Guest Editorial: Compelling Issues in Telemedicine

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Recent and impendent changes resulting from the Health Information Technology for Economic and Clinical Health Act (HITECH) (part of Title XIII of the American Recovery and Reinvestment Act) of 2009 and the Patient Protection and Affordable Care Act (ACA) of 2011[1] offer unprecedented potential for telemedicine to play a significant role not only in reforming the current U.S. healthcare system but also in shaping innovative health systems of the future. There is much to be done, however, to realize this capacity in an optimal fashion. Needed is a better understanding of the potential roles and policy for telemedicine in facilitating the development of integrated, efficient, and effective patient-centered care systems, chronic disease management, and clinical outreach, as well as prevention and wellness programs.

Over the last several decades, policy initiatives, such as the Regional Medical Program and health maintenance organizations, have had limited success in advancing healthcare reform. But, the recent reform acts of 2009 and 2011 have provided renewed hope and reinvigorated reform efforts by relying on a complex of infrastructure development, provider incentives, and federally funded pilot programs. The development of the health information technology infrastructure is an apparently dominant source of optimism for achieving the desired change. In particular, the healthcare legislations of 2009 and 2011 have placed a heavy emphasis on electronic health records (EHRs) and personal health records (PHRs). Although EHR systems serve the information needs of healthcare professionals and facilities, PHR systems capture health data entered by individuals and are controlled by them. Several large health systems have "tethered" PHRs to their EHRs, thereby allowing patients to input data on their records that can be seen by their providers or to communicate directly and securely with their providers. PHR systems typically include tools to help individuals assume a more active role in their own health and health-seeking behavior, including decision-support capabilities and tools to assist in managing chronic medical conditions as well as wellness and preventive care strategies. These healthcare activities are strengths and central to telemedicine.

Malaysia was the first country to adopt a "Lifetime Health Plan"[2] incorporating a "lifelong PHR" for every citizen. It soon proved unsustainable as a public–private enterprise, and the managing company went into receivership. In the United States, the business model and functions of PHRs are still evolving. Some companies such as Microsoft (HealthVault) and Google (Google Health) have launched PHR efforts with limited success. (For an excellent analysis of PHRs versus EHRs, see Tang et al.[3]) The more promising model for the future adoption of PHRs, already implemented in some places, is to "tether" them to EHRs, as described above.

EHRs are owned and operated by doctors' offices, hospitals, and/or health insurance plans. Growing numbers of doctors' offices are using these systems, but they often limit patients' access to and especially control of their medical record. Moreover, EHR acceptance among large and small facilities, as well as private health professional practices, has encountered considerable resistance, despite incentives for adoption. All things considered, the potential benefits and challenges of EHRs vary by the setting in which they are implemented. For example, direct delivery and single-payer systems such as the Veterans Administration, the U.S. Military, and the Indian Health Service make their investments in EHRs (and telemedicine generally) on the basis of special benefits consistent with their missions. The considerations in implementation are rather straightforward for a single-payer system where one entity—usually a government-run or government-financed organization—collects all healthcare fees and pays out all healthcare costs.

Today, academic medical centers are being called upon to assume a much greater role in the total health experience of their clients, ranging from prevention to acute and chronic care and end-of-life care. They are offered tangible incentives for achieving positive health outcomes for their clients, and these outcomes are assumed to be linked with the use of EHRs and the development of integrated patient-centered systems of care. There are also disincentives for failing to perform at defined targets.

Much has been written on how EHRs and PHRs would improve healthcare quality and patient safety. Despite obvious benefits, such as ready availability of essential clinical information on patients at the point of need, start-up costs are considerable, at least for the foreseeable future. Furthermore, the learning curve is proving steep in many instances. Ultimately, the real impacts of health records depend on the effective and efficient use of the data. Solely implementing EHRs without a change in the organization and delivery of healthcare will likely increase cost without improving quality or access to care. Integrating EHRs with telemedicine systems is the optimal way to obtain added value from EHRs. So far, this has not happened.

Optimizing EHRs and PHRs for telemedicine applications seems prudent. Nonetheless, implementations of EHRs often make it cumbersome to transfer control of a patient record to providers outside their systems. At the same time, Meaningful Use (MU)[4] is a HITECH Act incentive program aimed at promoting the use of certified EHRs.

In particular, the MU initiative is designed to engage patients and their informal caregivers in their own care and to improve care coordination and public health (i.e., preventive health and wellness) while maintaining privacy and security of patient health information. Yet, while these are rapidly becoming major telemedicine functions, to date, telemedicine has not been explicitly linked to MU development incentives, even at the third and last stage of MU implementation, albeit electronic communication with patients is included in stage 2 and more likely in stage 3.

