■ *Guest Editorial*

Electronic health records: advantages of use and barriers to adoption

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An Electronic Health Record (EHR) is a digital collection and retrieval of a patient's medical records. Widespread implementation of EHR systems decreases health care expenditures. In addition, EHRs improve patient safety, health care efficiency and outcomes. Lack of funding and interoperability of the available systems are probably the two most important barriers to widespread adoption. Additionally, the lack of a national information standard slows down its implementation.

Containing cost and improving efficiency are twin challenges of today's health care system. The US spends 17.6% of its GDP (8233 USD on health per capita in 2010) on health care.[1] Yet 16.7 percent (50.7 million) of the population do not have health insurance coverage of even basic primary care.[2] The Institute of Medicine (IOM) reported that over one hundred thousand people die each year from preventable medical errors in the US.[3] As per the IOM report, by decreasing preventable medical errors, adoption of EHR will help save lives. However, in a developing country like Nepal, it will take years to simply collect these kinds of data.

Nepal's economic fortunes could be greatly improved through increased utilization of its vast potential for tourism. Travelers' health issues should be managed immediately as they arise. It will not only improve the image of the country in the international arena but also increase the number of tourists because they feel safe traveling in the country. Considering the large number of tourists and other international travelers, visits to a hospital or clinic are quite common, particularly when the visitors fall sick. It makes international clinical data exchange not only useful, but necessary in assisting physician access to patient health information for precise assessments and pertinent therapeutic plans. Clinical data sharing between different health systems could be achieved by using interoperable systems. It is possible

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to share patient information across countries through international health data exchange as demonstrated in pilot test of Global Dolphin, the collaborative work of Zhejiang University in China and Kyoto University and Miyazaki University in Japan concerning the design and development of an international clinical data exchange system using medical markup language (MML).[4] This project clearly showed how medical data can be accessed internationally to maintain the integrity and continuity of patients' health information.[4] However, establishment of a super directory service across countries, data transformation, protection of privacy and security of data and language translation are important elements of achieving cross-border sharing of clinical data.[4] In this way, EHRs hold great promise not only to improve efficiency but to reduce the cost of health care as well, for those residing within the country and those visiting from abroad.

EHR include patients' demographics; medical history, examinations and progress reports of health and illnesses; immunization records; laboratory test results; radiology images (e.g. X-rays, CTs, MRIs); photographs from endoscopy or laparoscopy or clinical photographs; allergy lists; medication information including side-effects and interactions; evidence-based recommendations for specific medical conditions; records of appointments and other reminders; billing records; advanced directives, living wills and health powers of attorney; and multi-media (e.g. video, audio) files.

It is fair to state that EHR holds many promises: decreasing morbidity and mortality rates, improving continuity of care, increasing efficiencies, reducing adverse drug reactions, and more importantly, decreasing the cost of health care.

The US allocates more than 1.7 trillion dollars towards the health care industry.[5] Unfortunately, this has not translated into improved quality of health care. The US lags behind many industrialized nations in terms of delivering cost effective health care. Implementation expenses for EHR can be exorbitant. The total first-

year cost of electronic health record implementation for a five-physician practice is an estimated $233,297, with an average per-physician cost of $46,659.[6,7]

Net Medicare and Medicaid spending for bonuses and penalties would total $30 billion during 2011-2019.[8] These payments will include payments to providers and hospitals. Both of them have to demonstrate meaningful use of certified EHR. One of the meaningful use criteria is quality improvement. Larger hospitals with bed capacity over 500 could receive up to $6.1 million, whereas smaller hospitals could get up to $3.5 million in incentive payments.[8,9] According to the Congressional Budget Office projection, 25% more US hospitals will adopt an EHR because of this incentive program. Each provider could collect $44,000 (over 4 years starting 2011) from Medicare or $63,500 (over 4 years starting 2011) from Medicaid if they showed the evidence of certified EHR use as specified in the federal register and met the criteria for meaningful use. The cumulative cost of EHR adoption for 90% of the hospitals is 98 billion dollars; for physician practices, the cumulative cost is about 17.2 billion dollars.[2] Of course, one can easily understand why funding coupled with the uncertainty of return on investment remains a significant barrier for the EHR implementation Certainly one should be cognizant of the recurring costs of system maintenance and upgrades. Ongoing staff training is paramount for system upgrades. The financial benefit to the providers will be minuscule in comparison to payers and consumers. Therefore, most of the providers remain skeptical of benefits of EHR.

