



Key Issues in EHR Adoption and Sustainability Whitepaper

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Introduction

Implementation of an electronic health record (EHR) has the potential to reduce physician practice expenses and improve quality of care, but also introduces new costs and complexity to office environments that, in many cases, are unforeseen and unbudgeted, leading to less than optimal adoption of the EHR system. While much has been written about how to select and implement an EHR system, there is little practical information available to assist physicians, potential investors and legislators in understanding the ongoing effort and cost related to EHR usage. As a result, physicians generally understand that implementing an EHR is an expensive proposition, but there is no generally-available methodology for ensuring that all related costs are budgeted and understood.

Having better information regarding the costs of sustaining an EHR-enabled medical practice would assist physicians in making better decisions regarding system selection, implementation and optimization. It would also facilitate constructive discussions between physicians, payors, employers, other potential investors and legislators regarding how to offset the direct and indirect costs related to automating clinical care in a physician office setting so that the end-goal of optimizing clinical care can be realized. The purpose of this white paper is to illuminate some of these issues in order to enable this discussion.

Reports indicate that EHR adoption may be increasing across larger healthcare organizations but not necessarily across smaller physician offices,¹ and approximately half of all independent physician practices are solo or in a group of less than 10 physicians.² For smaller practices, the barriers to adoption and sustainability seem to be more significant and include access to skilled healthcare Information Technology (IT) resources, which increases overall operating budgets and initial capital requirements. Smaller office practices typically pay more per physician for EHR components such as software licenses. This issue may be addressed by procuring the EHR through a network or other entity (i.e., health system) that has access to discounted pricing, but this creates an additional relationship to manage.

Although participation in pay-for-performance programs may offset some costs related to EHR adoption, the dollars at risk for pay-for-performance do not cover the cost of the system. In addition, participation in pay-for-performance adds complexity to EHR adoption. Data must be discrete in order to be reportable, which requires structured data entry *and* appropriate EHR-based reporting systems. While many EHR systems provide structured data entry options, and structured data entry is a condition of Commission for Certification of Health Information Technology (CCHIT) certification³, physicians typically use a variety of data entry methods, both structured (drop-down lists) and unstructured (voice recognition or whole-text typing) to document patient encounters. As there is no standard reporting metric for pay-for-performance at this juncture, physicians typically have to customize EHR reports in order to obtain the data for participation in pay-for-performance.

¹ California HealthCare Foundation Report -Gauging the Progress of the National Health Information Technology Initiative. January 2008.

² According to the Community Tracking Study Physician Survey, 2004-05: [United States] by the Center for Studying Health System Change, 58.6% of independent physicians practice in groups of one to ten physicians and 36.9% of independent physicians practice in groups of one to three physicians.

³ Certification Commission for Healthcare Information Technology (CCHIT) Final Ambulatory Functionality Criteria 2007.

In many cases, report customization is either performed for an additional fee, by the vendor, or by a practice through a highly-skilled individual. Given that physician reimbursement is declining and other costs, such as malpractice insurance, are rising, practices are seeking cost-effective systems and methods to become EHR-proficient as quickly as possible and may not employ on-going process improvement methodologies for their EHR usage.

The pace of EHR system development and on-going market evolution also lends complexity to both EHR adoption and sustainability. On one level, physicians have tended to wait to purchase an EHR until the time is right, meaning that functionality is fully-developed and cost presents an appropriate value. New ASP-based entrants to the EHR market are clearly driving down the cost of system acquisition. At the same time, on-going system development is making systems both more robust and complex, which drives up direct costs and indirect costs (i.e., desktop and server hardware). While EHRs become more sophisticated, it appears that some vendor-direct costs (for example, interfaces) continue to be either replicated across providers or show substantial variability without a direct association to value.

Additionally, vendors continue to acquire and be acquired at rapid pace, which causes market confusion for buyers looking for a stable option with substantial longevity. The entrance of complimentary products into the market, such as chronic disease management systems (CDMS) and personal health records (PHR), have the potential to also be disruptive as there does not seem to be a clear vision for how these components should be integrated into an EHR product—or if there is a clear path for adopting these technologies. For example, a CDMS may be a substantially lower cost than an EHR, yet enable a provider office to manage a patient population and participate in pay-for-performance more effectively than with an EHR. Recent efforts initiated by **Google, Microsoft** and others to create community- or consumer-based PHRs may disrupt or delay provider adoption of EHRs by creating new costs for providers potentially without EHR integration.

For a practice embarking on the process of selecting an EHR, or considering use of an EHR subsidized by a health system, each of these key issues require consideration:

- What resources are needed in addition to those typically provided by vendors? How will the practice pay for these resources?
- Will pay-for-performance evolve to provide substantial cost relief to practices implementing EHRs?
- Will EHRs become mandated, and will there be substantial government stimulus to support EHR adoption (similar to the Hill-Burton Act for hospitals in the 1960s)?
- Should providers seek leverage via buying coalitions or establishing relationships with hospitals/health systems, or will the sunset of the Stark/AKS exception/safe harbor in 2013 create a dependency from which providers will not be able to recover?
- Are there other risks that need to be addressed proactively so that physicians and patients are comfortable with the increased use of EHRs?

This paper is intended to provide an overview and certain topics may be the subject of later detailed analysis.

Background

In the recently published Federal Health IT Strategic Plan, the Office of the National Coordinator for Health Information Technology (ONC) indicates that the federal goal of increasing EHR adoption is not purely for the sake of automation, but to enable patient-focused healthcare (higher-quality, more cost-effective healthcare in which patients and providers are exchanging pertinent information) and population health (access to information for purposes of public health, biomedical research, quality improvement and emergency preparedness).⁴ This paper focuses on two aspects of adoption and sustainability by physician groups and physicians who are not employed by hospitals. First is the ability and willingness of physicians to expend the financial and other resources necessary to implement and continue to use EHR systems. Second is the impact of issues other than financial and technical aspects of EHRs that may make the EHR system more difficult to adopt or to use on a long term basis.

