Razavi Int J Med. 2018 April; 6(2):e55938 DOI: 10.22034/RIJM.2018.55938

Published online 2018 February 20. **Review Article**

Electronic Health Records Acceptance and Implementation in Developing Countries: Challenges and Barriers

Mohammad Reza Hassibian [1,*]

[1]Department of Medical Informatics, School of Medicine, Mashhad University of Medical Sciences, Mashhad, IR Iran

*Corresponding author: Mohammad Reza Hassibian, Department of Medical Informatics, School of Medicine, Mashhad University of Medical Sciences, Mashhad, IR Iran. P. O. Box: 91775-48564. Tel: +98-5118815894, Fax: +98-5118002445, E-mail: hasibianmr@mums.ac.ir.

Received: October 6, 2017; **Revised:** November 3, 2017; **Accepted:** November 5, 2017

Context: This literature review mostly emphasizes on the challenges and barriers for acceptance and implementation of electronic health records (EHRs) in developing countries. Although the willingness of developing countries for acceptance and implementation of EHRs is rising, they will face some challenges and barriers which can slow down their progress due to the multidisciplinary and complexity characteristics of EHRs. Some of these challenges and barriers can be seen in the past and present histories of EHRs acceptance process in developed countries too. Familiarity with these challenges and barriers will help developing countries to have better understanding of these problems towards successful EHRs. The main goal of this survey is to study the challenges and barriers of acceptance and implementation of EHRs in the developing countries and how they can overcome such problems.

Evidence Acquisition: Two databases, Pub-Med and Scopus with Combination of terms such as Electronic Health Records, Developing Countries, Barriers, Challenges, Acceptance, and Adoption were searched. Totally, 514 articles extracted. Some exclusive criteria such as date of publication (year 2000 and above) and having a close relation to the subject of the study (through abstract) were applied. The result was eight articles from Scopus and 12 articles from Pub-Med. Also, 7 articles were extracted by general search in internet. Also, 11 articles with the same search policies were selected from Journal of Health informatics for Developing Countries (JHIDC) with no exclusion criteria.

Results: Developing countries must be fully aware of challenges and barriers in their way towards EHRs. They also need to study the experiences of countries which are successful in acceptance and implementation of EHRs. Developing countries also need to provide infrastructures needed for a successful implementation of EHRs.

Conclusions: Despite the positive effects of EHRs in healthcare services, the acceptance rate of EHRs in developing countries and even developed countries is still low. The developing countries are facing many problems in their way toward implementing successful EHRs. Lack of infrastructures in information and communication technology, cost, and cultural resistance are considered as main barriers for developing countries in their approach to accept and implement EHRs.

Keywords: Electronic Health Records; Developing Countries; Barriers; Acceptance

1. Context

Developing countries are a highly diverse group with different views and concerns. These are countries with low level of economy growth and inadequate technical and social infrastructures especially in the area of Information and Communication Technology (ICT) and Health Information Technology (HIT). They are less industrialized and need fundamental reforms in different aspects of their society. Developing countries are usually technology dependent (1, 2).

HIMSS defines EHRs as a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports. The EHRs automates and streamlines the clinician's workflow. The EHRs have the ability to generate a complete record of a clinical patient encounter, as well as supporting other care related activities directly or indirectly via interfaces including evidence based decision support, quality management, and outcomes reporting. Today, Electronic Health Records are considered as a major topic in health informatics and is viewed as a key component of improving the quality of care while reducing healthcare costs.

There has already been a large volume of work done internationally over the past decade on public domain EHRs reference architecture requirements. In very broad terms the requirements for truly global EHRs should en-

Implication for health policy/practice/research/medical education:
HIMSS defines EHRs as "A longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports. The EHRs automates and streamlines the clinician's workflow. The EHRs have the ability to generate a complete record of a clinical patient encounter, as well as supporting other care related activities directly or indirectly via interfaces including evidence based decision support, quality management, and outcomes reporting".

sure that it can be used, shared, and exchanged between clinicians of all disciplines, across all sectors of health, different countries, and different models of healthcare and healthcare delivery systems. It should also support secondary uses such as research, epidemiology, population health, health administration, financing, and health service planning. Finally, it should facilitate the evolution of existing systems as well as the construction of new systems.

