Upcoming Issues of *Virtual Mentor*

April: The "R" Word—Ethical Allocation of Medicine's Services
May: The Country Doctor
June: Allopathic Medicine's Interface with Comparative and Alternative
        Treatments
July: Physician Authors

Virtual Mentor

FROM THE EDITOR
Some "Face Time" for Health Information Technology

According to a report released by the Office of Science and Technology Policy of the Executive Office of the President and the President's Council of Advisors on Science and Technology, "information technology has the potential to transform health care as it has transformed many parts of our economy and society in recent decades" [1]. Further, the Health Information Technology for Economic and Clinical Health Act (HITECH) of 2009 seeks funding of up to $20 billion from the American Recovery and Reinvestment Act of 2009 (ARRA) to promote adoption of health information technology use in the U.S. While questions about the implementation of HITECH and ARRA remain, the importance of adopting and utilizing available technology and, in fact, seeking to perfect unavailable technology has been widely accepted. In the end, the primary goal for implementing health information technology is improved quality of health care for individual patients.

As with widespread use of any technology, be it medical records or CT scanners, ethical concerns are sure to arise, and in this issue of *Virtual Mentor* we attempt to pinpoint, define, and explore those aspects of HIT that create the potential for ethical dilemmas.

The issue begins with a series of case studies drawn from doctors' real experiences. Deborah D. Nelson, MD, comments on the far-too-common problem of physicians' "selective editing" in electronic medical records (EMRs) and the harm this practice can cause, especially if a physician is caring for more than one patient with the same diagnosis. In a desire to become more productive, a resident is "forced" to copy and paste notes and recommendations from one chart to the other. A cut-and-paste error results in a pediatric patient being given an incorrect and potentially nephrotoxic medication. The resident is to blame, but Dr. Nelson remarks upon the ethics of using an HIT system that makes cutting and pasting possible. This month's clinical pearl arises from that medication error. Jennifer P. Rudine, PharmD, a clinical pharmacist in Memphis, Tennessee, and I review vancomycin and its potential danger to pediatric kidneys.

In the second case, Stephen T. Miller, MD, and Rexann G. Pickering, PhD, CIP, RN, look at how the ability to mine data rapidly for research purposes in the age of health information exchanges invites lapses in informed consent. They cite the infamous Tuskegee and the Nazi experiments as examples of "scientific curiosity" pursued in the absence of consent to underscore the necessity of securing it, even when merely mining preexisting data.

In the third and final case, Nabeel Farooqui, MD, provides insight into a physician's use of health information technology to enhance his income by retrieving database information on prospective patients and selecting only those who are compliant and insured or timely payers. As health care professionals, we must support ourselves financially, but Dr. Farooqui questions whether this is an ethically acceptable way of going about it.

As we move forward, it is informative to glance back occasionally to understand why changes were needed to our recordkeeping systems in the first place. Jim Atherton, MD, a resident physician in pediatrics at the University of Tennessee, looks at the historical development of the medical record.

Health information technology not only means better exchanges of information and data between care providers, but also describes an area of medicine that is fairly new—clinical decision-support systems and bioinformatics. Clinical decision-support systems (CDSS) provide physicians with computer-based medication, testing, and laboratory recommendations. Standardizing evidence-based recommendations contributes to quality health care and minimizes treatment discrepancies across populations. James B. Lewis, MD, and Kathryn Ryder, MD, MS, both residency program educators, describe the educational value of CDSS and bioinformatics and look at the threat of cookbook medicine, wherein residents might order certain labs and meds without knowing the significance of those tests and treatments for their patient.

The term "meaningful use" has garnered much attention lately, due to the availability of federal funding and increased payments from government payors for clinicians who develop and implement HIT in a meaningful way, that is, in a way that improves quality of care. In the policy forum section, former Robert Wood Johnson clinical scholar Stephen T. Miller, MD, and Alastair MacGregor, MB ChB, MRCGP, explain what counts as meaningful use of HIT under the American Recovery and Reinvestment Act. Health law expert Howard Burde provides an overview of the HITECH Act's provisions.

A critical aspect of quality care is patient safety, and this, too, is an area where HIT has a role to play. Angeline Wang, second-year medical student at the University of Michigan, reviews a recent article in the *New England Journal of Medicine* on reduction of medication errors effected by use of bar-code technology. In a second journal article related to safety and reporting of adverse events, Timothy Hotze, senior research assistant at the American Medical Association, reviews an article that appeared in the *Journal of Health Information Management Association* on how to assess the harm done to patient confidentiality by a breach in data security.

Our medicine and society piece this month is written by James E. Bailey, MD, an HIT expert with particular interest in how health information exchanges can improve management of chronic disease. Here he looks at the perennial concern over the

dehumanization of medicine and concludes that today's technological innovations may, in fact, further humanize health care.

Finally, we have two op-ed pieces this month that deal with the potential advantages and possible pitfalls of implementing HIT. Alon B. Neidich, a second-year medical student at Tufts University in Boston argues that HIT implementation is a necessary step in providing twenty-first-century care. Kenneth Robertson, MD, MBA, draws on his personal experiences to state that, while information technology is needed and a great tool for health care, ethical slippery slopes exist.

We attempted in this issue of *Virtual Mentor* to give the ethics of technology and its impact on society more "face time" (paradoxically) than it has heretofore had.

References
1. President's Council of Advisors on Science and Technology, Executive Office of the President. *Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward*; December 8, 2010. http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-health-it-report.pdf. Accessed February 17, 2011.

Anthony C. Rudine, MD, MBA
PGY-3
Internal Medicine and Pediatrics
University of Tennessee in Memphis

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

American Medical Association Journal of Ethics
March 2011, Volume 13, Number 3: 144-147.

CLINICAL CASE
Copying and Pasting Patient Treatment Notes
Commentary by Deborah D. Nelson, MD

Dr. McGill was the first physician in his family. Success was never easy for him, but his perseverance was legendary in his undergraduate and graduate days; he was known for studying more, arriving earlier, and staying later than anyone. Early in the course of his pediatric residency, however, he began to experience problems with efficiency. As the patient population he was responsible for each day began to grow, he became more and more overwhelmed with his duties. On more than one occasion, he arrived at rounds not having seen all of his patients, written orders, or checked the daily labs.

The breaking point occurred when he arrived for rounds looking disheveled and unkempt and informed his attending that he simply did not go home after his call day, in order to have sufficient time to round on his patients and write their notes. When asked why he was unable to keep up with the demands of his patients and the daily tasks, he explained that the daily progress notes took up the majority of his time, many hours a day.

Only then was he informed that it is common practice for residents to simply copy and paste the previous examination, assessment, and plan to the following day's notes, only editing if any changes need be made. Because his home institution did not use electronic medical records, he had been unaware that "selective editing" was possible, appropriate, allowed, or even ethical. Now he agreed to selectively edit his daily notes and immediately saw his efficiency of long ago returning.

Unfortunately, a short time later, he transcribed some recommendations on the wrong note. He copied recommendations for one of his pediatric patients with staphylococcal cellulitis to a similarly afflicted patient—who also had renal disease. When the patient with renal failure was written for scheduled vancomycin therapy rather than pulse dose, it caused a rise in creatinine and the patient required a prolonged hospitalization.

