use program's focus is on primary care, it is extremely rare to find any support for mental health providers from the Regional Extension Centers (RECs) that were established throughout the U.S. to assist providers with the selection and implementation of EHRs. Third, the EHR software developers have been slow to incorporate functionality needed by mental health providers, even for such basic requirements as support of DSM. Fourth, more so than in many other specialties, as seen by the chart below, mental health care involves many different types of providers. Therefore, EHRs must not only satisfy the needs of this diverse group, but depending upon the care setting, ensure that they are able to communicate amongst each other, as well.

Clinical Workforce Totals (2012)

- 41,000 Psychiatrists
- 96,000 Psychologists
- 193,000 Clinical Social Workers
- 14,000 Psychiatric nurses
- 48,000 Substance Abuse Counselors
- 145,000 Counselors
- 62,000 Marriage and Family Therapists

Source: Data assembled from various sources by SAMHSA and published in *Behavioral Health, United States, 2012*.

In addition, as many studies have shown that a majority of visits to primary care providers have some sort of mental health component, the need exists to not only have EHRs for primary care include the ability to capture this information, but also to communicate it with various mental health providers. Finally, an additional burden placed upon vendors supporting mental health is the set of laws in place to protect the confidentiality of patients with mental illness. Two in particular are 42CFR which addresses the confidentiality of substance abuse information and the extra protection accorded to psychotherapy notes, over and above the confidentiality requirements for all evaluation and progress notes. This is, of course, in addition to the HIPAA confidentiality laws for all patients. As a result, many Health Information Exchanges (HIEs) which were established throughout the U.S. to provide greater accessibility to providers for their patients' clinical information have restricted the

storage of mental health information, primarily because they don't want to have to deal with this additional confidentiality burden. In August 2011, ONC sponsored the creation of the Behavioral Health Data Exchange Consortium amongst five states, Alabama, Florida, Kentucky, Michigan, and New Mexico, to pilot the secure interstate exchange of behavioral health records among treating health care providers. In June 2014, the Consortium issued a report detailing their findings and recommendations [4]. Not surprisingly, it highlighted the challenges of dealing with the additional privacy concerns imposed by behavioral health data. The primary lessons they learned include: "(1) Behavioral health data exchange is complex, but possible (2) Provider education is key to success, and (3) Cooperation and flexibility are invaluable when addressing complex problems."

In 2004, the Certification Commission for Health Information Technology (CCHIT) was established and 2 years later began certifying EHRs, including those for Behavioral Health. As part of this work, they needed to develop extensive requirements and test scripts for each health field they were certifying. However, due primarily to the significant financial, manpower, and time resources needed by the EHR vendors to achieve this certification, many chose not to participate. As a result, only three Behavioral Health EHRs received the certification and in 2014, CCHIT stopped their certification program altogether.

2.3 How to Proceed

In recognizing that the mental health community is not being adequately supported by the Meaningful Use program, ONC has begun to investigate the possibility of developing a voluntary certification program for EHRs that provide support for the mental health community. As a result, early in 2014, they sought input from this community, including both providers and patients, to better understand their needs. They also asked vendors that have developed EHRs which provide some degree of functionality for mental health for their opinion on the need for such a certification program. They then asked for public comment and are now further deliberating on whether to move forward with such a program, and if so, what should be the design and content of such a program.

Mental Health professional organizations can play an important role in providing assistance on computer technology to their members in several ways. First, they can represent their members' needs and serve as an intermediary with vendors. They can also provide links to information sources on their websites and host vendors at their conferences. For example, in recent years, the American Psychiatric Association (APA) has steadily increased its activities in this area. During their annual meeting, vendors have an opportunity to discuss and demo their software in the Exhibit Hall and their EHR committee has presented workshops and symposia on relevant computer technology topics. In 2013, the Committee changed its name to the Mental Health Information Technology (MHIT) committee to reflect its widening scope in dealing with HIT topics beyond EHRs. Its members have expertise and are

involved in such areas as privacy/security, health information exchanges (HIEs), and telepsychiatry. It has been responsible for developing a detailed set of requirements that EHRs need to satisfy to support psychiatry. Those requirements, along with a variety of documents and links to other sources of information, are posted on the APA's website. In 2014, in recognizing the need to establish a more direct relationship with vendors, the MHIT committee hosted a webinar for them during which they acquainted the vendors with various HIT related activities going on within the Mental Health field. Two MHIT Committee members are members of the American Association of Child and Adolescent Psychiatrists (AACAP), as well, which has also been working on various HIT related activities. The MHIT Committee has recognized the importance of collaborating with other Mental Health professional organizations, as well, and in the near future hopes to develop a more formal structure for reaching out and working with them on HIT activities of mutual interest.