Developing countries interested in EHRs must be fully aware that EHRs have some severe problems inherent in them such as high startup costs, high cost of creating technological infrastructures, high ongoing cost, uncertainty over return of investment, high cost of transferring from paper based systems to electronic systems, and developing national interoperable heath data exchange protocols (3).

The chances for developing countries for successful acceptance of EHRs are higher if they are familiar with the barriers and challenges associated with adoption and implementation of EHRs.

1.1. Why Developing Countries Need EHRs

Traditional healthcare management continues to be a big challenge for developing countries. Most developing countries have weak economy which forces them to spend their limited financial resources very carefully specially in costly areas such as healthcare services. Since, a significant portion of any country's national budget is allocated to healthcare services, health authorities are looking for appropriate solutions to reduce the healthcare cost while increasing the health level of their society. Many countries including developing countries have realized that EHRs can be considered as a good solution for them to overcome most of their problems in healthcare delivery services. A decade ago, computer technology saved many lives by being used in imaging, surgery, and clinical life support devices. Today, EHRs can change the face of health systems drastically by reducing the cost of healthcare services, reducing the medical errors, and increasing the patient's satisfaction (4).

EHRs have the potential to improve clinical management, improve patient safety, reduce medical errors, lower administrative and medical costs, improve point of care decision support, fast access to patient's records, and also improving efficiency and effectiveness of healthcare delivery systems. Public health authorities, Physicians, nurses, healthcare managers, researchers, and patients are the main beneficiaries of EHRs (5).

One of the biggest advantages of EHRs is changing the traditional concept of patient medical records, access type to patient medical records, patient and physician relation, patient's medical information confidentiality, reducing healthcare cost, and reducing the medical errors (6).

Staggering increase in costs as a result of increasing population and specially growing elderly population and hidden costs of medical errors are among other anxieties of developing countries and even developed countries. The IOM 1999 report represents the real treat of medical errors. In this report and the subsequent report the usage of EHRs and other new technologies for increasing the patient's safety and better quality of healthcare are recommended (7, 8).

Health central administration is another distinct benefit of using EHRs. Electronic Health Records not only look at patient as the main purpose of healthcare services, but try to increase and change drastically the healthcare quality too. EHRs can support the patients collected data not only for clinical care but also for patient's admission and discharge, quality management, public health disease surveillance and reporting, better drug distribution and consumption, easy exchange of data among distributed and heterogeneous health systems, and strategic health decision making (9).

Portability and interoperability of medical data are big advantage of EHRs. These are considered as key factors towards globalization. Having a common medical language and unique medical data exchange protocol is necessary to ensure accessibility of patient's medical information generated by various health settings in different environments which are very heterogeneous and continuously changing. Interoperability is also essential for online exchange of health information among disparate health sectors. Moreover, medical records are considered as a national asset and are valuable sources for medical science researchers. Electronic Health Records are able to facilitate health information transfer among different healthcare sectors and substantially increase the amount of medical data available to clinicians and researchers. In the future, medical science researchers can access to online medical databases containing massive amount of data anywhere and at any time (10).

Electronic Health Records are not a single system. They are a collection of inter-locking systems that were tied to a series of complex clinical and administrative workflows. In fact, it can be looked as a virtual system that results from the cooperation of several heterogeneous systems (11). This characteristic of EHRs enables health administrators and managers in developing countries to have supervision and evaluation control over their programs and progress they make for effective healthcare delivery services (12).

Evaluation studies that were conducted on several EHRs show increase in physician's time per working shift which is a good sign for developing countries with shortage of physicians. EHRs can be also used as a very effective way of screening the society for several health abnormalities such as children development delays (13).

1.2. EHRs Challenges and Barriers

Healthcare delivery systems are among the most costly and fundamental public services with domination over almost all public sectors. The high cost of running and improving healthcare delivery systems is among the reasons that most countries adopting EHRs as an effective solution for reduction of cost and improvement of their people's health. Fortunately, even the cost of acceptance and implementation of EHRs seems to be very high but it is not a continual cost and it will return on investments after a period of time (14).