Commentary
The modern medical record is quite different from that first one recorded by Hippocrates. The medical record of today is not only a clinical record to inform other physicians and health care workers of our finding, thoughts, and plans; it is also used as a legal document in the event of a malpractice claim or occupational injury, as support for billing payers for reimbursement, by hospital review committees for quality assurance and improvement, and for data collection in support of research.

The electronic medical record (EMR) has many benefits over the handwritten entries in a paper chart. EMR entries are always legible, they are dated and timed, and patient information can be available both at the point of care and remotely. Some EMR systems include computerized physician order entry and decision-support tools designed to improve patient care and safety.

While these features can save physician time by providing easy access to masses of information, they do not necessarily save time in the day-to-day entry of patient encounter notes. More than two-thirds of internal medicine residents who completed a survey reported that they spent in excess of 4 hours daily performing documentation tasks, while only one-third spent that amount of time with patients [1]. Adding this to the ACGME restriction on work hours, it is understandable why a busy resident would try to find ways to enter information into the EMR more efficiently. Efficiency, though, must not compromise patient care or the educational experience.

Copying and pasting of information within the EMR is one of the time-saving tactics seen in many medical centers. An electronic search of medical records found that the practice was common, though it varied with level of training. Copying of one's own notes was most common at the level of intern, and copying others' notes peaked among residents [2].

The practice takes many forms. Large sections of a note can be copied without change from one day to the next during a hospital stay; notes can be copied forward adding any new information from day to day, creating running notes, one provider can copy part of the note of another provider; and notes can be copied from one patient to the next. It is known by several terms: "copy and paste," "copy forward," and "cloning," among others.

Despite its widespread use, copying and pasting of notes raises a number of ethical issues. It has been shown to produce notes that are confusing, increasingly lengthy, uninformative, disorganized, internally inconsistent, misleading, or lacking in credibility and may introduce and propagate errors that can place patients at risk [2-6].

As a clinician educator, I am concerned about the loss of a major educational opportunity. Writing notes is a means of documenting history-taking and exam skills and the thought process that culminates in an assessment, differential diagnosis, and a plan of evaluation and treatment. Writing the daily progress note is an important training tool by which residents experience and internalize the cognitive processes that constitute medical reasoning and analysis, and it is a means for a learner to demonstrate the development of these skills.

Who is responsible for this error? Patient safety is a concern that we in health care must address. The focus of the current patient safety movement is on teamwork and

systems, as opposed to the historical risk-management model, which focused on individual human error. This case involves both human error and systems failure.

Dr. McGill certainly bears responsibility for his actions, including the presumed carelessness that resulted in harm to his patient. He had been told of the "copy forward" practice as a time-saving strategy. He took that practice another step, copying notes from one patient to another. This even more risky practice introduced the original error that resulted in harm to his patient.

Dr. McGill should be learning and practicing the critical thought processes that will enable him to write concise, focused, informative notes—which will save him time for years to come. His professional responsibility is to strive for the highest standard and not allow himself to fall to the lowest common denominator. His goal is not just to get a note on the chart; it is quality patient care.

The attending physician who encouraged this risky strategy also bears significant responsibility. It is of great concern when an attending physician or senior resident instructs a junior trainee to take shortcuts, particularly one that has been shown to confer significant risk to the patient. Was the attending physician clear about the need to carefully edit notes that had been copied forward? Did the attending properly oversee Dr. McGill, who had already demonstrated difficulty coping with the stress and demands of his patient care responsibilities? Is the attending teaching and modeling proper note skills?

What responsibility does the hospital bear in this situation? The hospital certainly shares responsibility for any system failures that resulted in harm to a patient in its facility. A fully functional computerized physician order entry (CPOE) system should have prevented this medication error from reaching the patient. In the absence of CPOE, was there a policy for a pharmacist to double-check orders for possible medication errors? Are there other systems in place to prevent them?

The hospital and the medical staff are jointly responsible for the trustworthiness of their medical records. Together they have an obligation to foster a culture that upholds the highest standards of patient care and quality. In systems that allow notes to be copied and pasted, there is a responsibility to audit the medical records to ensure their integrity. That said, I disagree with those who have advocated for removing the copy and paste functions from medical record systems. The ability to easily copy information is one of the major benefits of an EMR and can save much time and typing. The problem is not with the technology, but with how it is used and what information is copied. Copying usually static information such as demographic information, drug lists, and previous medical history is OK if the information is independently verified.

Somewhere in the process of checking template boxes, typing, clicking dropdown windows, cutting, counting, copying, and pasting, we have lost sight of the original purpose of the daily progress note—to succinctly communicate our findings,

thoughts, and plans. This is even more vital as house staff work hours are further reduced and patient handoffs increase. To this end, it is crucial that note quality in EMRs be high.

References

1. Oxentenko AS, West CP, Popkave C, Weinberger SE, Kolars JC. Time spent on clinical documentation: a survey of internal medicine residents and program directors. *Arch Intern Med*. 2010;170(4):377-380.
2. Thielke S, Hammond K, Helbig S. Copying and pasting of examinations within the electronic medical record. *Int J Med Inform*. 2007;76 Suppl 1:S122-S128.
3. Hirschtick RE. A piece of my mind: copy-and-paste. *JAMA*. 2006;295(20):2335-2336.
4. Hammond KW, Helbig ST, Benson CC, Brathwaite-Sketoe BM. Are electronic medical records trustworthy? Observations on copying, pasting and duplication. *AMIA Annu Symp Proc*. 2003;269-273.
5. Siegler EL, Adelman R. Copy and paste: a remediable hazard of electronic health records. *Am J Med*. 2009;122(6):495-496.
6. Embi PJ, Yackel TR, Logan JR, Bowen JL, Cooney TG, Gorman PN. Impacts of computerized physician documentation in a teaching hospital: perceptions of faculty and resident physicians. *J Am Med Inform Assoc*. 2004;11(4):300-309.

Deborah D. Nelson, MD, is an associate professor at the University of Tennessee Health Science Center in Memphis. Her principal research interest is resident education.

Related in VM

Vancomycin in the Treatment of Pediatric Staphylococcal Infections, March 2011

Decision-Support Systems in Medical Education, March 2011

The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental.

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

CLINICAL CASE
Use of Electronic Patient Data in Research
Commentary by Stephen T. Miller, MD, and Rexann G. Pickering, PhD, CIP, RN

A recent graduate of a large internal medicine residency program, Dr. Smith is beginning her infectious disease fellowship at a top-notch program. As a person who has lived with the HIV virus her entire life, she has a particular interest in infectious diseases—specifically, HIV and HIV transmission. She chooses to focus the research project required for her fellowship on HIV transmission to neonates.

As a physician and a patient, the importance of privacy is not lost upon her, and she chooses to pursue a fellowship in a program that shares her views on privacy and confidentiality. In fact, her program has recently purchased and implemented a new electronic medical record system for patient data.