Similarly, the concept of health information exchange (HIE) as a source of aggregated digital records is likely to spur further development of telemedicine. HIEs assume that access to the EHR at the point of need for care will facilitate continuity of patient-centered care when rendered by multiple providers within a region or a state. With the appropriate interfaces, an HIE can aggregate patient data from a variety of EHRs. If deemed desirable, an HIE link can be embedded in an EHR as a single sign-on without leaving the native EHR or having to go through a separate portal. Hence, the HIE is designed to enable the electronic sharing of patient health-related information across participating provider entities within a specified exchange. However, the question of uniform decision-making (based on evidence-based medicine) and standardized protocols (for diagnostic tests and medical procedures) must be addressed. Accordingly, the HIE concept, like the EHR, is an important step forward in developing telemedicine systems. But, in defining the development of HIEs, the reform acts fail to embrace fully the requirements for telemedicine's information exchange and transparency. Telemedicine systems require an integrated flow of information (between providers and clients in both directions), care coordination (at various levels of care), and optimal resource use in a transparent way.[5]

Enter the concept of the accountable care organization (ACO), which builds on its precedents, the health maintenance organization and pay-for-performance programs, by making the provider of care "accountable" for the provision of comprehensive services to a defined Medicare population and for their outcomes. The ACO is aimed at care coordination, patient safety, preventive care, and care management for patients with chronic illness. It remains to be seen whether the subversion of health maintenance organizations' original and laudable goal of "health maintenance" will be repeated in the case of the ACO. Nonetheless, proper accountability has to be based on reasonable attribution of responsibility, and health systems cannot be held responsible for all suboptimal or adverse health outcomes, especially when they treat high-risk populations or when their clients are not fully engaged in their own care. Indeed, health outcomes cannot be solely or even predominantly attributed to provider interventions, especially in chronic illness. Patient-derived data (from monitoring devices, self-entered information, or corrections to doctors' notes) must be utilized to extend the reach of health systems while also holding patients accountable for their health outcomes (Joseph Kvedar, personal communication). Yet, here again, as with the EHR and MU, the discussion of the ACO has been devoid of any mention of or connection with telemedicine as a major player in the implementation scenario.

Whereas connectivity remains a core function of telemedicine, in the new environment, the domain of telemedicine is no longer limited to connectivity between patient and provider or among providers, as addressed in the recent reform legislation. We are at the threshold of a new environment in which telemedicine, broadly defined, must be an essential part of mainstream healthcare if patients are to receive the appropriate care (based on clinical need and evidence-based medicine), at the appropriate site (closest to where they live and work aided by electronic links), by the appropriate provider (based on explicit and rational triage criteria), while avoiding duplication and waste (using uniform protocols for diagnostics and procedures). However, this prodigious task can only be achieved through a deliberative process of developing *telemedicine systems* that incorporate and integrate the core elements of healthcare reform, namely, EHR, MU, HIE, and ACO.

The gradual implementation of these HITECH and ACA provisions gives us an opportunity to think carefully (yet expeditiously) and plan ahead in designing optimal systems that achieve the multiple goals of enhancing quality, improving access, and containing cost. Just as a computer network requires a "backbone infrastructure" to interconnect various pieces and provide a path for the exchange of information between local and wide area networks, so too does the ACO. If properly constructed, a full service telemedicine network would provide the foundation for a successful ACO. It would introduce the necessary organizational change in the delivery process rather than simply making the old system operate electronically. Without telemedicine, the systems will not be optimized in terms of the geographic flow of information, physician education from place to place, or patient engagement in their own care. From this perspective, the telemedicine enabled ACO is the embodiment of a virtual full-service integrated healthcare network. The EHR is a necessary tool but not sufficient for the effective and efficient integration of primary care and prevention, acute care, chronic disease management, and rehabilitation, as well as specialty and end-of-life care.

The recent healthcare reform legislation has targeted needed changes in the integration, effectiveness, and efficiency of the medical care system through financial incentives for ACOs, bundled care, patient engagement, and medical care homes. Enabling these and related programs through deep-seated changes in the healthcare information infrastructure forms the core of current policy optimism. An optimal change involves much more than the EHR. It involves systems that integrate the flow of information, coordinate care, and engage patients, as well as promote a healthy life style. Telemedicine must be an essential part of the reform process, and it should play a major role in the way these solutions are structured.

It is time to think boldly about the current health reform legislative environment and the unprecedented opportunities for not simply promoting the diffusion of telemedicine but, much more importantly, to establish telemedicine as an integral component of a more rational healthcare organization in this country. Given the pervasive "mixed-modality" and suboptimal nature of the health system in the United States, including differential access to an unbalanced mixture of private and public payers, providers, and systems, only marginal improvements in efficiency and effectiveness can be achieved unless

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telemedicine moves to the forefront, in concert with other health information technologies, in planning the health system of the future.

Postscript: *In preparation for writing this editorial, I solicited comments from a few thought leaders in telemedicine. I asked them to list the top five hot button topics in telemedicine. I wish to acknowledge the following individuals who gave me valuable insight (in alphabetical order): Dale Alverson, Elizabeth Krupinski, Joseph Kvedar, Thomas Nesbitt, Sherilyn Pruitt, Tim Reardon, Gary Shannon, and Peter Yellowlees. They concurred on the importance of achieving the vision of technology-enabled healthcare" (Nesbitt) and the need for coordination with the EHR and "patient-centered medical home" (Kvedar). I wish to thank them for their thoughtful contributions. However, I may have interpreted some of their ideas freely, and also introduced many of my own in response to their comments. Hence, the final responsibility for any ideas expressed in this editorial is entirely mine.*

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