There are certainly significant challenges facing EHRs in both developed and developing countries encompassing structural, technical, financial, and social issues. Understanding these challenges is the first step to resolving them. In the United State of America, On the basis of responses from 63.1% of hospitals surveyed, only 1.5% of U.S. hospitals had a comprehensive electronic health records system (i.e. present in all clinical units), and an additional 7.6% had a basic system (i.e. present in at least one clinical unit) (15). Also, 11.9% of acute care hospitals in Austria and 7.5 percent of the same hospitals in Germany in 2007 were using EHRs (16). Another study in 2007 showed that only 10 percent of the hospitals and 10.1 percent of the clinics in Japan had used EHRs. Also, in 2004, only 9 percent of educational and public hospitals in South Korea had used some form of electronic health records (17).

Low rates of EHRs usage in countries that are highly developed can indicate serious problems and obstacles in the acceptance and usage of EHRs in developing countries too. Studying and understanding these obstacles can be an easier path for countries interested in implementing electronic health records with less time and cost (Box 1).

Box 1. EHRs Barriers and Facilitators

EHRs Accepting Facilitators	EHRs Accepting Barriers	EHRs Common Factors
Financial Factors	**Financial Factors: Initial Costs**	**Financial Factors**
Government support	Software and hardware	Organization productivity
Insurance Companies support	Transition from Paper based systems to electronic based system	Organization income
Technological Factors	Training	**Organizational Factors**
Gradual implementation	**Financial Factors: Ongoing Costs**	Organization size
Technical support	Software upgrade	Healthcare unit Type
Expert manpower	Hardware upgrade	Managerial methods
EHRs performance compliance	Maintenance ,training	System adaptability
	Financial Factors: Others	Change in power structure
	Ambiguity of ROI	
Personal Cooperation	**Ethical and Law**	**User-related Factors**
Personnel tendency	Security and privacy	User age
Physician priority	Information ownership	User computer experience
Physician Participation in system selection	Judiciary limitations	Ability to use EHRs
Attention to personnel comments	**Socio-Technical**	User application of system performance
	Insurance companies cooperation	Encouraging users with better use of EHRs
	System low speed	
	System high failure	
	System complexity anxiety	
	User computer phobia	
	Shortage of specialists	
	Change of physician patient relation	

One of the main barriers to the acceptance and use of EHRs is the high cost of it. The costs includes various items such as transition from healthcare paper-based systems to electronic systems, hardware and software, installation of internet and intranet networks, training healthcare professionals, and ongoing costs as well as support and update of the computer systems. Private healthcare providers usually do not have the ability to tolerate high expenses; therefore, will show their interest to simple solutions which usually do not have specification that are intended for EHRs (18).

High performance of EHRs is accessible if technologies

such as telecommunication, internet networks, and necessary infrastructures are provided (19). Moreover, the existence of medical terminologies standards, and health data exchange protocols are required for successful EHRs (20).

Another important barrier to the successful acceptance and use of electronic health records is physician resistance to migrate from paper-based systems to electronic systems. There are several reasons for physician resistance against EHRs. The high cost of software and hardware, Uncertainty about the true effectiveness of EHRs, physician Belief of reducing the number of patient visits by using EHRs, and the concern of the complexity of working with EHRs can be mentioned as some reasons for physician resistance (21).

Existing governmental Regulations and Directives that control the operation of the healthcare environment have been affected by the constraints and characteristics of traditional systems based on paper. These regulations are unable to respond to the new conditions created by the new information technologies. In addition, many countries are still considering paper based medical records as a requirement for health care providers which make it difficult for them to eliminate paper from their operation environment. Therefore, the slow transition from paper medical records to electronic medical records can be considered as another challenge for acceptance and use of electronic health records (22).

Time commitment for success is another challenge to EHRs. Usually, Full implementation of EHRs does not result in short term and takes many years to roll out. Healthcare providers are not patient enough to wait so long for the full benefits of EHRs (23).

Electronic Health Records successful performance requires cooperation and acceptance electronic health records by real users, including physicians, nurses, CEOs, and other influential users in the field of healthcare. Users play an important role in the success or failure of EHRs. Therefore, taking into account the views and experiences of users along with their training before and after EHRs implementation can affect the success or failure of electronic health records implementation. Healthcare managers must understand the critical success factors and do not follow the acceptance and use of electronic health records through applying pressure on their employees. Bottom-up management can be challenging and encourage EHRs users to increase the use of electronic health records (24).