Dr. Smith is most interested in the soon-to-be mothers and their unborn children. Over the course of her first few months in fellowship, she begins to collect data on HIV-positive mothers and retrieves information regarding the HIV status of their newly born children through her hospital's electronic health records. While HIV incidence and fetal transmission are well known from a public health standpoint, no specific data exist for her particular community or the hospital's patients. Although newborn HIV testing is mandatory at her hospital, treatment of an HIV-positive mother is not. Dr. Smith begins to gather data on HIV-positive mothers and transmission to their infants. She wishes to be able to provide more accurate information to her future patients about the incidence of HIV transmission to newborns in her community.

A few months after beginning data collection, Dr. Smith is approached by one of her colleagues, who has become aware of the project and is concerned that it is unethical to collect and compile existing data without obtaining informed consent from the participants.

Commentary
The hypothetical Dr. Smith has fallen into the trap that has led many past investigators to violate ethical principles in pursuit of scientific goals. Dr. Smith has a disease and she wants to protect others from getting it by collecting clinical data. She can do that without troubling the subjects because the data already exist. All she has to do is to look at patient records. The patients actually come to the clinic where she works. Although they may not be her own patients, they are hers inasmuch as she is a professional caregiver in the clinic. As a result of the project, Dr. Smith will be

able to give her patients better information about HIV transmission from pregnant women to their newborns.

With such laudable aims to this project, why do we have ethical concerns about Dr. Smith's project?

Scientific interest is not a justification for violating ethical principles of autonomy and nonmaleficence. The acts of Nazi doctors in the 1930s arose originally from scientific queries rather than political motives [1]. The research at Tuskegee [2] and other instances of inappropriate research on vulnerable populations [3] were largely undertaken out of scientific curiosity.

Mining electronic medical records for data might be viewed as less harmful than the egregious insults on vulnerable subjects, but Dr. Smith's project involves a violation of privacy and, as such, of patients' autonomy. That is why there are clear and distinct ethical, professional, and legal guidelines for the collection and use of data from medical records.

Dr. Smith might argue that her project is more along the lines of a patient-care registry. Registries are useful quality-improvement tools in clinical care, particularly for patients with chronic conditions. Registries made from electronic medical records are one of the "meaningful use" objectives of new health care reform legislation. Dr. Smith, however, is mining the medical records to complete her fellowship requirements, not principally to improve patient care.

Restarting the Project Properly
Clear guidelines exist for initiating a project in data mining. First, Dr. Smith must inquire whether her clinic or institution has procedures in place for mining electronic medical records. She should determine whether the clinic's patient consent forms for medical care include the provision that registries for patients with particular medical conditions may be made or electronic data searches may be performed. She should scrutinize those procedures and consents to make certain that the records of patients who declined inclusion in the registry or searches are left out. If Dr. Smith does not find adequate procedures for inclusion and exclusion in electronic data mining at her institution, she should work to put them in place. That would be a superb project for a beginning investigator.

If her clinic has appropriate procedures, they will include oversight by an institutional review board (IRB) for research activities, including both data mining and interventional research. Any investigator or educational program requiring research should be well-versed in IRB policies for medical record reviews.

Relevant Policy
Collection of data from medical records for research purposes—specifically the creation of a database—is permitted under criteria established in the Code of Federal Regulations (CFR) [4]. If data were collected solely for nonresearch purposes, such

as medical treatment or diagnosis, the project will meet criteria 5 for expedited review by the IRB [5].

IRB approval of creation of a registry does not, however, provide approval for using data from the registry in other research projects. Each project is considered a separate research study, and each study needs IRB approval.

Dr. Smith's project involves protected health information, which can be used to identify an individual. The Health Insurance Portability and Accountability Act of 1996 (HIPAA) lists 18 individual identifiers, including names, medical record numbers, social security numbers, license or beneficiary numbers, all dates related to identification of an individual except year of birth, and any address information more specific than state [6]. Due to the sensitive nature of the data that Dr. Smith is collecting, the IRB may require that she apply for a Certificate of Confidentiality (COC) from the Department of Health and Human Services [7]. The COC will protect the researcher and institution from being compelled to disclose information that would identify research subjects in any civil, criminal, administrative, legislative, or other proceeding, whether federal, state, or local. Researchers can apply for a COC if data collected in a study have the potential to cause adverse financial, employment, insurability, or reputation consequences for the subject if information is disclosed.

Once the registry has received IRB approval, Dr. Smith or other investigators can apply for expedited review or an exemption certification. These much simpler applications permit investigators to proceed with IRB approval without having to apply for complete reviews. The exemption certification can be granted by the IRB if the project is studying existing data, (i.e., data from the registry), or if the information is recorded by the investigator in such a manner that subjects cannot be identified directly or indirectly.

Investigators eager to explore databases should be aware that preexisting de-identified data are available in the public domain, with safeguards to ensure appropriate and ethical use [8, 9]. It is not free, but selected information can be obtained at a reasonable cost. Mining of local or combined data sets is a legitimate research activity that can be accomplished with adherence to regulations, cognizance of the reasons for their development, and proper respect for subjects.

References
1. Braund J, Sutton DG. The case of Heinrich Wilhelm Poll (1877-1939): a German-Jewish geneticist, eugenicist, twin researcher, and victim of the Nazis. *J Hist Biol*. 2008;41(1):1-35.
2. Thomas SB, Quinn SC. The Tuskegee Syphilis Study, 1932 to 1972:implications for HIV education and AIDS risk education programs in the black community. *Am J Public Health*. 1991;81(11):1498-1505.
3. Frieden TR, Collins FS. Intentional infection of vulnerable populations in 1946-1948: another tragic history lesson. *JAMA*. 2010;304(18):2063-2064.

4. US Department of Health and Human Services. Protection of human subjects. 45 CFR sec 46. http://ohsr.od.nih.gov/guidelines/45cfr46.html. Accessed February 16, 2011.
5. Code of Federal Regulations. Institutional review boards. 21 CFR 56 sec 110. http://edocket.access.gpo.gov/cfr_2002/aprqtr/21cfr56.110.htm. Accessed February 16, 2011.
6. Centers for Disease Control. HIPAA privacy rule and public health: guidance from CDC and the US Department of Health and Human Services. *MMWR*. 2003;52 Suppl 1:1-17, 19-20. http://www.cdc.gov/mmwr/preview/mmwrhtml/m2e411a1.htm. Accessed February 16, 2011.
7. US Department of Health and Human Services. Certificates of confidentiality kiosk. http://grants.nih.gov/grants/policy/coc/. Accessed February 16, 2011.
8. Smith A, Steinman M. Datasets for research on hospitalized adults. *SGIM Forum.* 2010;33(12):7. http://www.sgim.org/userfiles/file/SGIM%20December%202010.pdf. Accessed February 16, 2011.
9. Society of General Internal Medicine. Dataset compendium. http://www.sgim.org/go/datasets. Accessed February 16, 2011.

Stephen T. Miller, MD, is a professor of medicine at the University of Tennessee Health Science Center and senior vice president of medical education and research at Methodist LeBonheur Healthcare in Memphis, Tennessee. Formerly, he was program director for an internal medicine residency program.

Rexann G. Pickering, PhD, CIP, RN, is the administrator for human protection and administrative director of the institutional review board (IRB) at Methodist LeBonheur Healthcare in Memphis, Tennessee. She is a member of the University of Tennessee Health Science Center IRB.

Related in VM
Reassessing "Minor" Breaches of Privacy, March 2011

The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental.