Financial barriers were viewed as having the greatest impact on decisions about the adoption of electronic health records according to the study conducted by DesRoches et al.[10] High levels of physician satisfaction and improvement of quality of care on several dimensions due to EHR deployment are some of the important findings of this study. Implementation of information technology certainly is expensive in the beginning. Hospitals with deep pockets could mitigate the financial burden of the many small to solo practitioners who lack funds (in spite of the incentives provided by the government) for the implementation of the EHR.

Change management is very challenging. Since it is a costly endeavor, sponsorship of the EHR implementation should start from the senior-level executives and physicians. The prior experience of those who were involved in the previous implementation should guide those needing help in this regard.

Perhaps physician reluctance in EHR implementation particularly from senior-level physicians is quite understandable. If one factors in the huge start-up and recurring maintenance costs, uncertain return on investment and system vulnerability to crashes, one can easily comprehend their logical skepticism. According to Jha et al,[11] the very low levels of adoption of EHRs in U.S. hospitals suggest that policymakers face substantial obstacles to the achievement of health care performance goals that depend on health information technology. A policy strategy focused on financial support, interoperability, and training of technical support staff may be necessary to spur adoption of electronic-records systems in any hospital.

Because of the lack of standards and interoperability, there is difficulty in transferring data for the purpose of continuity of care. This is a real hindrance in improving patient care because the very reason one would implement EHR at a huge cost is the ease of access of patient records to provide timely care. Besides incentivizing the physicians and hospitals for widespread adoption (as in the US), governments can outline industry standards and a common platform that allows all the systems in use to communicate with each other.

Increasingly, the practice of medicine will depend on electronic data. Safeguarding that data is very important to the success of medical practice. Computerized practice management and EHR technology have hidden expenses. But these costs are far less than the cost of being forced to scale back or shut down a practice because of a system failure. Therefore, a high degree of reliability in EHR server hardware is not only desirable but essential.[12] System failure not only costs the facility a lot of money but also creates safety issues and frustration.[13] Medical practice must be prepared for managing the consequences of system failure. Schackow et al advise the following tips for protection of patient data:

1. Data should ideally be continuously available 24/7/365 — even in the event of data loss, data corruption or equipment failure.

2. Data should always be secured against unauthorized access.

3. Everyone should be accountable when it comes to data protection and disaster preparedness.[12]

Ethically, beneficence and non-maleficence are assessed in what is called "Benefit–Risk Ratio" reasoning. It would be clearly wrong for a physician to set out to harm a patient, but it is almost inevitable that when a physician attempts to benefit a patient, by medication or surgery, some harm may ensue. Physicians must calculate this "ratio" and fashion it into a recommendation to the patient who evaluates it in light of his or her own values.[14,15] With EHR, we are talking about beneficence to society at large by helping physicians and hospitals prevent medical errors and thereby many deaths. Conceivably, technical glitches in the software, network or hardware or hackers with malicious intent will cause harm to patients from the use of EHR. Whether or not these harms will balance out the harms of not adopting the technology in health care is not well-studied.

EHR use showed improvement in quality of care in some studies.[16-18] Using EHR may still be prudent if benefits significantly outweigh harms. Moral questions regarding EHR systems should shift from obligations of adoption to that of proper use in future.[19]

Summary

In the twenty-first century we are at an interesting intersection of technology and health care. New technology in health care has translated into improved health outcomes. Lack of funding, national/international information standards and interoperability still remain the bottlenecks in the widespread adoption of EHR in both poor, developing countries and wealthy, industrialized ones. Private and public sector partnerships at the state and international levels will go a long way in mitigating these problems. Development of a robust infrastructure, maintenance of information privacy and security, and establishment of national and international standards are cornerstones for successful EHR deployment. Until then, EHR-based improvements in health care quality, access and costs will not be realized for the benefit of society at large. Benefits from innovation in health information systems will not be accrued until and unless there is universal adoption of a truly interoperable EHR on a global scale.

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