Today the relation between patient and physician is face to face. Electronic health records along with other concepts such as Tele-medicine and mobile health can change this type of relationship. Cultural and social customs in some developing countries are still willing to accept the old view of the relationship between patient and physician which can be considered as a barrier for advanced technologies and EHRs. Confidentiality of patient medical information could be known as another challenge for EHRs. Healthcare providers insist for confidentiality of patients' medical information and believe that internet is not a secure way of data exchange. On the other hand, there are patients who are very concerned about ethical and unethical use of their medical information and do not believe deeply the security promised by EHRs (25). Today, many organizations such as HIPAA seek to develop procedures and regulations to ensure the security and confidentiality of patients' medical records (21).

2. Evidence Acquisition

Two databases, PubMed and Scopus with Combination of terms such as Electronic Health Records, Developing Countries, Barriers, Challenges, Acceptance, and Adoption were searched. Totally, 514 articles extracted. Some exclusive criteria such as date of publication (year 2000 and above) and having a close relation to the subject of the study (through abstract) were applied. The result was 8 article from Scopus and 12 articles from Pub-Med. Also, 7 articles were extracted by general search in internet. Also, 11 articles with the same search policies were selected from Journal of Health informatics for Developing Countries (JHIDC) with no exclusion criteria.

3. Results

The study includes 31 articles that have considered barriers to EHRs as perceived by different health professionals. Eight main categories of barriers including infrastructures, Technical, Financial, Legal, Social, Organizational, change process, and time were identified. It is very important to realize that all mentioned categories are interrelated with each other. Developing countries interested in accepting and implementing EHRs must consider the experiences of countries which are successful in EHRs and also must accept a change in their health management perspective.

4. Conclusions

Electronic Health Records challenges and barriers in one developing country may differ from another one. But there can be some common issues which have major role in the successful acceptance and implementation of EHRs. Some of these barriers may cause the total failure and some slowing down the acceptance and implementation of EHRs. Some barriers are known local and some of them are considered global. A successful acceptance of EHRs can be done when it is considered both locally and globally.

Developing countries have to accept that the acceptance and use of electronic health records are faced with many challenge and barriers. The most important problem they are faced is that they have to allocate most of their valuable and limited financial resources for EHRs

while they do not have a codification national strategic plan and a clear and realistic goals regarding electronic health and in particular EHRs. Even though, Readiness for accepting EHRs is of great help, but developing countries must first define their own national vision, strategic priorities, and strategic initiatives of EHRs.

Developing countries, before any action, should define their objectives of investing and encouraging healthcare providers to invest and use EHRs. They must make it clear for themselves that what kind of health problems can be solved by EHRs and what will be the real position of EHRs in their health system. Also, they have to clear the ownership, custodian for codification of health data exchange protocols, accessing methods, developing medical terminologies, and medical services code words.

With regards to the type of challenges and barriers which were mentioned, particularly in funding the implementation cost of EHRs, the role of government will become very crucial. Governments can facilitate the acceptance and implementation of EHRs by sponsoring healthcare providers, providing appropriate loans for healthcare providers who are interested in using EHRs, introducing incentive packages, guiding the public opinion towards accepting inevitable changes in the traditional healthcare services, legalization paperless healthcare services, ensuring healthcare professionals of benefits of using EHRs, ensuring physicians of no reduction in their number of visits, and also the role of EHRs in reducing medical errors.

Developed countries such as Australia, Germany, and New Zealand have overcome many social and technical challenges and barriers of EHRs and have reached to a reasonable point of ICT and HIT. It is a good opportunity for developing countries to use the experiences of such countries in their way towards EHRs. Of course, developing countries must realize that the nature of their EHRs challenges and barriers may be totally different with those of developed countries. Healthcare models in developed countries may deliver high quality care but may be not cost effective for developing countries (26).

Electronic Health Records acceptance is a bottom up process. All major health players such as healthcare legislators, public health officials, healthcare providers, healthcare payers, physicians, clinicians, consumers, and EHRs vendors must be deeply involved. Physician's commitment and willingness to adopt EHRs is a key element for successful adaptation of any electronic medical system. Physicians and other healthcare providers must be convinced that EHRs are essential for their future healthcare services. It is also important that general public realize the effectiveness of new ideas such as the integration of their lifetime medical records.