The Substance Abuse Mental Health Services Administration (SAMHSA) is a federal organization within the Department of Health and Human Services which has been in existence since 1992. In recent years, it has had an increasingly strong focus on HIT and its strategic goals for 2011–2014 have included:

- Goal 6.1: Develop the infrastructure for interoperable EHRs, including privacy, confidentiality, and data standards.
- Goal 6.2: Provide incentives and create tools to facilitate the adoption of HIT and EHRs with behavioral health functionality in general and specialty health care settings.
- Goal 6.3: Deliver technical assistance to State HIT leaders, behavioral health and health providers, patients and consumers, and others to increase adoption of EHRs and HIT with behavioral health functionality.
- Goal 6.4: Enhance capacity for the exchange and analysis of EHR data to assess quality of care and improve patient outcomes.

SAMHSA has been heavily involved in the HL7 organization, particularly with one of their many workgroups, Community Based Collaborative Care (CBCC), which has developed both a Behavioral Health Functional Profile based on HL7's EHR Functional Model and a Behavioral Health Domain Analysis model. The APA is an organizational member of HL7 and several members of the APA's MHIT Committee have become involved, as well. The CBCC workgroup, with help from their SAMHSA and APA members, will be working on integrating the APA's Function Requirements and CCHIT's Behavioral Health Function Requirements with their Behavioral Health Functional Profile with the intent on further expanding it to other Behavioral Health settings. Eventually, the intent is for these requirements to be used by software developers to build products that more closely satisfy the needs of the Mental Health field and for prospective users of these products to be able to determine which ones most satisfy their own needs.

The American Association for Technology in Psychiatry (AATP), a non-profit organization of physician and mental health professionals, began in 1995 as a meeting and in 2002 expanded its scope. Its mission is to:

- promote the use of information technology to improve the quality and availability of psychiatry and mental health care
- promote the development and dissemination of knowledge in the use of technology in psychiatry and mental health
- foster technology in psychiatry and mental health as a recognized body of knowledge
- promote the development and dissemination of standards and best practices for use of technology in psychiatry and mental health, including respect for, and preservation of, confidentiality and privacy
- inform and influence public policy in the use of technology in psychiatry and mental health

2.4 Decision to Use an EHR

The decision to incorporate an EHR into one's practice involves a number of factors:

1. If you are a **Medicare provider**, you will need to determine to what extent the penalties you will incur if you haven't begun using an EHR in 2014 will affect your income. With regard to having to satisfy the Meaningful Use criteria, although as mentioned earlier they are oriented towards primary care providers, there is sufficient flexibility so that it is possible to satisfy the criteria as a psychiatrist, something I have been able to do in my solo private practice.
2. **E-Prescribing**, including controlled prescriptions, is starting to be required by individual states. For New York physicians, this will be as of March 27, 2015. Using a standalone product for this purpose, only, could be a good place to start incorporating computer technology into your practice, especially if it is one that is also integrated into an EHR which you are considering implementing at a later date. I have found e-prescribing to be a huge time-saver, both in eliminating the calls to pharmacies and recording what medications my patients are taking. The software that you use should allow you to keep track of not only what you're specifically prescribing, but all of the medications your patients are taking, both OTC and those prescribed by other providers. Most e-prescribing programs also have drug interaction checking built into them.
3. **Interoperability**: If you practice in either an inpatient or large outpatient setting, you probably have recognized the importance of being able to communicate with other providers and staff within that setting through some form of automation. Those of you who practice in solo or small group practices may feel that this has not been an issue. However, the ability to easily communicate with other providers, esp. those in primary care, with whom you likely share patients, can decrease the time you normally take and staff resources you use to do this manually. Of course, the computer is not intended to replace the sometimes essential direct conversation with another provider, but often that conversation can be all the more optimal if both parties have detailed clinical information

about the patient they are discussing right in front of them. In addition, for those of you who practice in settings where governmental reporting requirements have been mandated, computer software is likely going to be essential to providing the data being requested.

4. **New Practices:** If you are just starting out in your own practice, other than obtaining e-prescribing software, you would probably benefit from holding off getting anything else for the first 6 months – 1 year to give yourself time to better understand what your own needs are and how best an EHR can help satisfy those needs.
5. **Finances:** As most EHRs are not free, you will want to determine whether you have the financial resources to invest in one, either paying a one time fee for the life of your contract or paying on an installment basis. Financial considerations will be discussed in more detail later on in the chapter.
6. **Time/Manpower Resources:** In order to successfully implement any software in your work setting, it is critically important that considerable time be spent in preparation, which I describe in the following section. For solo/small group practices, this can be made much more manageable if you give yourself plenty of lead time prior to when you plan on beginning use of the software and develop a plan which minimally impacts your practice. Realistically, some work on weekends may be needed, but the more lead time you give yourself, the less time you will need to spend during any one weekend. This is not the time to procrastinate and then cram at the last minute – that may have worked for you when taking tests, but it is not a good strategy to use here!