There are a variety of models of EHR deployment in the ambulatory context. In the federated model, physician practices use data specific to their practice on a stand-alone database that is either hosted directly by their practice or accessed via an application service provider (ASP) or other hosting entity. In a community of federated EHR deployments, data may be shared among providers via a brokering system or entity, such as a Regional Health Information Organization (RHIO). In the enterprise model (most commonly found in employed medical groups), physicians share a single patient chart among their practices. The enterprise model is typically hosted by a hospital or health system, but may also be ASP in nature. There are also hybrid examples of physician communities that are using both federated and enterprise models. The advantages and disadvantages of these models with respect to adoption and sustainability are set forth in Appendix A to this paper.

The costs and benefits of federated and employed models vary. In an enterprise model, data is entered one time and then shared among all physicians who treat that patient. For example, if a medication is changed, or allergy added, each physician would have that information the next time the EHR is referenced. In the federated model, the brokering system typically either pushes or pulls information among physicians based on preferences, security and permissions. Therefore, to find the same information (e.g., medication changed), the physician in the federated model may need to reference the brokering system. In a stand-alone federated model, without brokering or integration among other community EHR users, physicians would not know of changes to medications or other pertinent information unless it was provided to them by other treating providers using traditional means (fax, paper chart, or potentially, a disk).

While there are concerns regarding sharing information in an enterprise model, there are also substantial cost benefits to doing so. A system can be configured one time and then leveraged among multiple practices, thus reducing incremental cost. However, the central server hardware required to support a large enterprise deployment can be very expensive, especially when the hardware is scaled to support backups, redundancy and failover in real-time. In contrast, the hardware cost to support a federated deployment may be quite small, but at the same time, individual physician practices may lack the sophistication to understand that they too require adequate backup, redundancy and failover (as well as disaster recovery planning) in the event of system down-time. Furthermore, practices in a

⁴ The ONC-Coordinated Federal Health IT Strategic Plan: 2008 – 2012. Department of Health and Human Services. June 3, 2008. See <http://www.hhs.gov/healthit/resources/HITStrategicPlan.pdf>.

federated or stand-alone environment typically lack sufficient leverage to negotiate key contractual considerations and price breaks to address their needs.

The Need for a Sustainable Financial Model

EHRs are currently being used by less than 25% of physicians in the United States⁵ including those funded by grants from government and non-profit sources. However, many of these grants are reaching the end of their terms so continued use will depend in many cases on whether physicians are willing to pay the ongoing costs themselves,⁶ an essential element of sustainability. Some current grants are requiring that the recipients demonstrate steps taken to achieve sustainability of the EHR implementation funded by the grant.⁷

As shown in Figure 1, costs to physicians for EHR deployment and maintenance include numerous aspects beyond simply EHR software acquisition.⁸ However, when purchasing systems, most providers simply focus on the vendor-direct costs (software licensing, implementation, interfaces and support) and potentially supporting costs (hardware and technology) but rarely on the “soft” costs associated with system adoption, such as on-going assistance, process change, change management and training.

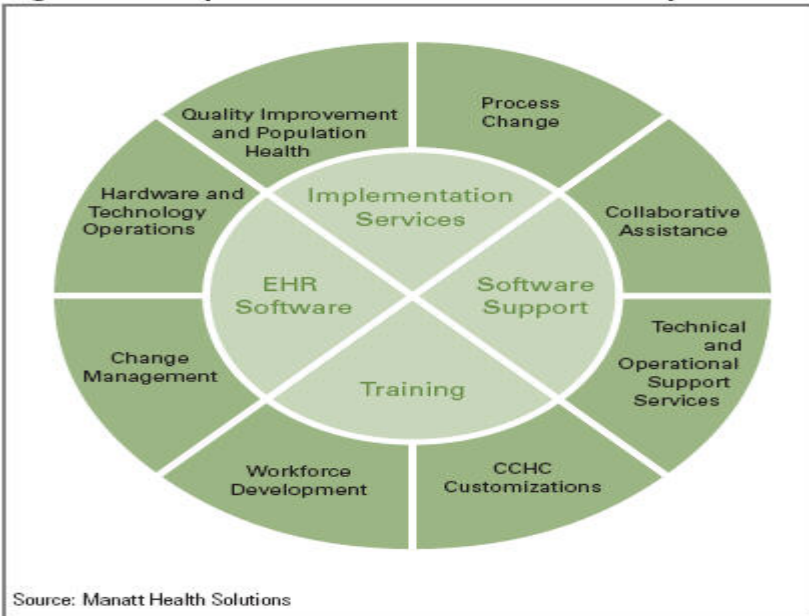
⁵ See “Studies explore the use and functions of electronic health records” at <http://www.ahrq.gov/research/nov071107RA11.htm> . A recent study indicates that only four percent of physicians reported having an extensive, fully functional EHR system and another 13% reported having a basic EHR system. See Electronic Health Records in Ambulatory Care – A National Survey of Physicians at <http://content.nejm.org/cgi/content/full/NEJMSa0802005>.

⁶ Massachusetts e-Health Collaborative’s initial \$50 million funding for its pilot sites from Blue Cross Blue Shield of Massachusetts is expected to expire at the end of 2008. It is reportedly in discussion to obtain additional funding from the Commonwealth of Massachusetts. See “Proponents look to expand medical-records program,” *Boston Business Journal*, April 11, 2008, <http://boston.businessjournals.com/boston/stories/2008/04/14/story18.html?f=et166&b=120814>.

⁷ Electronic Health Record Implementation Initiative. See <http://www.hhs.gov/grantsforecast/cfda/health/education/hrsa83.html>.

⁸ Issue Brief: Creating EHR Networks in the Safety Net. California Healthcare Foundation. March 2008.