It is important for developing countries to establish a Health Transition Authority Center (HTAC) for supporting the national vision for EHRs through defining and developing objectives, frameworks, priorities, health standards and health data exchange protocols. In fact, The HTAC coordinates the development and progression of centralized or decentralized interoperable EHRs through collaboration with healthcare providers, healthcare payers, EHRs vendors, and different level of health policy makers. Different work groups inside HTAC define and develop the communication backbone of the national e-health system, patient identifiers, health data exchange standards, medical terminologies and clinical vocabulary data sets, EHRs ontology, secure messaging and authentication, and also defining clinical processes such as referrals, discharge, pathology diagnostic, imaging, and medication management.

Technical and clinical standards and also structured data organization are essential for EHRs to interoperate in a meaningful way (27). EHRs vendors may implement their own developed technical and clinical standards in their products which results in systems that are not interoperable. This does not mean that they do not want to adopt standards, but it may be because of the lack of information they have regarding the existing certified standards. HTAC can coordinate EHRs vendors towards a national EHRs product. As an example, HTAC can introduce health information standards to EHRs vendors. HTAC can develop their own national health information standards, or consider the standards developed by other work groups such as HL7, Committee European de Normalization-Technical Committee (CEN TC), and American Society for Testing and Materials (ASTM).

Today, many studies conducted by Local or international health organizations in African Countries such as Kenya and Mozambique, indicates that providing and monitoring care for diseases such as HIV/AIDS requires complete and accurate documentation of patient visit information and test results, Data quality which is judged based on completeness, accuracy, and reliability plays an important role in efficiency of EHRs.

It is wise for developing countries interested to accept and implement EHRs to have a clear understanding of their expectations of EHRs. Full EHRs usually require entering a large volume of patient's data items which can be used for better healthcare services and monitoring the public health. Entering data is costly and time consuming. Therefore, health managers should pay attention to the type and amount of data they need. This will be a good guide for them in selecting suitable EHRs.

Acceptance and implementation of Electronic Health Records in developing countries is hindered by many barriers such as lack of well-defined national health strategy plan, weak economy constraint, un-suitable ICT and HIT infrastructures, cultural and social challenges, lack of health data exchange protocols, lack of medical terminology and vocabulary standards and code sets, and finally lack of ICT and HIT expertise. If developing countries want to appreciate the numerous benefits of EHRs and avoid the barriers they are faced, they do not need to

repeat everything from the scratch. They can save money and time by observing half a century successful experiences of EHRs progression in many developed countries. Understanding and realization of the society's healthcare delivery systems weaknesses that cause the high cost and scale down the progress, effectiveness, and coverage of healthcare services is the key factor of success for acceptance and implementation of EHRs in any developing country.

Electronic Health Records acceptance and implementation is not an easy task and needs new health regulations, new vision and methods of health management, ICT and HIT infrastructures, well informed and expert manpower, re-engineering of healthcare workflows, health data exchange standards, clinical vocabulary and medical terminologies code sets, money and also patience.

Acknowledgements

This study was supported and encouraged by DR. AR Razavi and Dr. SM Tara of medical informatics department at Mashhad University of Medical Sciences.

Financial Disclosure

There is no financial interest to disclose.

Funding Support

There was no funding support for this study.