2.5 Selection Preparation

Once you make the decision to incorporate a clinical software product into your practice setting, it is absolutely essential that you do a thorough analysis of that setting to determine exactly what you are going to need. **One of the primary reasons there have been so many problems with the implementation of EHRs, in general, is that the preparatory work is not done nearly as well as it should. For hospitals and large outpatient settings, clinicians and administrators representing every department who will possibly be affected by the EHR should be involved in many of these preparatory steps.** These steps include:

1. **Assembling A Team:** For large practices and hospitals, the very first step is to assemble a team of clinicians, administrators, and staff representing the involved departments who are willing to commit to working together with the IT staff throughout the Preparation, Selection, and Implementation phases. Typically, a Chief Medical Informatics Officer (CMIO) who is often, but not always, a clinician, leads this team and works closely with the head of the IT staff. As the work involved in this effort can be rather time consuming, members of this team sometime need to be able to cut back on their normal

duties for a period of time. Their work is extremely important, as the knowledge they acquire and provide from undertaking many of the following steps in the Selection Preparation phase will be essential for selecting an EHR which best fits the needs of their practice setting. They will then play a critical role in ensuring that the Implementation phase goes smoothly and is successful.

2. **Decide Which Functions and Data You Need:** EHRs contain many functions that providers may need, but it isn't necessary to implement all of them at one time or even at all. Therefore, you need to assess the settings in which you will be providing care to determine which functions and data are most important to you, both now and in the future. If you are a Medicare/Medicaid provider and planning on participating in the Meaningful Use program, you may need certain functions and data for that purpose. If you treat children and adolescents, you will most likely need the EHR to maintain certain data elements unique to those patients, ex. growth charts. As a solo practitioner, I wanted to initially implement the billing, e-prescribing, and clinical charting functions, but decided to hold off on the EHR's appointment function while I continued to use Microsoft Outlook.

Now 3 years later, I decided to switch over to their own appointment function and implement both their patient portal and patient reminder functions. I initially chose to do this to provide additional functionality to my patients, but then discovered that I needed to use elements of these functions to satisfy the Meaningful Use Stage 2 requirements.

The functions needed by hospitals will be somewhat different. For example, computerized order entry (CPOE) for various tests, including labs, radiology, etc. will be essential, but an appointment function likely will not be needed. I do order lab tests for my patients and many EHRs for outpatient practices do have functionality to allow providers to electronically send lab orders to specific laboratories and receive the results electronically. However, the frequency that I do so is relatively low, so for me, it isn't important to use an automated function. Instead, I continue to send lab requests the old-fashioned way, i.e. write the labs I want on a prescription pad with a note to fax me the results and then either fax it directly to the lab or give it to the patient.

Understanding a practice setting's future needs, as well as their current ones is extremely important, because you want to make sure that the EHR which is selected will be able to support those future needs, both from a function and data perspective. It may well be that some degree of customization may be needed to support those needs, but if the underlying software and database structures are not compatible with the customization that would be needed, you would want to know that before the EHR is selected. The worst thing that could happen is to have to replace the EHR in the future, because this upfront work was never done.

Once it is determined what functions are needed, it is critically important to understand **how** they are used in a particular care setting. This involves a thorough analysis of the daily work flow, who is involved, what functions they use, and what data gets accessed. This analysis can not only be helpful in

preparing for the selection and implementation of an EHR, it can also be highly useful in determining how work flows might be improved **without** automation. Computers can't and shouldn't fix everything!

One hospital that did not do sufficient preparation in this area ran into problems during their implementation which involved the need to transfer patients from the medical/surgical inpatient units to inpatient psychiatry. The first time this had to be done after the system went live, there was great difficulty in doing so, because the EHR did not easily support the functionality that was needed when this type of transfer occurred.

3. **Who Needs Access to the EHR?** You will need to decide which functions other providers and staff in your office or department need to access and whether those who access a particular function can both read and update the corresponding data or only read it. For example, a staff member who handles the patient billing would need both read and update access to all of the billing related functions, but would likely only need to read any clinical data. The bigger the practice or for an inpatient psychiatry department within a hospital, both deciding what functions are needed and then who and to what degree providers and staff have access to those functions becomes a much more involved task, but again, is absolutely necessary to do. Within hospitals, in particular, an additional complexity is that access to patient data can be temporary, ex. for covering physicians, residents, or consultations.

Patient portals are becoming increasingly popular and are actually part of Meaningful Use Stage 2 which requires more than 5% of your patients to actually access their clinical data online. These portals provide patients with such functions as access to subsets of their own clinical data and links to diagnosis related education, appointment scheduling, authorization to share parts of their chart with other providers, and the ability to communicate electronically with their own treatment providers, all within a secure environment.