Figure 1. Components for Successful EHR Adoption



These on-going costs typically initially range between approximately 20 – 30% of the acquisition costs of the system per year, but may also require substantial periodic re-capitalization due to issues in technology, scalability and licensure. While some costs associated with EHRs are subject to economies of scale (i.e., decrease as a per physician cost when purchased in large quantities), others are not or may become more complex depending on the manner in which the system is implemented.

Initial capital costs related to system acquisition have been estimated to range between \$15,000 – \$80,000 per physician depending on the type of system used, the interfaces desired and whether an integrated practice management systems is acquired with the EHR and if the system is client-server or ASP/SaaS. Additional costs can be present if the solution includes integration to a hospital information system for demographic data exchange, orders and results, medication reconciliation and continuity of care. Integration among different practices in a community typically has associated capital and operating expenses. Implementation efforts per practice also range tremendously depending on the sophistication of the system build, amount of data conversion, level of standardization or customization, incorporation of best practices and one-on-one assistance during training and on-going use. A variety of models for deploying an EHR are summarized in Appendix A.

In order to improve the sustainability of an EHR for physician practices, their financial, clinical, and legal requirements for an EHR need to be understood and met. There are many stakeholders in the sustainability of EHR for physicians, including health IT vendors, government entities, payors, the larger provider community and patients.

As a critical first step, the physician practice needs to understand the total cost of ownership and its unique needs in order to determine the best approach for its specific situation. Often, a physician practice will weigh the pros and cons of different vendor products based on the software cost and functionality. A better approach would be to understand and primarily plan for the costs of implementation, training and support (including the typical ratio of physicians to support staff in various EHR models) and recurring hardware and software maintenance costs. Practices should also be aware that capital expenditures for EHRs are likely to recur as technology and standards evolve.

In addition, after December 31, 2013, hospitals will no longer be able to subsidize the cost of certain EHR technology for non-employed physicians because the current exception to the Stark Law that permits such assistance will expire at that time.⁹ Financial arrangements that rely on this exception to subsidize up to 85% of the cost of certain EHR technology for non-employed physicians will need to be terminated or revised by this deadline unless the regulations are extended or revised.

Health systems vary in their interpretation and implementation of this rule. In some cases, EHRs are being subsidized up to the maximum amount from both a capital and operating expense perspective through 2013, while in other cases donors (i.e., hospitals and health systems) may opt to subsidize either the capital or the operating expenses, but not both (more frequently the capital rather than operating expense). In addition, donation amounts may be tiered based on acceptable criteria and may not reach the entire 85% at the discretion of the health system, within acceptable guidelines.

There is other variability in the interpretation and application of the donation rules, which then creates some confusion for physicians in understanding the trade-offs in accepting a donation. For example, some health systems may include integration in the donation, while others may not. Some entities may provide both an EHR and practice management system (assuming the two are integrated and that the predominant use is the EHR while others may only provide the EHR. Lastly, some health systems may provide specialized local support for the applications, while others may require physicians to acquire standard implementations and/or support services directly from the vendor.

Government grants continue to be proposed¹⁰ and additional funding may become available from other sources, but it is unlikely that third party funding will be available forever. Therefore, one or more financially sound business models must evolve for EHRs to be sustained on a long term basis and provide the expected benefits. The development of sustainable models for EHRs is likely to be enhanced by a better understanding of the benefits received by physicians when EHRs are used and of ways to minimize potential problems with EHR implementations.

Benefits of EHRs for Physicians, Patients and Payors

EHRs are generally expected to result in lower costs and increased quality of care across the entire healthcare system.¹¹ However, adoption by physicians may be hampered by a belief that the economic benefits from EHRs will be realized primarily by health insurers and government payors. The expected decrease in errors may also benefit malpractice insurers, at least until premiums are adjusted to reflect lower risks. Developing a sustainable model, therefore, needs to take these perceptions into account and compare them to the reality of who will receive the economic benefits of EHRs.

⁹ 71 Fed. Reg. 45140 (Stark EHR Exception). There is also a parallel safe harbor from the anti-kickback statute for up to 85% of the cost of certain EHR technology. See 71 Fed. Reg. 45110 (anti-kickback EHR safe harbor).

¹⁰ On February 27, 2008 Michael Leavitt, Secretary of the Department of Health and Human Services (DHHS), indicated that the DHHS 2009 budget included \$3.8 million for a demonstration project involving up to 1,200 physicians practices to improve quality by increasing the functionality of their EHR systems. See <http://www.hhs.gov/asl/testify/2008/02/t20080227c.html>.

¹¹ Commission on Systemic Interoperability. Ending the Document Game: Connecting and Transforming Your Healthcare through Information Technology. Oct. 25, 2005. See <http://endingthe documentgame.gov>.

Some of the expected benefits to payors include the reduced cost of care if prescription errors are reduced, tests are not repeated due to missing results and disease management protocols are used for chronic diseases, such as diabetes. Certainly, some payors appear to believe in the potential of EHRs, as evidenced by Blue Cross Blue Shield of Massachusetts providing \$50 million of funding to the non-profit Massachusetts e-Health Collaborative to help implement and evaluate community-based EHRs at three pilot sites.¹² An argument may be made that the cost savings realized by payors should also be shared with physicians on an ongoing basis through higher reimbursement rates or other mechanisms such as pay-for-performance initiatives.

Payors are also expected to benefit from reduced claims processing costs if EHRs are used and an improved ability to detect and prevent fraudulent billing. However, some payors expect that the use of EHRs may increase their costs in the aggregate because physicians will have more complete documentation for claims that might be rejected today and may properly code them at levels that result in higher reimbursement. There is also a concern that fraudulent transactions may be conducted on a larger scale through the use of improved technology (for example, making upcoding easier), and efforts are underway to develop functional requirements to combat fraudulent activity using EHRs.¹³

Regardless of whether payors are willing to share any net savings, physicians have independent reasons to implement EHRs and appear to be relatively satisfied with their use. The reasons fall into four general categories as discussed below: improved quality of care, economic benefits to physicians, improved patient satisfaction with care and improved physician satisfaction with practice.