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

CLINICAL CASE
Limits to Patient Selection
Commentary by Nabeel Farooqui, MD

Dr. Johnson is an enterprising internist in a single specialty group in a busy practice. While in medical school, he earned his master's degree in business administration with a focus in health care management because he believed that good business acumen would be nothing but beneficial to him, his family, and his future patients. He was always interested in general internal medicine and takes pride in the treatment of his compliant patients.

Most of Dr. Johnson's patients are adequately insured and have the range of chronic medical conditions that plague his community—hypertension, diabetes, heart disease, cancer. In general, his patients do well, and he has the statistics to prove it. By all accounts, his statistics are better than any other in the community, when it comes to quality monitoring and improvement—lower hemoglobin A1c, tighter blood pressure control, cancer screening examinations and vaccines always up to date, and lipids always at goal. Dr. Johnson looks forward to the proposed changes in health care that will bring "pay-for-performance," believing that the system will reward those physicians who maintain better control of their patients, while, at the same time, benefiting their patients.

Dr. Johnson initiated a "protocol" in his office for scheduling new appointments. His community has a large health information exchange that allows physicians members unrestricted access to patient records from all hospitals in the area. Dr. Johnson has instructed his staff that, when a new patient called for a visit, they were to send him an e-mail with the patient's identifying characteristics and inform the patient that a representative from the office would contact them.

After the close of business each day, Dr. Johnson investigates each of the prospective new patients, of whom there are many. Dr. Johnson looks into each patient's chart on the health information exchange to determine that individual's comorbid conditions, payer status, history of medical compliance, and recent laboratory evaluations. In fact, Dr. Johnson uses this information to select the patients most likely to be compliant with his advice and most likely to improve his quality measures over the long term. Those with poor numbers are informed that, unfortunately, Dr. Johnson is not accepting new patients at this time.

Commentary

Computers and the Internet have evolved into indispensible tools that allow people to optimize daily tasks, whether it be researching information, communicating with others, or just making a simple purchase from an online vendor. The advent of novel web applications under the moniker of Web 2.0 has brought a new dimension to this platform by introducing the concept of sharing information in a more personable and interactive manner. In the health care field, this environment has empowered both patients and doctors to make more conscientious decisions about the access and delivery of health services, simultaneously giving way to new ethical considerations.

Trusted online resources have allowed patients to become informed participants in their health care. The public is now learning more about their conditions, finding specialists to treat them, and seeing how particular doctors are rated by their peers and patients. For physicians, hospitals, and other medical care organizations, electronic health care solutions show promise in improving the cost, quality, and access to care through the use of tools such as interoperable electronic medical records and virtual patient encounters. In our consumer-driven society most citizens have developed a sense of entitlement in the marketplace.

This phenomenon has manifested itself in the health care market as well [1] and, coupled with the power of the Internet, technology-savvy patients have become quintessential consumers. Web sites such as Healthgrades.com readily provide physician ratings based on patient reviews and performance measures, and ultimately can help a patient decide whether or not to obtain medical services from a particular health care professional [2]. This concept of patient as consumer in the capitalist economic system reopens the question at the heart of our nation's health care debate today—do people have a right to health care?

Do the same market principles suggest that physicians have a similar right to choose their patients? Like any other small business owner, the physician employs a workforce to whom he or she pays salaries and benefits, has multiple costs comprising overhead, has business and educational financial obligations, and has to work in a high-pressure environment with the constant guillotine of litigation over his or her head. A pay-for-performance model would be the obvious choice upon which to balance physician reimbursement with delivering quality care to one's patients. After all, choosing compliant patients to keep your statistics perfect and get paid accordingly is just business, right?

The first line of the American Medical Association's Report of the Council on Ethical and Judicial Affairs reads, "Physicians are professionals and as such have obligations to use their skill and knowledge for the benefit of society." Yet the council believes that, "both patients and physicians should be able to exercise freedom in choosing with whom to enter into a patient-physician relationship." These two statements need not be mutually exclusive. Though the jury is still out in the United States, pay-for-performance has been a widely popular model in Europe, and patients excluded from pay-for-performance programs may actually be less

likely to achieve treatment goals [3]. Novel health care encounter technologies such as virtual medicine also show promise in improving access to health care and improving outcomes. A study carried out by Chan and co-workers demonstrated that children with asthma who were given asthma education and monitoring via telehealth systems had improved quality of life scores, medication compliance, and disease control [4].

Health information exchange (HIE) systems are becoming an integral part in the future of health informatics and patient care. The goal is to provide universal, interoperable, and secure access of medical records to any physician directly involved in a patient's care, across a variety of health care settings, to ensure cost effective and quality care. Unfortunately, this widespread access to sensitive information leaves open the potential for abuse. Under the guise of maintaining favorable health quality indices, Dr. Johnson is accessing the medical records of patients with whom he has no established relationship and consciously choosing not to treat the more complicated cases. He is ultimately denying care to those in need for the primary purpose of financial reward. These actions clearly cross the ethical boundaries that doctors are expected to uphold and may even constitute a violation of the HIPAA laws.

The aforementioned evidence would suggest that providing quality medical services to patients regardless of their level of compliance or payer status may in fact improve quality of health *and* be financially beneficial for the practitioner. Health care organizations that embrace collaborative, Internet-based health care information management will be rewarded with loyal "customers" because they will deliver a better product. Ultimately, the advantages delivered by the ethical use of the Internet enhance the health of patients and create a more rewarding doctor-patient relationship.

References
1. McDonald R, Mead N, Cheraghi-Sohi S, Bower P, Whalley D, Roland M. Governing the ethical consumer: identity, choice and the primary care medical encounter. *Sociol Health Illn.* 2007;29(3):430-456.
2. Fanjiang G, von Glahn T, Chang H, Rogers WH, Safran DG. Providing patients web-based data to inform physician choice: if you build it, will they come? *J Gen Intern Med.* 2007;22(10):1463-1466.
3. Dalton AR, Alshamsan R, Majeed A, Millett C. Exclusion of patients from quality measurement of diabetes care in the UK pay-for-performance programme. *Diabet Med.* Feb 5, 2011. [epub ahead of print].
4. Chan DS, Callahan CW, Sheets SJ, Moreno CN, Malone FJ. An Internet-based store-and-forward video home telehealth system for improving asthma outcomes in children. *Am J Health Syst Pharm.* 2003;60(19):1976-1981.

Nabeel Farooqui, MD, is an instructor and serves as director of medical informatics in the Department of Medicine at the University of Tennessee Health Science Center in Memphis.

The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental.

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

MEDICAL EDUCATION
Medical Education and Decision-Support Systems
James B. Lewis Jr., MD, and Kathryn Ryder, MD, MS

Only about 55 percent of patients receive evidence-based care [1]. If we want to increase the use of evidence-based medicine and raise the quality of care for all patients, the evidence must be at the fingertips of those making clinical decisions. In their ranking of evidence-based resources in terms of their effectiveness as decision-making aids, Strauss and Haynes place original journal articles at the bottom, followed by systematic reviews (Cochrane database), evidence-based journal abstracts (ACP Journal Club), and evidence-based textbooks (ACP PIER, Clinical Evidence); at the top, they argue, should be the computerized decision-support system (CDSS) [2]. Their argument is a practical one. For the practicing physician, evidence-based assistance must be "reliable, relevant, and readable" [2], and for the physician trainee, a CDSS that succinctly cites the evidence for specific orders has great educational promise. The CDSS also offers the opportunity to move a new therapy from newly published research to standard of care more quickly than the 17 years it currently takes [3, 4].