4. **User and Data Accessibility:** Nowadays, EHRs can be accessed on more than the computer sitting on your desk or at a nursing station. Once it is determined what functions will be needed and by whom, it then needs to be determined how and where these users will be accessing those functions. Even if you are a sole proprietor, there are options. For example, do you want to be able to readily access the EHR while you're talking to patients to review medications and other clinical data? Are you planning on writing progress notes during the session? I know of one psychiatrist who actually projects the note he is writing onto a large screen so the patient can view what he is writing and provide input. How about using tablets or smart phones to access data? I personally find it very helpful to be able to access my e-prescribing functions on my smart phone so that if a patient calls me while I am not at home or in the office, I can readily check their medication regimen and even send in a prescription electronically. In addition, for many years, I have used one lightweight laptop (approx. 3 lbs) that I take with me to both of my offices and also use at home. Community mental health organizations may have outreach programs whereby clinicians see patients where they reside. It could be quite advantageous for

these clinicians to have some form of portable device allowing them access to a subset of the functions of the organization's EHR.

In a hospital setting, there are many more possibilities for user access beyond the nursing stations, including ORs, ancillary areas, satellite clinics, and even patient rooms, as well as all of the administrative and support staff offices. Within each area, is the hardware used for access stationary, i.e. on a desk or at a nursing station, or does there need to be the option of having it be portable? For example, should a clinician (nurse, physician, physical therapist, etc.) be able to access their patients' information from a tablet that they take with them into the patients' rooms or an admissions representative when they need to admit a patient from the ER? If the hardware is stationary, ex. at a nursing station, how many computers will be needed to ensure that every clinician who needs one at any point in time will have the requisite access? If it's portable, can they be shared or should every clinician have their own? If shared, how many is enough?

If you are in a solo or small group practice, the data and actual EHR software typically physically reside in the "cloud", which are actually remote servers located anywhere in the US or abroad and accessible via the Internet. The larger the practice setting, the more likely the data and software are housed on more local servers, somewhere within the vicinity of that setting. If that is the case and it is permitted, you may want access to the data and software remotely, ex. from your home.

5. **Volumes of Data:** Again, if you are in a solo or small group practice, most EHRs should be able to handle the amount of data associated with the patients within your practice. However, larger outpatient settings and hospitals need to be able to quantify the volumes of data they expect an EHR to handle, both currently and in the future, optimally projecting out to the next 3–5 years. These numbers need to include both average and maximum amounts during the course of a day, week, and month for each of the functions the practice setting will be using. An important component of these calculations are the number of concurrent users of the EHR, again both average and maximum numbers, because this directly affects the overall volumes of data. Interoperability requirements also place demands upon an EHR system and need to be understood in detail, as well. All of this information needs to be part of any discussion with vendors to determine whether their software will be able to handle these volumes of data without any degradation in response time and what accompanying hardware, ex. servers, will be needed.
6. **What Data Needs to be Moved into the EHR?** If you've been in practice for a number of years, the thought of transferring every piece of data you have for each patient into an EHR is enough to scare you away from ever getting one! Not to worry – you don't need to do that unless you want to. First, you should focus on your current patients. The data that is particularly important includes medications, both current and history, diagnoses, allergies, other clinical information, demographics, insurance, and billing. If you have

been seeing a patient for a long time and have lots of handwritten notes, don't feel you have to scan in every one of them. Rather, for each patient, decide how far back and which notes you would like to have readily accessible. With regard to billing information, a good strategy is to determine the current balance owed by each patient as of a specific starting date. Then from that point, you can start using the EHR to record each visit. Any payments you receive for visits prior to that starting date should be able to be credited to the patient using one of the EHR's billing functions.

Clearly, implementing an EHR in a hospital setting can be much more complex, because it is a very dynamic environment and great care needs to be taken to ensure that every activity related to a patient is accurately captured. If your practice setting is currently using software applications to capture data, it may be necessary to have data conversion programs written to transfer the data from the old system to the new one. I know of one hospital who rather than doing that decided to manually enter every medication each patient was taking up to a specific cut-off point. After that, they continued to use the old system, but also entered new medication orders manually into the new EHR when it went live the following day. However, what was not recorded in the new EHR were medications that were stopped after the cut-off time, but prior to the new EHR going live. Fortunately, this was discovered a short while later.

7. **Hardware Platforms:** If you are in a solo or small group setting, you will have more decision making power regarding your preference for using specific computers (PCs or MACs), smart phones and tablets (Apple, Android, Amazon, Microsoft, etc.). You may need to have some flexibility if the EHR or other software you like doesn't support your choice in hardware platforms. If you work in a hospital or large group setting, it is likely that these decisions will be made for you.
8. **System Availability:** Hospitals, of course, need to ensure that their EHRs are normally up and running 24 h/day, 7 days/week and, if not, alternative procedures need to be established for planned and unplanned outages. This will be further discussed in detail in the Implementation section of the chapter. As the data and software are typically stored in local servers and hospitals have backup generators to ensure that they have an ongoing supply of electricity, they usually have more control over their system availability.