- **Improved Quality of Care.** The benefit most sought after and promoted is the ability of EHRs to promote improved quality of care. Two large literature reviews support this contention,^{14,15} although one study has recently challenged this conclusion, indicating that the manner in which EHRs are currently implemented does not guarantee improved quality.¹⁶ Quality benefits primarily revolve around better adherence to disease management and health maintenance guidelines and improved prescribing safety.

¹² See <http://www.maehc.org>.

¹³ RTI International Report to ONC - Recommended Requirements for Enhancing Data Quality in Electronic Health Records. May 2007. See http://www.rti.org/pubs/enhancing_data_quality_in_ehrs.pdf.

¹⁴ Chaudhry B, Wang J, Wu S, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care, *Annals of Internal Medicine*; 2006;144:742-752

¹⁵ Shekelle PG, Morton SC, Keeler EB. Costs and Benefits of Health Information Technology. *Evidence Report/Technology Assessment No. 132*, Rockville, MD: Agency for Healthcare Research and Quality, April 2006.

¹⁶ Linder, JA; Ma, J; Bates, DW; Middleton, B; Stafford, RS. *Electronic Health Record Use and the Quality of Ambulatory Care in the United States*. Archives of Internal Medicine. 2007;167(13):1400-1405. The executive summary of a recent study funded by the Robert Wood Johnson Foundation states that it failed to find “a significant association between EHR use and improved quality of care, although it notes that the reasons could include the need for better measures, quality benefits of EHRs that may occur later and/or an overestimate of the quality benefits of EHRs. See *Health Information Technology in the United States: Where We Stand, 2008*, The Robert Wood Johnson Foundation. June 18, 2008. See <http://www.rwjf.org/qualityequality/product.jsp?id=31831&c=EMC-CA142> .

Prescribing safety is improved through the use of drug utilization review, such as allergy checking, drug interaction checking, drug-disease checking, drug-dose checking and duplicate drug checking, as well as increased legibility of prescriptions, reduced human transcription errors and the ability for the provider to identify patients on medications that have been recalled. In addition, EHRs offer improved access to more complete clinical information to aid in clinical decision-making, the potential to have improved communication between healthcare providers and, with some systems, the option of decision-support, such as clinical protocols.

- **Economic Benefits to Physicians.** The economic benefits of EHRs have been established by several studies^{17,18,19} but interestingly, the common perception is that the economic benefits have not been established for physicians. Economic benefits include the ability to reduce staff costs through greater office efficiencies, reduce or eliminate transcription costs, reduce paper-related costs, increase the level of coding for reimbursement through more complete documentation, improve charge capture, improve physician recruitment, document and improve HIPAA compliance and become candidates for pay-for-performance programs.

Some malpractice insurers are beginning to recognize the benefits of EHRs in their premium structure, although a reduction in premiums may be conditioned on specific educational activities. In the future, a mechanism to charge for responding to questions submitted electronically may significantly increase the economic benefits.

- **Improved Patient Satisfaction with Care.** EHRs improve patient service through the availability of printed health summaries, medication lists, patient instruction sheets and patient education handouts; through reduced call-back waits due to eliminating the time it takes to pull a paper chart; through reduced pharmacy waits due to the convenience of e-prescribing and through patient portal access to a practice when available in the EHR system.
- **Improved Physician Satisfaction with Practice.** Finally, although it is seldom discussed, physician users of EHRs often report increased satisfaction with their practice of medicine related to the sense that they are practicing “higher quality medicine.” For those that have remote access to their records, the ability to have more flexibility when and where they can access their patients’ records is also viewed as a benefit. One indicator of this satisfaction can be found in two EHR user satisfaction surveys published in 2005 and 2008, which showed that 87% and 83% of EHR users, respectively, would not want to return to paper charts if they could.^{20,21}

¹⁷ Miller et al. The Value of Electronic Health Records in Solo or Small Group Practices. *Health Affairs*. 2005; 24: 1127-1137.

¹⁸ Wang et al. A Cost-Benefit Analysis of Electronic Medical Records in Primary Care. *American Journal of Medicine*. 2003;114:397-403.

¹⁹ Barlow S, Johnson J, and Steck J. The economic effect of implementing an EHR in an outpatient clinical setting. *Journal of Healthcare Information Management*. 2004;18(1):46-51.

²⁰ Edsall, RL, Adler, KG. An EHR User-Satisfaction Survey: Advice from 408 FamilyPhysicians. *Family Practice Management* 2005; 12(9): 29-35.

It is, therefore, important to bear in mind the wide variety of potential benefits of EHRs to various stakeholders in order to properly evaluate how to improve adoption and sustainability.

Minimizing Potential Problems with EHR Implementations

Despite the potential benefits and out-of-pocket costs, many physicians avoid EHR adoption due to concerns associated with implementation. Several studies indicate a high rate of implementation failure or suboptimal usage. To maximize the probability of implementation success, a focus on adoption and sustainability should be employed when selecting and operating EHRs.

EHR adoption is unsuccessful in some cases due to lack of end-user support. Common causes are:

- lack of involvement of key stakeholders in the requirements definition and system evaluation process
- lack of understanding regarding how the system is going to affect practice operations and how processes might be modified to ensure success
- lack of alignment between individual/clinic performance and system adoption success criteria (which may be the result of the lack of identified benefits)

To prevent this, it is essential to include clinicians and key staff at the onset of the selection process, as well as input from IT and administration (defined collectively as key stakeholders). This group should identify, rank by importance, and define metrics for the key goals the practice is trying to achieve through use of the product and mitigate any differences in perspective. The chosen criteria should be used for product evaluation and selection, with the key stakeholders involved in vendor demonstrations and other evaluation steps, such as reference checks and site visits. By taking these steps, the product is more likely to have the features necessary to support the goals that the practice has identified. This process also helps educate clinicians on realistic expectations of product functionality and reduces any misconception that an EHR is primarily an IT initiative.