Both resident and attending physician should be expert in using electronic resources, not only because they are fast becoming ubiquitous, but because they improve care quality and resident education. It is for such reasons that, as a component of the Accreditation Council for Graduate Medical Education's "practice-based learning and improvement" competency, residents must use information technology to optimize learning. The American College of Physician's Teaching Medicine Series devotes a chapter in *The Theory and Practice of Teaching Medicine* [5] to medical informatics.

Improvements in Care
Use of CDSS can bring about a number of positive changes. Residents appreciated the guidance provided by an acute coronary syndrome order set in the emergency department more than experienced physicians did [6]. Also extremely important are the improvements to patient care: reductions in medication errors [7], increased prescription of analgesics [8], better compliance with national standards of congestive heart failure care [9], improvement in preventive care (e.g., higher rates of immunization and cancer screening) [10], and application of evidence-based guidelines for ventilator management and shock resuscitation in trauma care [11].

In our hospital, the VA Medical Center, for example, ACE inhibitor use or documentation of reason for non-use had been promoted with a laborious process of daily chart review and feedback to staff physicians. We surveyed residents about

their reasons for withholding ACE inhibitors and created order sets that provided focused teaching based on their answers (e.g., reassurance that patients on dialysis can be offered ACE inhibitors). As a result, ACE inhibitor use or documentation of non-use increased to 100 percent and the nurse positions dedicated to daily chart review were no longer needed.

Similarly, prophylaxis for deep venous thrombosis (DVT) in high-risk patients at our hospital succeeded only 68 percent of the time. Late in 2009, we instituted mandatory DVT prophylaxis fields in all admissions orders, including information on contraindications and alternatives to heparin. Through 2010, DVT prophylaxis was 80 percent—above the national average.

Improvements in Resident Education
Improved compliance creates opportunities for teaching and correcting misunderstandings (e.g., "clopidogrel prevents DVT"). When compliance was lower, there were too many failures for targeted teaching. On the basis of the feedback and errors, for example, we have added an option for prophylaxis in patients with heparin-induced thrombocytopenia and teaching on DVT incidence in cirrhosis.

Pitfalls of Computerized Systems and How to Avoid Them
Of course, some drawbacks come with the territory. Attending physicians occasionally express concerns that computerized systems encourage "cookbook medicine" because residents simply click off orders and do not actually write or type them. To our knowledge, this has never been studied in a formal manner. Furthermore, some of these concerns are mitigated by the complexity of many of the patients' conditions. Complex cases are less likely to be managed by a standardized order set.

In our hospital, the additional time spent on the computer away from the bedside and the need for closed charting rooms to prevent patient information being displayed publicly on screen have separated the nurses from the physicians. Our residents lament the loss of verbal communication with nurses, feeling it contributes to delays in medication and testing. Detrimental changes to nurse-resident communication and the impact of this on medical error rates should be quantified, and solutions should be studied and implemented.

Physicians have also complained about "alert fatigue" caused by the number of clinical alerts in the electronic medical record. We have found that some administrators, in their desire to meet performance measures and ensure patient safety, want language in order sets to cover all exceptions, but this led residents to opt out of our DVT prophylaxis order set early in implementation. Eliciting feedback, adjusting order sets and alerts, and focusing on the needs of the resident user are essential.

A good example of a thorough and effective CDSS development process is an electronic checklist developed by Riggio et al. at Thomas Jefferson University

Hospital (TJUH) [12]. TJUH had a computerized physician order entry system in place. To meet congestive heart failure and acute myocardial infarction quality measures (e.g., use of aspirin, beta blockers, and angiotensin-converting enzyme (ACE) inhibitors), a multidisciplinary team including a focus group of residents developed a checklist, embedded in the computerized discharge instructions, that required resident physicians to prescribe the recommended medications or choose from a drop-down list of contraindications. The checklist was vetted by several committees, including the medical executive committee, and presented at resident conferences for feedback and suggestions. Implementation resulted in a dramatic improvement in compliance.

Similarly, at the VA Medical Center in Memphis, which uses teaching order sets for the most common admission diagnoses, those order sets are reviewed periodically during daily turnover rounds and morning reports to encourage their use, and feedback from residents who opt out of the sets is used to improve them. The order sets have been effective in achieving many of the clinical performance measures required at VA hospitals.

Because users' trust in computerized decision-support systems is one significant determinant of their willingness to rely upon them, it is important to involve all stakeholders in the development of a CDSS [13]. This should result in a CDSS that is not only complete and based on the latest evidence but is also most compatible with the systems-based practice at a particular hospital.

Finally, while clinical management systems appear to be efficacious in general, *diagnostic* decision-support systems receive mixed reviews in the literature. Berner describes a study of internal medical residents using Quick Medical Reference (QMR), a diagnostic support system [14]. The residents tended to be strongly anchored to their prior diagnosis, but reported that they might change their diagnosis if it was not included in the QMR top ten. Another system, DXplain, expanded internal medicine residents' differential diagnosis list [15]. The residents generally found the system useful, but tended to use it infrequently. A study of psychiatry residents using a computer-based diagnostic system found it less effective in arriving at the correct diagnosis than traditional methods [16]. More research is required to understand and ameliorate the relationships between these systems and their users.

Conclusion
There is a need to train residents in more sophisticated access to evidence-based medicine sources. Residency training programs should consider a formal informatics curriculum that covers such topics as EBM literature searches, clinical decision-support systems, telemedicine, digital imaging, electronic medical records, and information security and privacy.

Residents also need to be involved in the development and use of clinical decision-support systems. Not only does the CDSS need to undergo a formal revision process at least annually to remain current, but hospitals and health care systems should also

collect data from the resident users on how well the computerized systems support care and learning. "Opting out" should be studied to get rid of unnecessary education and alerts and tailor informatics to resident needs.