If you work in an outpatient setting, you or your facility needs to decide when you need the EHR to be available and, as with hospitals, what to do when you don't have access to it. One concern I have always had about data and software located in the cloud and accessible via the Internet is what happens when your Internet service stops working, ex. during a storm. In that situation, I can use the hotspot function on my smartphone as a backup as long as my cell phone is still working, but if you don't have unlimited data, that can very quickly become costly. Usually, such outages are restored fairly quickly, but after super storm Sandy hit the east coast several years ago, it took much longer. One way to lessen the impact of an interruption in access to the cloud would be for EHRs to provide a way for critical data to always be downloaded to

the computer and the software for important functions housed there, as well. However, this would involve the need for the EHR to keep the data in both places in sync and the software be kept up to date on the local computer.

9. **Interfaces to other Applications/Systems:** This is currently and typically only of concern for most solo and small group practices in a limited way. In these settings, interoperability can be relevant for interfacing with labs, other providers, especially in primary care, and perhaps with a hospital with whom you are affiliated. As health information exchanges (HIEs) become more established and robust in the future, sending to and receiving patients' clinical information from them to achieve better coordination of care will become increasingly important.

Hospitals have more complex interoperability needs, because in addition to the EHR, they have a number of disparate systems, all of which need to be in communication with each other in real time. Examples include lab, radiology, OR scheduling, pharmacy, and billing. Nowadays, it is not uncommon for multiple hospitals to be part of one overall healthcare system, increasing the possibility that individual hospitals may need to communicate with each other, as well.

One area of interoperability that can potentially affect both large and small providers is the increasing reporting requirements, including clinical quality measures (CQMs), being imposed by both federal and state governments. As the states often have their own unique set of requirements, it can be difficult for a vendor to support them for every state. Therefore, it is important to have a good understanding of your or your institution's own reporting requirements, so that you can discuss this in detail with prospective EHR vendors.

10. **Implementation Timeframes:** There can be specific deadlines that impact the need to implement an EHR or other software applications. These need to be identified as soon as possible to ensure that sufficient time exists to complete all of the steps needed for a successful implementation. One example is the e-prescribing requirement mentioned earlier. This not only impacts outpatient providers, but hospitals, as well, who routinely give patients prescriptions when they are discharged.

2.6 Cost Considerations

When determining your budget for getting an EHR, there are a number of both initial and ongoing costs that you need to consider. These include:

1. Does the vendor want you to purchase the EHR outright? If not, what is the monthly cost and is any interest charged?
2. Are any discounts available for either paying the entire cost of the contract up front or for purchasing a more long term contract?
3. Is there any charge for software updates?

4. What is included in the costs? If they're not, what are the additional charges for each of the following:
 - (a) Additional Users.
 - (b) Data Conversion Programs.
 - (c) Hardware Needs Analysis and Purchase.
 - (d) Customization (pre and post-implementation) for templates, interfaces/ interoperability, additional functionality, etc.
 - (e) Documentation.
 - (f) Training (pre-implementation plus post-implementation for new users).
 - (g) Implementation Support.
 - (h) Technical Support (pre and post-implementation).

Many of these topics will be discussed in detail in the next section.

5. Additional staffing may likely be needed by larger healthcare entities to adequately prepare and implement the EHR. However, even solo or small group practices may find it beneficial to hire someone to help them with the additional workload imposed by the preparation and implementation phases.

2.7 Selection

The more thorough the preparation, the easier will be the selection process. **The first step is to determine which EHRs satisfy the requirements you have identified during the preparation.** There may be some requirements that the EHR can't initially satisfy, but you may be able to receive assurances that they will be able to do so within the timeframe that you need it. In that case, you would want to ensure that the satisfaction of these future requirements are stipulated in your contract. This is particularly relevant if you or your institution are planning on participating in all stages of the Meaningful Use program. **The clinicians and administrators who worked on the Selection Preparation steps should also be involved in the Selection process. They need to have the opportunity to actually use a demo system to provide feedback on the functions they will be using, including how user friendly they are.**

A **vendor's reputation** can be very helpful in the selection process. The best way to determine that is to be able to speak directly to their current and former customers. Vendors should be able to provide you with those contacts. However, in addition and if possible, you should try to identify providers from alternative sources. For example, the AmericanEHR organization works with professional organizations to provide detailed information on EHRs and providers' experiences with them via member surveys and other means. This information is accessible on their website (www.americanehr.com). You should also determine how many overall and mental health customers the vendor has. Although a relatively new vendor with a limited number of customers can have a robust product, you would want to make an extra effort to ensure the excellence of their products and that they will continue to have

sufficient resources, including finances and manpower, to not only support your practice setting, but remain in business for the foreseeable future.