With this focus in mind, EHR “shopping” should continue by considering other important areas that will enable the EHR to assist the practice in meeting goals. This includes proper determination of required infrastructure, ensuring that the EHR is sized appropriately and is capable of integration with other systems, and realistic estimates of ongoing costs. See the Background section at the beginning of this document for a further discussion of costs.

While vendors may have recommendations regarding staffing to support implementation and on-going use, allocation of personnel is frequently overlooked in the planning stage, especially where a practice’s specific considerations or goals may modify vendor standard recommendations. Clinicians and staff must understand and plan for a shift in staff roles with the introduction of the software into a facility but cannot do so within the constraints of their clinical workday and still be productive; therefore, specific staff must be identified to focus on clinical transformation and optimization.

Many vendors provide training on system use during the implementation phase, but not all vendor standard training encompasses system configuration, optimization and maintenance. Furthermore,

²¹ Edsall, RL, Adler, KG. User Satisfaction with EHRs: Report of a Survey of 422 Family Physicians. *Family Practice Management* 2008; 15(2): 25-32. (unpublished result from study not previously reported).

vendors rarely provide customized training that incorporates a practice's newly enhanced workflows. These functions frequently fall to individuals within the practice. In addition, on-going practice-specific refresher and optimization training of all staff after go-live provides opportunity to optimize provider efficiency.

As one means of preventing the oft-heard provider complaint that an EHR requires more data entry work than facilitating the practice of medicine, physician practices should plan to tool their staff to “work to their licenses.” For example, nurses may only be recording vital signs, whereas they could record chief complaint, allergies, current medications, current problems, past histories and history of presenting illness; the physician would then review this data with the patient. Recent time motion studies of physicians in traditional paper-based clinics and EHR users show that individuals in the paper-based environment spend approximately 10 more minutes per patient in non-patient care activities than their EHR-using counterparts. Individuals effectively using an EHR are able to spend one to two minutes less than their non-optimized EHR counterparts.²²

In selection, the key stakeholder can flush out these role shifts and identify gaps in vendor provided training by having conversations and site visits with similar facilities that are using the target system. Practices should use this information to insure that adequate time and cost for training, as well as resource availability, are well accounted for in the planning phase.

EHR sustainability may also fail when implementations are forced upon providers in a “big bang” approach rather than focusing on how to achieve the most important goals of the implementation. The “big bang” methodology may introduce too many changes at once and contribute to clinicians and their staff fearing that the EHR will drastically interrupt their business. Greater success may be achieved using a stepwise approach to implement one or two features that provide an immediate return for effort, such as lab results, transcription or e-prescribing. This contributes to an increased familiarity with the system navigation and capabilities. However, if there are important elements that will be achieved only at full implementation, a phased-in approach may take too long and result in a failure to achieve the end-stage benefits.

The realization that the EHR system can increase efficiency in workflow will open the door to further system use. Users should also be reminded of non-immediate benefits such as decreased transcription costs, reallocation of staff away from paper chart maintenance and decreased physical space requirements. Having top-down sponsorship and alignment of individual performance to compensation and practice goals is essential to overcoming the apprehensions of clinicians and staff.

Suggestions to Improve Sustainability

Development of financial models that support an EHR will greatly improve the ability of physician practices to implement and maintain EHR systems. Currently, the business case for an EHR, where the costs are borne solely by the physician practice, is not compelling. Other potential issues may be addressed in contract negotiations and implementation so that they do not create problems during implementation and continued use. Following are suggestions for improving the chances of short term and long term success.

Documenting Clinical Improvements

²² Valancy, J. “How Much Will That EHR System Really Cost?” *AAFP Journal of Family Practice Management*. April 2002.

Conducting and publishing research on improvements in clinical outcomes associated with an EHR could also enhance EHR sustainability. Use of preventive care reminders to improve immunization rates or compliance with other preventive care guidelines is one example. The ability to avoid adverse drug reactions through alerts is another example of potential for clinical improvements. Although personal health records, or PHRs, will present challenges as discussed below, the EHR could become a valuable source for populating the PHR that patients will use to manage their care. Developing standards for both measuring and monitoring improvements in clinical outcomes resulting from EHR usage could also play an important role in the sustainability of EHRs.

Meeting New Payor and Regulatory Requirements

EHRs can also be an important tool for complying with reporting requirements of CMS and other payors and governmental agencies. With the increased awareness of quality metrics and the potential for increased reimbursement if quality improvements can be shown, an EHR is likely to become a necessary part of the physician's practice. Consistency in implementation of pay-for-performance is another key ingredient in the adoption and ongoing use of EHRs. Consistency in pay-for-performance guidelines and practices will enable workflow and reporting requirements to be better incorporated into EHR products and support further implementation of those products in the physician practice. The movement toward transparency in healthcare is another driver for capturing a physician practice's clinical outcome improvements.

Changes in the Payor–Provider Landscape

Increased use of EHRs may lead to further changes in the relationship between payors and providers that cannot be predicted at present. For example, greater use of clinical systems could allow more initial intake information to be provided by patients directly or through the use of mid-level personnel, which, in turn, could affect the overall reimbursement level and the economics of physician practices. Another area for potential change is the determination of medical necessity, a sometimes contentious subject for providers and plans. Medical necessity determinations could be significantly affected by the vastly greater amount of information about actual clinical practices and outcomes that will become available as the healthcare industry increases its use of EHRs.

Training and Ongoing Adjustment of the EHR System

In order to receive the full benefit of automated drug alerts and other clinical decision support, the practice should thoroughly review how these elements will work, develop any revised workflows that may be necessary, obtain clinical input about the initial settings and develop a process for periodic re-evaluation. For example, there are numerous reports of alerts being disregarded because they are not appropriate for the practice, which lead to physicians becoming frustrated with the system and ignoring alerts that would be useful.²³ This problem can be addressed by periodically reviewing and adjusting how the alerts are set and determining what follow up is appropriate for disregarded alerts.