References
1. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348(26):2635-2645.
2. Straus S, Haynes RB. Managing evidence-based knowledge: the need for reliable, relevant, and readable resources. *CMAJ*. 2009;180(9):942-945.
3. Institute of Medicine Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.
4. Balas EA, Boren SA. Managing clinical knowledge for health care improvement. In: Bemmel J, McCray AT, eds. *Yearbook of Medical Informatics 2000: Patient-Centered Systems*. Stuttgart, Germany: Schattauer Verlagsgesellschaft; 2000: 65-70.
5. Hersh W. Keeping up your fund of knowledge: how teaching physicians can access clinical knowledge, answer questions, and develop skills for lifelong learning. In: *Theory and Practice of Teaching Medicine*. Philadelphia, PA: ACP Press; 2010: 95-114.
6. Asaro PV, Sheldahl AL, Char DM. Physician perspective on computerized order-sets with embedded guideline information in a commercial emergency department information system. *AMIA Annu Symp Proc*. 2005;6-10.
7. Kazemi A, Ellenius J, Pourasghar F, et al. The effect of computerized physician order entry and decision support system on medication errors in the neonatal ward: experiences from an Iranian teaching hospital. *J Med Sys*. 2009;35(1):25-27.
8. Morrison RS, Meier DE, Fischberg D, et al. Improving the management of pain in hospitalized adults. *Arch Intern Med*. 2006;166(9):1033-1039.
9. Gardetto NJ, Greaney K, Arai L, et al. Critical pathway for the management of acute heart failure at the Veterans Affairs San Diego Healthcare System. *Crit Pathw Cardiol*. 2008;7(3):153-172.
10. Ling CY, Kajioka E, Luu V, Phanthawimol W, Honda H, Kuribayashi L. A quality improvement project - use of a computerized medical database and reminder letters to increase preventive care use in Kaiser Permanente patients. *Perm J*. 2009;13(3):19-24.
11. Sucher JF, Moore FA, Todd R, Sailors M, McKinley BA. Computerized clinical decision support: a technology to implement and validate evidence based guidelines. *J Trauma*. 2008;64(2):520-537.
12. Riggio JM, Sorokin R, Moxey ED, Mather P, Gould S, Kane GC. Effectiveness of a clinical-decision-support system in improving compliance with cardiac-care quality measures and supporting resident training. *Acad Med*. 2009;84(12):1719-1726.
13. Alexander GL. Issues of trust and ethics in computerized clinical decision support systems. *Nurs Adm Q*. 2006;30(1):21-29.

14. Berner ES, Maisaik RS, Heudebert GR, Young KR Jr. Clinician performance and prominence of diagnoses displayed by a clinical diagnostic decision support system. *AMIA Annu Symp Proc*. 2003;76-80.
15. Bauer BA, Lee M, Bergstrom L, et al. Internal medicine resident satisfaction with a diagnostic decision support system (DXplain) introduced on a teaching hospital service. *AMIA Annu Symp Proc*. 2002;31-35.
16. Bergman LG, Fors UG. Decision support in psychiatry - a comparison between the diagnostic outcomes using a computerized decision support system versus manual diagnosis. *BMC Med Inform Decis Mak*. 2008;8:9.

James B. Lewis Jr., MD, is a professor of medicine at the University of Tennessee Health Science Center and associate chief of staff for education at the VA Medical Center in Memphis, Tennessee. His interests are consultative medicine and medical education.

Kathryn Ryder, MD, MS, is an associate professor of medicine and preventive medicine at the University of Tennessee Health Science Center and assistant chief of the medical service at the VA Medical Center in Memphis, Tennessee. Her interests are quality improvement and preventive medicine.

Related in VM
Will Health Information Technology Dehumanize Health Care? March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

THE CODE SAYS
The AMA *Code of Medical Ethics'* Opinion on Computerized Medical Records

Opinion 5.07 - Confidentiality: Computers

The utmost effort and care must be taken to protect the confidentiality of all medical records, including computerized medical records.

The guidelines below are offered to assist physicians and computer service organizations in maintaining the confidentiality of information in medical records when that information is stored in computerized data bases.

(1) Confidential medical information should be entered into the computer-based patient record only by authorized personnel. Additions to the record should be time and date stamped, and the person making the additions should be identified in the record.

(2) The patient and physician should be advised about the existence of computerized data bases in which medical information concerning the patient is stored. Such information should be communicated to the physician and patient prior to the physician's release of the medical information to the entity or entities maintaining the computer data bases. All individuals and organizations with some form of access to the computerized data bases, and the level of access permitted, should be specifically identified in advance. Full disclosure of this information to the patient is necessary in obtaining informed consent to treatment. Patient data should be assigned a security level appropriate for the data's degree of sensitivity, which should be used to control who has access to the information.

(3) The physician and patient should be notified of the distribution of all reports reflecting identifiable patient data prior to distribution of the reports by the computer facility. There should be approval by the patient and notification of the physician prior to the release of patient-identifiable clinical and administrative data to individuals or organizations external to the medical care environment. Such information should not be released without the express permission of the patient.

(4) The dissemination of confidential medical data should be limited to only those individuals or agencies with a bona fide use for the data. Only the data necessary for the bona fide use should be released. Patient identifiers should be omitted when appropriate. Release of confidential medical information from the data base should be confined to the specific purpose for which the information is requested and limited to the specific time frame requested. All such organizations or individuals

should be advised that authorized release of data to them does not authorize their further release of the data to additional individuals or organizations, or subsequent use of the data for other purposes.

(5) Procedures for adding to or changing data on the computerized data base should indicate individuals authorized to make changes, time periods in which changes take place, and those individuals who will be informed about changes in the data from the medical records.

(6) Procedures for purging the computerized data base of archaic or inaccurate data should be established and the patient and physician should be notified before and after the data has been purged. There should be no mixing of a physician's computerized patient records with those of other computer service bureau clients. In addition, procedures should be developed to protect against inadvertent mixing of individual reports or segments thereof.

(7) The computerized medical data base should be online to the computer terminal only when authorized computer programs requiring the medical data are being used. Individuals and organizations external to the clinical facility should not be provided online access to a computerized data base containing identifiable data from medical records concerning patients. Access to the computerized data base should be controlled through security measures such as passwords, encryption (encoding) of information, and scannable badges or other user identification.

(8) Back-up systems and other mechanisms should be in place to prevent data loss and downtime as a result of hardware or software failure.

(9) Security
   (a) Stringent security procedures should be in place to prevent unauthorized access to computer-based patient records. Personnel audit procedures should be developed to establish a record in the event of unauthorized disclosure of medical data. Terminated or former employees in the data processing environment should have no access to data from the medical records concerning patients.
   (b) Upon termination of computer services for a physician, those computer files maintained for the physician should be physically turned over to the physician. They may be destroyed (erased) only if it is established that the physician has another copy (in some form). In the event of file erasure, the computer service bureau should verify in writing to the physician that the erasure has taken place.

Based on a report issued prior to April 1977; updated in June 1994 and June 1998.

Related in VM
Use of Electronic Patient Data in Research, March 2011

Reassessing "Minor" Breaches of Confidentiality, March 2011

Virtual Mentor

American Medical Association Journal of Ethics
March 2011, Volume 13, Number 3: 163-166.

JOURNAL DISCUSSION
Reassessing "Minor" Breaches of Confidentiality
Timothy Hotze

Dimick C. No harm done? Assessing risk of harm under the federal breach notification rule. *J AHIMA*. 2010;81(8):20-25.

Breaches of privacy have gained increasing attention in recent years, as more and more information about each of us becomes readily accessible online—either through our own efforts or without our knowledge. The presumed security of much of that information can be compromised and, once it is, the information can be spread easily and rapidly through digital networks. In one widely reported recent incidence, the security of account information at the popular blog network Gawker was breached [1], creating the risk for a form of "online identity theft"—someone other than the account holder could post comments under the account holder's name. More ominously, if the Gawker account holder employed the same password for accounts on other sites (e.g., e-mail or bank accounts), the security of those accounts could also be compromised.

Other recent media coverage has been given to financial information stolen from personal bank or credit card accounts [2] and computer networks on a major stock exchange [3]. In light of such large and public breaches, it is natural for individuals to prize personal (and especially private) information and for all of us to wonder how our private information might be compromised in the future.