Certification can be another way of determining how well an EHR performs. Of course, a particular certification would only be important to you if the criteria for that certification is relevant to your own needs. Currently, ONC is the primary entity certifying EHRs which they do for their Meaningful Use program, but if you have no intention of participating in that program, that certification may not be of much value to you. Other considerations in choosing an EHR vendor include the following:

1. **Privacy/Security:** In addition to HIPAA and other privacy regulations that must be met for all healthcare specialties, you need to ensure that the EHR vendor is satisfying the regulations that are unique to mental health, including the two that I mentioned earlier in the chapter, 42CFR and those related to psychotherapy notes. Care needs to be taken to prevent any patient's data from being transferred to any provider without the patient's explicit authorization to do so. Security is equally important, as it is essential that all data that travels outside of the office or hospital be adequately encrypted and as safe as possible from any form of hacking. Within an office or hospital, no one should be able to gain access to any functions or data within the EHR unless they are specifically authorized to do so. The ability should exist to have users automatically logged off within a specific period of time of no activity to prevent unauthorized users to gain access to the EHR during the previous user's logon session.
2. **Legal Ownership of Data:** It is important to ensure in writing that the EHR vendor does not have any intention of owning the data that is generated by the EHR. The policies that are in place for data ownership, particularly patient related, within a practice setting shouldn't change merely because the data is now being captured and maintained electronically instead of being stored in paper charts.
3. **Affordability:** After discussing all of your requirements with the prospective vendors and determining all of the costs discussed earlier, ultimately you will need to make a decision whether you can afford to implement an EHR or other software. If not, you may want to look into phasing in subsets of the EHR, especially if you work in a solo or small group practice and anticipate your practice growing.
4. **Adequate Testing:** It is extremely important that, as a prospective buyer, you have access to an exact replica of the EHR to ensure that all functions work as intended in a user-friendly manner which is acceptable to you. You should also ask the vendor what volumes of data, concurrent users, and test scenarios they used to determine if the functions could handle them without any degradation in response time. This is an area where being able to discuss the experiences of an existing or former customer of similar size and workload can be extremely helpful.
5. **Access to Test System:** Having access to a test system throughout the implementation process is very important for additional testing of any customization

that is done for your practice setting and then for subsequent training. Any customization testing should be completed as much as possible prior to the training so that the users do not see a system in constant flux as a result of changes that have to be made to fix errors encountered during the testing.

6. **Training:** There are various ways that training can occur, including in-house classes and on-line, either self-directed or with a vendor representative directing the training by phone or through the computer. Many large practices and hospitals use the “train the trainer” approach which involves initial comprehensive training for a subset of users of the EHR who will then assist with the training of their colleagues. The training needs to address the day-to-day work of each user, not just how each function works. For example, if the EHR is providing an inpatient order entry function, it is not sufficient to only provide training in how to enter an order. A surgeon who needs to d/c orders when a patient goes to the ER, enter new orders when the patient moves to the recovery room, and then restart some of the original orders that were in effect prior to the surgery would need to be shown how to accomplish that sequence of events.

The test system should ultimately contain the full functionality of the EHR so that users can practice, even when they’re not in a specific training session. Training needs to be available for not only current employees when the EHR is first implemented, but ongoing for any new employees or existing employees whose job responsibilities change.

7. **Documentation:** Comprehensive documentation for all functions provided by the EHR is needed. It should be on-line and easily accessible from each function. Optimally, it should also be available in hardcopy, especially during training, so that users can enter their own notes and be able to use it as a personal reference. As with training, it is important that the documentation reflect not only the EHR’s basic functions, but how they are used in actual practice. The documentation should also be updated whenever any changes/additions are made to the EHR.
8. **Ongoing Technical Support:** It is absolutely essential that a robust set of technical support services be provided. Key elements include:
 - (a) **Availability:** Coverage should be provided during the bulk of the time you will be using the EHR, regardless of time zone differences and including weekends. This is especially important for systems where the functions and data are housed in the cloud where the customer has little ability to fix any problems that may arise nor likely has the technical expertise readily at hand.
 - (b) **Responsiveness:** Once you report a problem or need some kind of help, how quickly can you expect that help or a resolution of the problem?
 - (c) **Disaster support:** In the event of a significant unplanned downtime, it is crucial for the vendor to provide additional support in order to minimize the impact on a customer’s daily functioning, particularly with regard to direct patient care.
 - (d) **Contact Modes:** This is typically by phone and, optimally, includes the ability of the vendor to take remote control of your EHR to fully investigate

a problem. For large customers, it is important to consider the need for onsite vendor support if a significant upgrade/change is made to the EHR.