Availability of appropriately trained resources for EHR system selection, implementation, maintenance and optimization is a key factor in the successful adoption and ongoing use of an EHR within a physician's practice. As mentioned earlier, underestimating the true cost of an EHR (e.g., by not including ongoing support from trained resources) can lead to selecting a system that the practice cannot sustain. Vendors can provide some assistance, but the physician practice should allocate

²³ van der Sijs, H et al. Overriding of Drug Safety Alerts in Computerized Physician Order Entry. *Journal of the American Medical Informatics Association*. 13, no 2(2006): 138-147.

sufficient resources for the development of “super users” to focus on quality improvement, not simply technology for technology’s sake. Defining job responsibilities to include dedicated resources for quality improvement should benefit the practice by increasing overall efficiency and by increasing the amount received under pay-for-performance programs.

It is also critical to properly train personnel to minimize misunderstandings regarding how these functions operate and the electronic records that they generate. For example, personnel need to understand what record is generated if an alert is disregarded because the data created from an override may not be obvious to the user but could be discoverable in litigation even if it is not part of the patient’s medical record.

Contractual Considerations

In many cases, physicians focus on price and payment terms as the key elements of a successful contract. However, as adoption and sustainability require numerous components and vendor-direct cost is only one aspect, a thorough contract should take into consideration many factors in addition to costs and payment terms.

Governance/Data Ownership

The contract should address ownership of the practice’s data and the extent to which it will be commingled with that of other providers if the EHR is sponsored by a hospital or a RHIO. For example, the sponsor should commit that the practice’s billing information and other financial data will be held separately and not be accessible to other practices that use the EHR system.

If personal health information (PHI) from multiple physician practices will be combined into a single record for each patient, the agreement should address whether data can be separated if the physician practice decides later to withdraw from an EHR sponsored by a hospital or RHIO. A similar issue may be presented when an individual physician decides to leave a group practice that uses an EHR, whether on a stand-alone basis or operated by a third party.

Third Party Services

If the EHR is operated by a hospital, RHIO or other ASP vendor, the contract should allocate responsibility for all important elements of the services, including:

- maintaining PHI and other data on a day to day basis
- producing data when required in response to a subpoena in compliance with e-discovery rules
- satisfying HIPAA privacy and security requirements, including providing notices, responding to patient requests, maintaining system security and determining sanctions for violations.

Planning for Personal Health Records

Personal health records, or PHRs, are expected to play a key role in the consumer empowerment component of the approach advocated by the Office of the National Coordinator for Health Information Technology (ONC). PHRs are currently being sponsored by Aetna, Dossia (for some employer groups), Google and Microsoft (for individual patients). In addition, some EHR vendors offer PHRs as part of patient portals.

Some concern has been expressed that PHRs may be a disruptive technology because it will be difficult to work with a variety of evolving PHR formats that may not be interoperable with EHRs.

To address these issues, it may be helpful to start with a recent report²⁴ to ONC that defined a PHR as:

An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be drawn from multiple sources while being managed, shared and controlled by the individual.

The report draws an important distinction between EHRs and PHRs, asserting that:

control of information distinguishes EHR from PHR. The information in a PHR, whether contributed from an EHR or through other sources, is for the individual to manage and decide how it is accessed and used. Electronic portals of information on an individual that are hosted by a provider or payer organization, without transferring the control of the information to the individual, are not PHRs but rather examples of giving individuals access to information in an EHR.²⁵

The distinction between who controls PHRs and EHRs may help the industry draw appropriate lines between the use of these two technologies. As a relatively new data collection bucket, the fit of PHRs and EHRs is contingent upon the development of standards for PHR content, transmission and interoperability. These are evolving and should be more clearly defined over the next few years.

At present, there are more questions than answers about PHRs. For example, will PHRs result in information overload for physicians, adversely affecting their workflow without additional reimbursement? What malpractice risks will physicians take if they rely on this data or, alternatively, if they fail to review it? How will authentication and data integrity be controlled?

As a starting point, providers should evaluate their current process for handling patient provided information and expand their policies as needed to address PHRs. For example, providers might encourage the *patient* to use the PHR as a resource during a visit (as opposed to expecting the provider to import or sift through reams of data). Providers should make sure the data being reviewed includes its source and be familiar with the sponsor of the PHR before relying on the data. Providers should also consider that a consumer may have more than one PHR and that the content, timeliness and accuracy may differ based on the sponsor's identity.²⁶

Ideally, PHRs will be used to create a partnership between the provider and the patient and to facilitate a patient's management of his or her own healthcare. By being aware of the issues inherent in this early stage technology and having a framework to address those issues, physicians should not feel that PHRs present a reason to delay or abandon EHR use.

²⁴ The National Alliance for Health Information Technology Report to the Office of the National Coordinator for Health Information Technology on Defining Key Health Information Technology Terms. April 28, 2008. See http://www.nahit.org/cms/images/docs/hittermsfinalreport_051508.pdf at page 19.

²⁵ Id. at page 5.

²⁶ Health IT Certification, CHPIE (Certified Professional in Health Information Exchange) – Course VIII, Personal Health Records, 2008, page 41.

Conclusions and Recommendations

Based on these indications, the HIMSS EHR Adoption and Sustainability Work Group recommends the following:

- Increased training (or cross-training) of smaller physician practice office staff to enable the transition to EHR technology and to improve the practice's performance.
- Increased study and publication of information on costs (and benefits) related to on-going EHR usage, including benchmarks and methodologies for optimal adoption.
- Development of consistency in pay-for-performance programs so that reporting requirements can easily be adopted into EHR systems and appropriate workflow processes can be incorporated into vendor product and service development and training programs.
- Additional clarification regarding the usage of PHRs and CDMS, including coordination and integration with EHRs so that these efforts are not disruptive.
- Stratification of products appropriate for smaller office practices versus larger, multi-specialty entities.
- Enhanced EHR product pricing models and offerings that are attainable for smaller offices (more software-as-a-service models) and spread costs of interface development appropriately.
- Development and support of networks for EHR adoption in communities across the United States.
- On-going financial support of provider EHR usage by all parties that benefit from EHR usage, including employers, ancillary service providers (such as labs) and payors.
- Call by the industry for the extension of the Stark exception beyond December 31, 2013 to allow hospitals to subsidize the cost of certain EHR technology for non-employed physicians.