Fundamentally, a breach of privacy is a breach of trust. We trust that a bank will keep our accounts secure and will not allow unwarranted access to our money. We trust that our login credentials to a website will be kept secure so that no one can act as a digital doppelganger and comment on a blog, posing as us. In the case of a bank, if a breach of trust does occur, the damage, and therefore the remedy, are most likely to be financial: a customer might reasonably expect the bank to cover damages from a theft of data, and some banks might offer credit monitoring services after such a loss to protect against continuing financial harm.

Unlike financial harm, a loss of trust between patient and doctor can be much harder to quantify or repair. The confidentiality between patient and doctor has long been observed and was codified in the first AMA *Code of Medical Ethics* [4]. The trust that comes with confidentiality facilitates the patient's describing (often very private) matters. Keeping symptoms, diagnoses, and treatment confidential is essential to maintaining trust in the profession and ensuring that patients return for ongoing treatment or when new symptoms develop.

There have been a number of legislative moves in recent years to help codify what information should be considered protected or confidential, as well as how and under what conditions that information may be shared. The 1996 Health Insurance Portability and Accountability Act (HIPAA) established guidelines for protecting personally identifiable patient information. More recently, the 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act, encouraging medical practices to implement electronic health records, spurred the Breach Notification for Unsecured Protected Health Information Rule [5]. This rule states that HIPAA violations must be reported to both the patient and the Department of Health and Human Services (DHHS); the violation need not be disclosed, however, if there was no significant risk of financial, reputational, or other harm to the patient [5].

Although the rule provided some examples, no set of examples could be inclusive enough to be instructive in all cases. In his article *No Harm Done,* Chris Dimick notes that the rule has caused many organizations to go into "overkill mode" [5], resulting in large jumps in the number of HIPAA violation investigations, many of which may not be necessary by the letter of the law.

Dimick offers interviews with a number of privacy officers at various health care organizations across the country. Although the specifics differ in each case, the organizations highlighted in the article share several experiences and characteristics. First, all suggest or state directly that since the rule has taken effect they have been confronted with more cases and have learned from experience, now treating risk-of-harm assessments differently.

All the health systems surveyed also follow officially sanctioned organizational procedures for assessing risk. These procedures might include e-mails or other correspondence surrounding the incident and comments or questions raised when the incident was brought to the attention of the privacy officer. All those Dimick interviewed also advocated ensuring that some key questions, such as the type and quantity of information revealed, be answered before the matter could be considered closed.

As a brief but relatively complete example, in a sidebar, Dimick republished the three determinants of risk delineated by Milwaukee's Aurora Health Care: "harm based on content and recipient" (who received access to protected health information and what information they received), "assessment of harm by the patient" (notifying the patient before deciding whether or not a formal report, which must be forwarded to DHHS, should be created), and "harm based on assurances received" (where a minor, but technically impermissible, disclosure occurs but where assurances are made that the information will not travel further and will be destroyed) [6].

Without a doubt, creating formal processes to document how risk was assessed is essential, both to protect a health care organization and to ensure that relevant facts of a case are examined, both for the sake of the patient and for the health care

organization; yet the focus of both this example and several others seems to confuse the letter and the intent of the law.

Many of the privacy officers suggest disclosing the breach of information to the patient unless it is absolutely clear that no harm was committed. In the cases that are disclosed to the patient, it may be determined, based on the patient's reaction, that no harm was done and that no further investigation (or reporting) need occur. While this is a sensible solution, and it is certainly right to ask the patient whether he or she feels harm occurred, it also suggests a reversal of priorities.

Using the patient as a "harm meter," rather than respecting him or her as a human being who may have been harmed by a breach of trust, suggests that the *real* concern is not the patient or trust, but instead, having to undergo a formal investigation and sending a subsequent report of a breach to the federal government.

The reason for defining protected information in HIPAA and the privacy rule that resulted from the HITECH Act are designed to protect the patient [7] and define, legally, the confidentiality of a patient-doctor relationship that has, over time, grown to include many health care professionals.

Given the focus on patient-centered communication in the context of a patient-doctor encounter [8, 9], it is somewhat disheartening to believe that when it comes to breaches of privacy with confidential patient information, we cannot maintain this patient-centered approach. Protecting an organization against harm resulting from an accidental breach of information is important, as is creating a formal process to evaluate the degree of harm and next steps. However, there is absolutely no reason that concern for the patient cannot and should not be the at the heart of these efforts.

References
1. Stelter B. Hackers disrupt sites run by Gawker Media. *New York Times*. December 12, 2010. http://www.nytimes.com/2010/12/13/business/media/13gawker.html?_r=1&src=busln. Accessed February 15, 2011.
2. HSBC admits huge Swiss bank data theft. *BBC News*. March 11, 2010. http://news.bbc.co.uk/2/hi/business/8562381.stm. Accessed February 15, 2011.
3. Naraine R. Nasdaq confirms servers hacked via web-facing application. *ZD Net*. February 7, 2011. http://www.zdnet.com/blog/security/nasdaq-confirms-servers-hacked-via-web-facing-application/8087. Accessed February 15, 2011.
4. American Medical Association. *Code of Ethics of the American Medical Association; May 1847*. 1st ed. Chicago: American Medical Association Press; 1897. http://www.ama-assn.org/ama1/pub/upload/mm/369/1847code.pdf. Accessed February 15, 2011.

5. Dimick C. No harm done? Assessing risk of harm under the federal breach notification rule. *J AHIMA*. 2010;81(8):20-25.
6. Dimick, 23.
7. Blumenthal D. Launching HITECH. *N Engl J Med*. 2010;362(5):382-385. http://www.nejm.org/doi/full/10.1056/NEJMp0912825. Accessed February 15, 2011.
8. Swenson SL, Buell S, Zettler P, White M, Ruston DC, Lo B. Patient-centered communication: do patients really prefer it? *J Gen Intern Med*. 2004;19(11):1069-1079.
9. Cooper LA, Roter DL, Johnson RL, Ford DE, Steinwachs DM, Powe NR. Patient-centered communication, ratings of care, and concordance of patient and physician race. *Ann Intern Med*. 2003;139(11):907-915.

Timothy Hotze is a senior research assistant in the Institute for Ethics at the American Medical Association in Chicago. His research interests include reducing health care disparities, ensuring equal access to care, and how technological change affects medical ethics.

Related in VM
[Use of Electronic Patient Data in Research](), March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

JOURNAL DISCUSSION
Use of Bar-Code Technology to Reduce Drug Administration Errors
Angeline Wang

Poon EG, Keohane CA, Yoon CS, et al. Effect of bar-code technology on the safety of medication administration. *N Engl Journal Med*. 2010;362(18):1698-1707.

Medication errors occur frequently and can result in serious adverse events for patients. An estimated 7,000 deaths annually result from medication-related errors both in and out of hospitals, as highlighted by the 1999 Institute of Medicine report, *To Err Is Human* [1]. Another study identified 6.5 adverse events related to medication use for every 100 inpatient admissions; a quarter of these adverse events were due to errors [2].