- (e) **Competence:** It is also highly preferable to have that support be provided by people who speak English well and truly understand the system they're supporting, not merely reading a script. Even better are support specialists who actually know your practice, because when problems arise, it makes it easier to diagnose and fix them. Large practice settings such as hospitals should have sufficient in-house support to handle emergency problems as those settings usually need 24/7 availability of most EHR functions.
9. **Software Updates:** These are updates the EHR vendor makes and are typically to provide additional functionality. In rarer circumstances, they could also be to fix a problem that has been detected. The vendor should be able to provide a detailed plan of how they expect to implement these updates, both on a scheduled and as needed basis, as well as the anticipated impact on the availability of the EHR during this process.
10. **Adequate Support/Manpower for Implementation, including Customization and Date Conversion Needs:** The vendor needs to commit to providing sufficient manpower to support every step of the Implementation process. It is important that they view the relationship with new customers as a partnership with staff from both the vendor and the practice setting working together to achieve a successful implementation.

2.8 Implementation

Once you have selected an EHR, now the work begins to prepare yourself and your practice setting for eventually using it.

2.8.1 *Develop a Work Plan/Staffing*

By now, you should have decided exactly what functions you want to start using in an EHR, what data you are going to need to move into the EHR, and made any necessary changes to your practice setting's workflow. At this point, you need to start developing an explicit plan and schedule leading up to a start date for using the EHR. You should decide whether you are going to be able to do all of the work yourself, enlist a friend or family member to help, or hire a consultant. The schedule needs to include time for data migration, testing, and training.

If this is a large outpatient setting or a hospital, it is extremely important to maintain a team of IT staff and clinicians working together throughout the implementation, usually the same people who worked on the earlier Preparation and Selection phases. The IT staff needs to clearly understand the needs

of these clinicians and administrators, because they will be representing those needs to the vendor. **The clinicians and administrators need to be particularly heavily involved in testing, developing a training plan, and deciding what documentation they need.** As with smaller practices, the development of testing, training, conversion, and implementation timelines, along with plans for adequate staffing/coverage, is extremely important in keeping the entire implementation process manageable and under control.

2.8.2 Software Addition/Changes

An early step in the implementation process is to finalize any requirements for additions/changes to the EHR, itself, as well as other programs that may be needed, so that work can begin on them. This would typically include:

1. function modifications
2. required interfaces
3. data conversion programs

As previously mentioned, these needs should have been discussed with the vendor during the Selection phase to determine whether this was feasible to do and at what cost. For larger practices and hospitals with a robust IT staff, some of this work can possibly be done in-house.

2.8.3 Hardware Needs

Any additional hardware that will be needed should be ordered early in the implementation phase to ensure that they will arrive in time to install them prior to their use in testing, training, and conversion to the new EHR. This would typically include:

1. Laptop/desktop computers
2. Servers
3. Power/data transmission lines
4. Backup Generators
5. Mobile devices

2.8.4 Downtime Procedures/Disaster Recovery

1. **Downtime procedures** need to be developed to be used in the event of a system failure. This is typically a set of manual procedures that utilize paper forms to

capture data (orders, demographics), etc. that can then be entered into the EHR once the system becomes available, again. In addition, communications protocols using phone, fax, etc. need to be established to ensure that daily work is not compromised.

2. **Disaster recovery** consists of a set of protocols to address the sudden loss of the use of the EHR and includes:
 - (a) Switching to downtime procedures.
 - (b) Assembling a support team to investigate the source of a problem and fix it. For larger practices and hospitals, this would likely include in-house staff working in conjunction with the vendor. For smaller practices, the vendor would be the primary focal point for assistance.
 - (c) Entering any data that has been captured by the downtime procedures into the EHR once it becomes available, again. In doing so, it is important to address any synchronization issues. For example, during downtime a lab order may have been recorded manually on paper. When the EHR becomes available, again, the order would have to first be entered into the system before the lab results could be recorded.

2.8.5 *Testing*

There are several levels of testing that need to be done to ensure a successful implementation. First, the vendor/developer of the EHR needs to do their own testing:

1. **Unit:** Each program within the EHR is tested to eliminate all errors.
2. **Integrated:** All programs are tested to ensure they work together without errors. You should ask the vendor/developer to provide assurances that both unit and integrated testing has been done.
3. **Function:** The next level of testing verifies that each function successfully works with not only the vendor/developer's own test data, but the customer's data, as well. This can be done even prior to actually purchasing an EHR by having access to the vendor/developer's demo system and testing out various real-life scenarios. It can be a good way to determine if the EHR will fit the customer's needs or whether any customization, if possible, is going to be needed.
4. **Systems:** This testing is used to confirm that the EHR can handle expected volumes of data and user utilization, both average and maximum, within response time parameters. This is particularly important for customers who have large volumes of data and many users. The vendor/developer should be able to give you assurances that such testing has been done on their own even prior to your purchasing their EHR. However, once the product is purchased and after any customization is completed, the customer will need to repeat this level of testing with their own data.