Summary

As long as the implementation of an EHR has the potential to reduce physician practice expenses and improve the quality of care, HIMSS Ambulatory Community will continue to work to educate our members and industry stakeholders on the need to improve the sustainability of EHRs for physician practices.

We must continue to work with physician practices, our members and the industry at large in an effort to ensure they continue research and education that address the adoption and sustainability of EHRs in the following areas:

1. Improve the delivery and quality of patient care
2. Provide economic benefits for practices
3. Provide improved patient satisfaction
4. Support improved physician satisfaction

We encourage the government and healthcare industry to continue to support the efforts to move toward EHR adoption and to provide resources and funding to conduct research, and programs that promote the sustainability of the EHR. HIMSS will continue to work with clinicians, ambulatory care providers, the HIMSS Ambulatory Committee and our members to continue the dialogue to promote the sustainability of the EHR within the industry.

Appendix A

EHR Model Type for Deployment

Software Models

ASP Models

ASP is a remotely hosted software system accessed via an Internet Web browser. This remotely hosted system is accessed by paying a rental or service fee. The server is secure and should be HIPAA compliant and is not located in your office. All technical aspects of the server are managed by a professional IT company, and you pay a monthly access fee (or per occurrence fee) for the services of this IT company. The cost of an ASP-based system is relatively low in the beginning. However, because the fees never stop, the cost over the long term adds up and usually ends up being more expensive than using a Client/Server-based system. One of the other benefits of the ASP based system is that almost all computing is done on the remote server, thereby reducing the minimum computer hardware requirements on the clients/workstations. The benefit to this model is that the cost becomes an operating cost versus a capital expenditure.

ASP allows you to access all of your information at any time, from any place with Internet access. With all comparisons of advantages come discussions of disadvantages. One such disadvantage is the loss of customizability; the host server is being accessed by many different users. Although your data is secure, your individual customized needs are not met as readily as you may desire. Your thoughts must turn to integrations between current office automation and the new ASP model of EHR. Unless the practice is doing away with all existing computer automation and a total replacement is in mind, you will need to keep up with the integration needs in the very near future. Tell the EHR vendor what systems you have in place (which you plan to keep) and be sure to get verification (in writing) from the EHR vendor that they have an HL7²⁷ interface to integrate your existing system(s) with the new EHR system.

Accountability issues are a deep consideration to an ASP. Company service degradation is felt more acutely and such things as vendor bankruptcy, which could have a more drastic impact on the practice as a whole. Periodically, check the stability of the EHR vendor and ask for a backup copy of your data for your records.

New features and enhancements are usually built into your monthly access charge and can be added to your system instantly without your involvement.

The advantages and disadvantages of using an ASP system include:

ASP for EHR Advantages

²⁷ Health Level Seven (HL7) is one of several American National Standards Institute (ANSI)-accredited Standards Developing Organizations (SDOs) operating in the healthcare arena. Most SDOs produce standards for a particular healthcare domain such as pharmacy, medical devices, imaging or insurance (claims processing) transactions. HL7's domain is clinical and administrative data. HL7's mission is to provide standards for interoperability that improve care delivery, optimize workflow, reduce ambiguity and enhance knowledge transfer among all its stakeholders, including healthcare providers, government agencies, the vendor community, fellow SDOs and patients. See www.hl7.org.

- System is maintained by IT professionals remotely, reducing the cost of maintenance
- Online backup service
- Accessible anywhere in the world from any computer with an Internet connection
- Low initial cost of ownership

ASP for EHR Disadvantages

- Risk of data being inaccessible in the event company goes bankrupt. You don't control your data
- Risk of company not performing routine maintenance (backup, updates, performance enhancements) as promised
- Dependant on internet connection. If your internet connection goes down you cannot use your system

Client/Server (Locally Hosted) EHR

Client/server models allow for quicker response times in the application as the data from the server to the client is transmitted much faster (usually 100 Mbits/second). The newer client/server products developed in **Java** and **Microsoft.Net** are capable of offering the “best of both worlds,” as they have the speed of a local system plus the accessibility from a remote location. Where traditional client/server products required practices to use **MS Terminal Services** or **Citrix** technology to access their data from remote locations, these newer systems can be accessed from any Internet browser. Client/server also boasts the benefits of a practice having the control over its data. However, with this control comes responsibility; the responsibility of being responsible for your data as you are now open to the risk of theft, fire, hard-drive failure and data corruption

The advantages and disadvantages of using a client/server system include:

Client/Server for EHR Advantages

- Faster overall operational speed
- Control over your own data
- No dependency on internet connection
- Better integration with imaging devices (scanners, printers) and on-site resources

Client/Server for EHR Disadvantages

- Higher upfront cost of ownership as a server and software must be purchased upfront
- Manual product updates are usually required (not in all cases)
- Online backup must be purchased as add-on 3rd party software
- Remote access to EHR is limited in functionality and is more complex

Many IT futurists consider ASP based systems to be the future; however, many offices find they do not have the need for remote access and do not want to put their data in the hands of another company making client/server systems—still a popular option. In most cases, if an office has multiple locations, an ASP system should always be considered. However, if an office requires high-performance and does not have multiple locations, the client/server system may be the better option.

If the client/server model is the model of choice, keep in mind the expectation of additional hardware and IT service networking expenses. You will need to purchase a server or designate one of your existing workstations/server to be the server in the new system. Servers can take up a

significant piece of your EHR budget, costing as little as \$2,500 for a single provider office and as much as \$100,000 for large organizations. The client/server model usually requires a business quality workstation. This may require you to upgrade the hardware or operating system in your existing computers, as the standard Microsoft Windows Home Edition may not provide you with the strength and speed needed to operate your EHR. As mentioned previously, it is highly recommended you research, review and purchase your EHR before buying the anticipated computer hardware. Once you have selected the EHR vendor, they will provide you with the minimum computer hardware specifications to operate the system. If you settle for the minimum, keep in mind your practice may need to buy additional memory in the near future to handle increased patient loads.

