Electronic Records in Health Care

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Health care can be studied from many viewpoints. Using information as the primary way to examine our health care system has lately been on the agenda of national health care policy. Physicians need to process large amounts of data into information to make clinical decisions. Public health practitioners need to aggregate heterogeneous data at population levels to prevent and detect epidemics. Health care policy makers need to use a variety of secondary databases as evidence for policy making. How can we ensure the right health care information is accessible to the right person at the right point in a timely manner? At this moment, the only solution to the question is to digitalize the information and share it on a secure, networked information system. Electronic health records (EHRs) offer one such solution by providing a platform for acquisition, storage, access, analysis, and presentation of health data. Electronic health records systems are touted as one of the keys to a new health care system that provides quality and cost-effective care.[1-6] President George W. Bush set a goal of making the use of electronic health records universal by 2014.[7] Various initiatives have been implemented across the health care spectrum from federal to community-level programs.[8,9] Studies demonstrate the promising effects of EHRs on controlling cost, enhancing quality, and reducing medical errors.[5,10-13]

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We are currently in a transition period in that many health care facilities are upgrading their paper-based record systems to electronic health records systems. Among the many functions of health records, documenting patient care over time is the most essential. To deliver quality care, providers need timely and accurate data on a patient's current and past medical history which may include findings from physical examinations, laboratory results, insurance, and other sources. This situation is made more complex due to increased life expectancy and the shift of the disease delivery model from acute care to chronic care. More data and information are created in the process of caring for a patient with complex, often multiple, diagnoses. Patients with chronic diseases often visit multiple providers and take multiple medications. It is cumbersome for doctors to go through the process of acquiring data from various sources in order to make the right diagnosis, perform the right procedures, and prevent medical errors. Even if practitioners obtain all of the data, they need enormous logistical and technical assistance in order to link it together.

Data in health care, especially patient-based clinical data, have long been entered and stored on paper. Paper records usually allow practitioners to record information in a semi-structured, free-text format. One weakness of paper records is that the information recorded there can be accessed by only one person at a time at one location. Sharing paper records is cumbersome and cost-inefficient. More importantly, it presents a challenge to aggregate all the data from different sources in order to find patterns which are often used in health policy analysis.

A consensus national priority is to establish a networked EHR system that shares the integrated information of each individual at the point of care. To achieve this goal, a totally automated EHR system is needed at each health care institution. More importantly, these institutions should have the capacity to share information with others. This commentary offers more detailed information about EHRs and their value as a data source for health policy, as depicted by Greene in the issue brief of this journal.

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Definitions

Historically, many terms have been used for the concept of an EHR system.[14] The electronic medical record (EMR) is a term often used interchangeably with EHR. The key conceptual difference between EMR and EHR is the owner and location of the record. Electronic medical records are usually included in a local clinical data repository used to support clinical operations. They are usually owned by an individual health care provider and are often accessible to the patients who are the customers of the health care provider. Electronic health records refer more to an overarching system based on information shared by individual care practitioners regardless of practitioner specialty, type of care (eg, inpatient, ambulatory), or location of care. Electronic medical records are often practitioner-oriented while the EHR is patient-centric and supports coordinated care. More importantly, the concept of EHR goes beyond episodic care in health care facilities by providing not only a comprehensive medical history (when patients interact with practitioners) but including patients' own records of their health status (when patients don't interact with practitioners). So, even an EMR system in an integrated delivery system is not equivalent to an EHR system because it does not contain the entire picture of a patient's health status.

Electronic medical records and EHRs are interrelated. Successful EHRs rely on EMRs as the data providers to construct different segments of the individual's health history. The key for the success of patient-centric EHR systems is for each EMR system to have the capability to share data in an automated and error proof way. Because a patient may have different records located in different EMRs, accurately and efficiently linking all the records together is a challenge because there is no existing centralized patient index. Such sharing is called health information exchange.[15]

To undertake the task of health information exchange, two solutions are being implemented by the Office of the National Coordinator of Health Information Technology. One is to build a national health information network which enables providers to access needed patient-related information. The US government is currently promoting a bottom-up, market-oriented approach by advocating regional health information organizations (RHIOs) as the foundation of a national health information network. Stakeholders within each RHIO will share data with their own selection of network and information architecture. The North Carolina Healthcare Information and Communications Alliance (NCHICA) is coordinating an effort to create a regional health information organization in North Carolina. Sharing data among regional health information organizations will complete the national health information network.

Fully functional regional health information organizations and national health information networks rely on information interoperability, which has a long way to go.[16] The other solution to health information exchange is to let patients manage their own personal health information using tools like personal health records. The American Health Information Management Association defines personal health records as "a collection of important information about your health or the health of someone you are caring for (such as a parent or child) that you actively maintain and update. The information comes from your healthcare provider and from you."[17] It is not necessary to have only the encounter data stored in the personal health record. Ideally, patients also would record data related to their health status such as weight, diet, and exercise routines. A successful personal health record system should have interfaces to all the EMR systems in which patients have data footprints.[18,19] Microsoft recently started a Web-based personal health record that allows consumers to store their health records online and share them with their designated providers.[20]

Electronic Health Records and Health Policy

The advocates of EHRs believe they are integral to controlling the cost, improving the quality, and increasing the efficiency of health care. These benefits are largely at the direct patient care level. There also are important benefits to health policy makers at a system level. As Sandra Greene defined in her issue brief, "health policy provides the direction, specifications, and building blocks that define our health care system." As such, EHRs could systematically be used for quick data collection and policy dissemination in health care.