5. **User:** This is an opportunity for the actual users of the EHR to verify that it is functioning exactly as expected. Test scripts should be developed with extensive input from the users of the EHR which comprehensively reflect the daily work being done by them. **It is imperative that this be done prior to the EHR actually being used in production.**

Sometimes, particularly when a facility has an existing software product and is converting to another, it may elect to run both systems in **parallel** for a short time to ensure that the new system provides the same output as the previous one for functions where this is expected to happen. This can be somewhat time consuming, because it requires the same data to be inputted into two different systems and the results then compared. For example, if a facility had an EHR which produced patient billing statements a certain way and the facility needed the replacement EHR to create a statement with the same information on it, it may want to use parallel testing for this purpose.

2.8.6 Training

As described in the Selection section, the developer of the EHR which is selected needs to provide comprehensive training and documentation. Once it has been thoroughly tested and the test system is stable, a training schedule needs to be established for everyone who will be using it. The test scripts that were used for testing the EHR can be used as part of the training process. In addition, the documentation requirements described in the Selection phase need to be customized to exactly reflect your practice setting's version of the EHR. It is important for all users to know to what resources they have access if they run into difficulty after the EHR goes live and they are using it in their daily work. For solo practices, this will typically be the vendor's technical support hotline. Larger practices and hospitals usually benefit from having colleagues in their own departments serve as an initial contact point with backup from the IT department and vendor, as needed.

2.8.7 Conversion/"Go Live"

After all of that hard work, you and your practice setting are finally at the point where you can start using the EHR in your daily work. Final steps involve:

1. **Migration of any data into the new EHR.** For large practices and hospitals, it is sometimes necessary for the vendor/developer to write computer programs which automatically convert and move customer data directly into it. For smaller practices, it will be up to the customer to manually enter any data that will be needed using the functions provided by the EHR, but you should consult with the vendor/developer to determine the optimal way to do this.

2. **Developing a specific plan to switch from your current way of managing your practice to using the new EHR.** This plan needs to minimize the impact on your daily work as you make the switch. One aspect of the plan is to determine whether you want to implement all of the EHR's functions immediately or phase them in. Sometimes timing can be a critical issue, ex. in hospitals where a new EHR may be replacing an older system. In such a dynamic place where the system is constantly being used, consideration needs to be made to ensure that no data is lost during the transition and sometimes downtime procedures may need to be used for a short time as the switch is being made. Timing and coordination are also critical with interfaces between any other software applications.

Sometimes outside events can influence the best time to go live with the EHR. One hospital did not consider a yearly community event which typically leads to increased activity in the ER and went live that weekend. As a result, the ER was overwhelmed with caring for an increased patient load while trying to get used to dealing with a new EHR.

3. **Vendor Support:** It is important to ensure that an adequate amount of vendor/developer support will be available during the conversion process, both in-house, if needed, as well as by phone.

2.9 Post-implementation/Ongoing

Congratulations, you did it!! Hopefully, you are now using the EHR or other software that you have implemented in your daily work with patients. You need to give yourself time to get used to it which can take weeks. Will everything go perfectly right? Probably not, especially if your practice setting is a large one. However, if you or your practice setting did a thorough preparation, those problems should be minimal. One hospital reported receiving 6,500 calls to their "command center" during the first day they went live and were actually proud of the fact that those calls had decreased to "only" 1,000 on the fifth day. There should never have been anywhere close to that many calls, either on the first day or the fifth.

For large practice settings, especially hospitals, it is important to do a post-mortem within several weeks after the implementation to assess how well it went, identify the problems that were encountered, determine the causes, and learn from them so that future implementations can be improved.

2.10 Last Thoughts

A lot of information has been provided in this chapter, but the two most important points to remember are:

1. Do as much planning as you can prior to starting to use an EHR or other software. The more work you do upfront will undoubtedly save you countless hours and

headaches trying to fix problems that likely will develop after the implementation if you don't do sufficient planning in advance.

2. It is absolutely imperative that the users of the EHR be extensively included in every step along the way to implementing it. In my opinion, the mismatch between the EHRs that have been developed and what the users want and need has been one of the biggest causes for the problems that have existed for years in gaining greater acceptance of software in healthcare.

References

1. Shortliffe E, et al. Medical informatics, Computer applications in health care. New York: Springer; 1990. p. 20–6
2. Sneider RM. Management guide to health information systems. Rockville: Aspen Publishers; 1987. p. 41–50, 55–8.
3. Miller M, et al. Mental health computing. New York: Springer; 1996.
4. Behavioral Health Data Exchange Consortium, ONC State Health Policy Consortium Project, Final report. Triangle Park: RTI International Research; 2014. p. 5–3, 6–2.

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