An important consideration regarding client/server is the purchase of the software. Once purchased, you now own it. Software is a “fluid” product; it is always in motion. After purchasing the software, keep in mind the vendor is continuing to modify and program new enhancements and features. How will you get access to these new features? With the ASP model, the practice will access the new feature almost immediately upon release. The client/server software requires updates for the new features.

Your EHR vendor will make you aware of these enhancements and sell you the new update in version releases. The new version release may be annual or semi annual, or occur when enough enhancements (as determined by the vendor) are included. The cost of these new releases is as varied as the initial purchase. How will you know if you are buying a release with substance, or just a “fresh coat of paint”? Simple; schedule a demonstration with the vendor. Ask to see the differences. Develop a series of questions. What if you decide to “pass” on buying the new version? Read your contract language. The vendor (in many cases) has contractual language that allows them to “no longer support” the current version if there have been two additional version releases that were not purchased. This is designed to allow the company to focus their efforts on the fluidity of the ever changing needs within the market.

EHR adoption by private practice physicians is still in the early phase. With noticeable migration at this point, there is no one true model in the lead—ASP vs. client/server. Only time will tell. However, with the ability to look at our past and speculate about the direction that major companies such as Microsoft are headed in, the signs are pointing to ASP.

Seeking outside help can assist you in making an informed decision. Do you need this upgraded version? In a buyers market, the practice can negotiate additional versions included at no charge or a percentage off retail. This type of negotiation strategy should be employed prior to commitment. Some EHR vendors will give away version releases while others will not.

Software as a Service (SaaS)

Within software as a service (SaaS) models, users download a small applet—exactly the software they need. In appliance models, a vendor tightly integrates a simplified version of a product to provide a turnkey solution to midrange or smaller customers, with a reduced feature set. In cloud computing, the software might never be delivered to a user; the compute cloud holds the software and handles the function on behalf of the user.

SaaS refers to a type of software deployment in which all of the system’s software and data is hosted and managed at a central data center operated by the software vendor. The physician practice simply uses the system through their Web browsers and a broadband Internet connection. The practice will

typically pay a monthly subscription fee to use the service, rather than purchase the software up front.²⁸

Advantages of a SaaS System

- **Limited IT burden.** A key reason why many practices choose the SaaS model is that their data is secured at a centralized location and monitored by IT staff that handle routine back-ups, upgrades, modifications, installations and necessary maintenance. The security and maintenance is typically far superior to what a practice could implement in their own office. Moreover, there is no need to buy server hardware.
- **Ease-of-use.** SaaS and Web-based systems are often easier to use. Since the user interface is essentially a Web page, the user experience is often on par with making a purchase online. If you have successfully made a purchase on Amazon.com or eBay, you can probably figure out how to use a SaaS or a Web-based EHR or a practice management system fairly easily.
- **Remote access.** Many physicians appreciate the ability to access their EHR or practice management system from outside the office. This might be while doing rounds at the hospital or updating records in the evening at home. With a SaaS system, users can access their system from anywhere they have Internet access.
- **Subscription pricing.** Practices often like the subscription model of SaaS. Subscription pricing means that the upfront costs are low, as the fees spread out over time. Thus, these expenses become an operational expense versus a capital expenditure.

Disadvantages of SaaS for a Practice

While the SaaS model is very compelling, here are some of the reasons why practices may choose not to select a SaaS system:

- **Poor Internet access.** With the SaaS model, it is important to have a quality Internet service provider (ISP) that is optimized for speed and has dependable bandwidth. If the Internet goes down, the system is down. Of course, on-premise systems can go down too when there are networking, electrical or hardware failures.
- **Complex customization.** Because SaaS systems are typically designed to serve numerous practices from a single, centralized “code base,” there have traditionally been fewer options for complex customization. This, of course, is changing over time as SaaS vendors build out more advanced configuration capabilities.
- **Fewer vendors.** While there are hundreds of EHR and practice management systems, very few of them are SaaS. The SaaS model is still relatively young, so only a few innovative firms have come to market with feature-complete, dependable SaaS solutions. Many of the leading specialty-specific systems remain client/server.
- **Long-term pricing parity.** While the subscription pricing model reduces up-front costs, those regular fees add up over time. In the long-run, SaaS fees will typically equate to those paid up front for a perpetual license for a client/server system.
- **Trust.** Some organizations find it very difficult to relinquish control or trust third parties to manage their applications and data.
- **Process Design.** Without clear objectives and defined business processes, a practice will be no better off choosing a SaaS solution than an on-premise solution.²⁹

²⁸ 4.6 Client/Server vs. ASP for Electronic Medical Records – How to buy an EHR Practices. See <http://www.centerforhit.org/x1014.xml>.

²⁹ Software Advice. See <http://www.softwareadvice.com/medical/is-software-as-a-service-right-for-your-practice/>.

EHR Model Characteristics Chart

Characteristics	SaaS	Client/Server	Web Enabled ASP
Server Deployment	Software and data reside on a central server, at vendors data center	Software and hardware are located onsite and managed by the practice.	Software and data may be deployed onsite or via a third party host
User Interface	Web browser access only	Software is installed and managed on each users PC	Access via Web browser or Citrix
Pricing	Subscription based	Perpetual license with an annual support fee.	Usually a perpetual license, but could be purchased on a subscription base.
Accessibility	Any Internet connection	Access onsite via remote PCs and VPN to server for access.	On site and remotely using a web browser or Citrix.
Maintained	By vendor hardware maintained by practice.	Onsite in physician's office by staff or a consultant.	Onsite by practice staff, IT consultant or hosting company.

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