References

1. World Health Organization . *Fifty-eighth World Health Assembly: Practical information for delegates of nongovernmental organizations (NGOs) in official relations with the World Health Organization (WHO).*: World Heal. Organ.; 2005. Available from: http://www.who.int/civilsociety/documents/en/CSI-NGO-WHA-05-1%20en.pdf.
2. Standard Country and Area Codes Classifications: United Nations Statistics Devision; Available from: http://unstats.un.org/unsd/methods/m49/m49regin.htm.
3. Gambo I, Oluwagbemi O, Achimugu P. Lack of Interoperable Health Information Systems in Developing Countries: An Impact Analysis. *JHIDC.* 2011;**5**(1):185–196.
4. Amatayakul MK. *Electronic health records: A practical guide for professionals and organizations.*: American Health Information Management Association Chicago, IL; 2004.
5. Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. *Ann Intern Med.* 2006;**144**(10):742–52.
6. Valdes I, Kibbe DC, Tolleson G, Kunik ME, Petersen LA. Barriers to proliferation of electronic medical records. *Inform Prim Care.* 2004;**12**(1):3–9.
7. *Crossing the Quality Chasm: A New Health System for the 21st Century.*Washington, D.C.: National Academy Press; 2001.
8. Erstad TL. Analyzing computer based patient records: a review of literature. *J Healthc Inf Manag.* 2003;**17**(4):51–7.
9. Azizi AA, Hasibian MR, Tara M. Systematic Review of the factors influencing the implementation And acceptance of electronic Health records.: 2012.
10. Poissant L, Pereira J, Tamblyn R, Kawasumi Y. The impact of electronic health records on time efficiency of physicians and nurses: a systematic review. *J Am Med Inform Assoc.* 2005;**12**(5):505–16.
11. *HIMSS Electronic Health Record Definitional Model.* 2003. Available from: http://www.himss.org/content/files/ehrattributes070703.pdf.
12. Wang SJ, Middleton B, Prosser LA, Bardon CG, Spurr CD, Carchidi PJ, et al. A cost-benefit analysis of electronic medical records in primary care. *Am J Med.* 2003;**114**(5):397–403.
13. Jensen RE, Chan KS, Weiner JP, Fowles JB, Neale SM. Implementing electronic health record-based quality measures for developmental screening. *Pediatrics.* 2009;**124**(4):e648–54.
14. Fleming NS, Culler SD, McCorkle R, Becker ER, Ballard DJ. The financial and nonfinancial costs of implementing electronic health records in primary care practices. *Health Aff (Millwood).* 2011;**30**(3):481–9.
15. Jha AK, DesRoches CM, Campbell EG, Donelan K, Rao SR, Ferris TG, et al. Use of electronic health records in U.S. hospitals. *N Engl J Med.* 2009;**360**(16):1628–38.
16. Hubner U, Ammenwerth E, Flemming D, Schaubmayr C, Sellemann B. IT adoption of clinical information systems in Austrian and German hospitals: results of a comparative survey with a focus on nursing. *BMC Med Inform Decis Mak.* 2010;**10**:8.
17. Yoon D, Chang BC, Kang SW, Bae H, Park RW. Adoption of electronic health records in Korean tertiary teaching and general hospitals. *Int J Med Inform.* 2012;**81**(3):196–203.
18. Miller RH, Sim I. Physicians' use of electronic medical records: barriers and solutions. *Health Aff (Millwood).* 2004;**23**(2):116–26.
19. Ouma S, Herselman ME. E-health in rural areas: Case of developing countries. *Int J Biol Life Sci.* 2008;**4**(4):194–200.
20. Watzlaf VJ, Zeng X, Jarymowycz C, Firouzan PA. Standards for the content of the electronic health record. *Perspect Health Inf Manag.* 2004;**1**:1.
21. Boonstra A, Broekhuis M. Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC Health Serv Res.* 2010;**10**:231.
22. Perritt HH. *Law and the Information Superhighway.* 2 ed: Aspen Law & Business; 2001.
23. Thakkar M, Davis DC. Risks, barriers, and benefits of EHR systems: a comparative study based on size of hospital. *Perspect Health Inf Manag.* 2006;**3**:5.
24. Coli LA, Surmenta L, Rotberg J, Marcelo A, Clifford G. Mobile Care (Moco) for Remmote Diagnosis and Screening (Electronic Version). *JHIDC.*;**3**(1):17–21.
25. Young P, Elul B, Maulsby C, Winchell D, Mavie B, Fernandes R, et al. Medical record completeness and accuracy at an HIV clinic in Mozambique, 2005-2006. *JHIDC.* 2010;**4**(2).
26. Saleem T. Implementation of EHRs/EPR in England. A model for developing countries. *JHIDC.* 2009;**3**(1):9–12.
27. Foundation of Research and Education of AHIMA . Update: maintaining a legally sound health record--paper and electronic. *J AHIMA.* 2005;**76**(10):64A–64L.