Electronic Health Records As a Data Source for Health Policy

The EHR has primary and secondary usages. Examples of primary usage of EHRs include informing and supporting direct patient care, management support, financial and administrative processes, and patient self-management. Secondary usages of EHRs include education, regulation, research, public health policy, homeland security, and policy support.

The medical or clinical encounter record, whether in paper or electronic format, is the primary data source in health care because it contains specific data pertaining to a specific patient. Primary data sources, after de-identification and aggregation, are the raw inputs to the secondary data sources that are used in health care policy making. For example, a cancer registry is a secondary data source that collects data related to cancer diagnosis and uses it for monitoring patterns of cancer cases in the US. After a patient is diagnosed with cancer, demographic data, occupational history, and administrative and pathological data will be recorded into a facility's cancer registry. The information is then sent to state and national registries. The process of data collection historically relied on manual chart review and reporting due to the paper-based record environment. In an EHR system, data collection is simplified by querying a well-structured database. Moreover, it accelerates the data transmission from an individual facility to a state or national registry. The National Program of Cancer Registries' Modeling Electronic Reporting Project (NPCR-MERP) is an effort at the Centers for Disease Control and Prevention to enable cancer registries to obtain most cancer data electronically and to produce more complete, timely, and accurate cancer surveillance data.[22]

Electronic health records may not necessarily reduce the burden of data entry; however, they will largely facilitate data retrieval and analysis. For example, drug recalls in the past required nurses to manually review patient charts at one facility to find all patients who had the drug on their medication list. In the electronic health record environment, it would take a fraction of the time to query a database in order to identify these same patients.[23] Because EHR and personal health records systems are patient-centric and health-oriented, they make it easy to collect data that would be hard to collect from paper records. For example, the Behavioral Risk Factor Surveillance System (BRFSS) collects data from telephone surveys. If the BRFSS survey is implemented as data elements in an EHR or personal health records system, the data can be easily collected electronically. Ball and Gold[24] proposed a Health Record Bank model that provided patients the power to share their health data with researchers. This would expand the scope of health policy data collection from clinical care to health status.

Electronic Health Records as a Distribution Vehicle of Health Policy

The other implication of EHR for health policy is that health care providers can be informed of important policy by integrating health policy with EHR systems. The Institute of Medicine of the National Academies defined 8 core functions of EHRs in *Key Capabilities of An Electronic Health Record System: Letter Report:* (1) health information and data; (2) results management; (3) order entry/management; (4) decision support; (5) electronic communication and connectivity; (6) patient support; (7) administrative process; and (8) reporting and managing population health.[25] The functions of administrative process and reporting and of managing population health could be used as the leverage points for implementing health policy at the practitioner's level.

Improvements in health care, once verified, need to be disseminated quickly to individual practitioners to be effective, especially at the point of care. This could consist of reminders generated from guidelines related to preventive public health interventions. Many studies have demonstrated that relevant, integrated reminders in EHR could increase the level of compliance with accepted health care guidelines or policies. Alerts could include important information about disease outbreaks or important medication updates. When available, information could be extended to providers on applicable public health interventions, preventive medicine, or disease management.

In the event of a health event affecting a large population, a key activity of health policy is to notify practitioners and patients about available actions to prevent a disease or reduce its impact at the individual and the community levels. Electronic health records can facilitate such intervention in several ways. First, they can provide decision support that enables the implementation of a public health intervention directed to the patient at the point of care. Additionally, they can be a means to inform clinicians of health policy updates. Ultimately, they can provide necessary education to both practitioners and patients.

As mentioned above, EHRs also offer the opportunity to improve policy compliance by incorporating policies, or rules, into the EHR system. Because each EHR system should have decision support capability, transforming health policies—particularly those for disease prevention and management—to unambiguous knowledge representation modules will systematically standardize treatment of consumers at the point of care. For example, the use of reminders in an EHR system increased the number of mammograms, glycosylated hemoglobin tests, and varicella and influenza immunizations for persons with diabetes.[26]

Many barriers remain on the way to having a universal electronic health records system by year 2014—notably lack of initial financial support, misaligned incentives, and missing business models for sustainable health information exchange.[17,27] The US Department of Health and Human Services has recently started a 5-year project to encourage small and medium-size medical practices to adopt EHR systems by providing bonuses to participating practices that adopt certified electronic health records.[28] There is still a long way to go to before there is an EHR system that can store the entire health history of a patient and provide instant access to those who need the information. Until then, the benefit of electronic health records to health policy will not be fully realized. **NCMJ**

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