Efforts to reduce medication errors and improve patient outcomes have turned toward new types of health information technology [3], including physician order-entry systems and electronic medication-administration systems, or eMAR. In eMAR systems, nurses scan the bar codes on a patient's wristband and on the medication prior to administration. The technology verifies the identity of the patient and the physician's order or pharmacy entry and automatically documents administration of medication.

In "Effect of Bar-Code Technology on the Safety of Medication Administration," Eric G. Poon and collaborators evaluate bar-code medication-verification technology in a tertiary care medical center [4]. After a nine-month study period in 2005—with 14,041 medication administrations observed and 3,082 order transcriptions reviewed—the authors conclude that both administration errors and potential adverse drug events were significantly reduced after implementation of eMAR technology. Based on these results, they argue that bar-code technology is needed as an additional safety net in medication administration.

The study investigated the relationships between two kinds of administration errors—those related to timing (administrations that were early or late by an hour or more) and those related to transcription errors (errors made when physicians' orders were manually transcribed to a paper record used by nurses)—and potential adverse drug events.

Research nurses shadowed staff nurses and recorded their observations about medication administrations, both in departments that had implemented eMAR technology and those that had not. If a research nurse believed an error was being

made during the observation stage, he or she would intercept the administration and record it as an error. The research nurses then reviewed physicians' orders and the record of medication administration to determine whether an error had been made. This information was also analyzed by a panel of doctors, nurses, and pharmacists to confirm the occurrence of an error and determine the potential harm to a patient.

In hospital units that had bar-code verification technology, non-timing-related errors were 41.4 percent lower than in units without the technology, and potential adverse drug events were 50.8 percent lower. The units with bar-code verification systems also had a 27.3 percent fewer timing-related errors. The number of transcription errors was reduced from 6.1 errors per 100 orders transcribed to zero.

Using this data, the study authors estimated that, based on the 5.9 million doses of medication the study hospital administers each year, use of eMAR could prevent approximately 95,000 potential adverse drug events.

As the authors point out, there are a few limitations to this study. It was conducted in a single hospital that had already implemented electronic physician order-entry and pharmacy bar-code verification systems. The study measured *potential* adverse drug events, as determined by a multidisciplinary panel, rather than actual adverse events. And the staff nurses in the study were being observed, which is almost certain to have altered their behavior. Interestingly, however, 20 percent of drug administrations on units with bar-code eMAR technology occurred without the bar-code scanning step, a rate of noncompliance that might explain why the number of medication errors observed during the study period was not lower.

Regardless, the study makes a strong case that bar-code medication-verification technology should be a required practice for demonstrating "meaningful use" of health information technology in efforts to obtain financial incentives under the American Recovery and Reinvestment Act.

But while the American Medical Association supports "appropriate financial and other incentives to physicians to facilitate electronic prescribing adoption" [5], it also seeks to work with the federal government to "set realistic targets for meaningful use" [6]. Significant challenges exist to implementing this technology. As Poon et al. point out, extensive resources were required to support the roll-out of the eMAR system at the study site, including training, on-site support, hardware, and a software-development team.

Furthermore, this study site was able to integrate the eMAR system with existing electronic physician order entry and pharmacy bar-code verification systems, both of which require extensive resources to implement. These systems most likely play complementary roles in improving medication safety. Any consideration of eMAR to qualify for "meaningful use" funds should take into account how this technology can most effectively be introduced.

References

1. Institute of Medicine. *To Err Is Human: Building a Safer Health System.* Washington, DC: National Academies Press; 1999.
2. Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events. *JAMA*. 1995; 274(1):29-34.
3. Bates DW. Using information technology to reduce rates of medication errors in hospitals. *BMJ*. 2000;320(7237):788-791.
4. Poon EG, Keohane CA, Yoon CS, et al. Effect of bar-code technology on the safety of medication administration. *N Engl Journal Med*. 2010;362(18):1698-1707.
5. American Medical Association. Resolution D-120.958: Federal Roadblocks to E-Prescribing. https://ssl3.ama-assn.org/apps/ecomm/PolicyFinderForm.pl?site=www.ama-assn.org&uri=/ama1/pub/upload/mm/PolicyFinder/policyfiles/DIR/D-120.958.HTM. Accessed February 14, 2011.
6. American Medical Association. Resolution D-478.982: Redefine "Meaningful Use" of Electronic Health Records. https://ssl3.ama-assn.org/apps/ecomm/PolicyFinderForm.pl?site=www.ama-assn.org&uri=/ama1/pub/upload/mm/PolicyFinder/policyfiles/DIR/D-478.982.HTM. Accessed February 14, 2011.

Angeline Wang is a second-year medical student at the University of Michigan Medical School in Ann Arbor and a member of the AMA Medical Student Section (AMA-MSS) Committee on Bioethics and Humanities.

Related in VM

The HITECH Act—An Overview, March 2011

Ethical Dimensions of the "Meaningful Use" HIT under the American Recovery and Reinvestment Act, March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

CLINICAL PEARL
Vancomycin in the Treatment of Pediatric Staphylococcal Infections
Anthony C. Rudine, MD, MBA, and Jennifer P. Rudine, PharmD

Vancomycin, an inhibitor of cell wall synthesis, is produced by the bacterium *Streptococcus orientalis* and is effective primarily against gram-positive organisms [1]. Vancomycin has become an important antibiotic for use in both the adult and pediatric populations, in particular, in the fight against methicillin-resistant *Staphylococcus aureus* (MRSA), and increased use of the antibiotic has been documented in some hospitals with a high prevalence of MRSA. Development of resistance to vancomycin is also a real possibility, and strains of vancomycin-resistant enterococcus (VRE) have been identified in culture.

Vancomycin inhibits transglycolase and thereby eliminates peptidoglycan prolongation, causing the cell to become weak and susceptible to lysis. The alteration of the peptidoglycan structure in the cell wall results in a higher affinity bonding with vancomycin and, thus, loss of cell activity. A glycopeptide, vancomycin is bactericidal for actively dividing bacteria only and kills more slowly than many other antibiotics, such as penicillins.

Administration of vancomycin to treat bloodstream infections requires intravenous delivery. In fact, because vancomycin has poor gastrointestinal absorption, the only infection it can effectively treat orally is *Clostridium difficile*. All other infections must be treated by parenteral administration. Pharmacokinetic studies of vancomycin show that approximately 90 percent of the drug is removed from the body by renal excretion. In patients whose creatinine clearance becomes a problem, accumulation of vancomycin is marked. Because the drug is not removed by hemodialysis, and there is risk of nephrotoxicity, a pharmacist-based clinical service with expertise in pharmacokinetics and dosing should be consulted in its use.

The most common adverse reactions to vancomycin are short-lived and minor, but real toxicities do occur in the clinical setting. Perhaps the most well-known reaction is "red man syndrome." Often thought to be related to anaphylaxis, this reaction is actually caused by histamine release in the patient, and can be eliminated by pretreating the patient with diphenhydramine and by prolonging the infusion duration.

The pediatric population presents significant clinical challenges to both the physician and pharmacist. At LeBonheur Children's Medical Center in Memphis, Tennessee, a pharmacist-based clinical pharmacokinetic service is called to interact with and

advise physician colleagues in the proper dosing regimens when vancomycin and other antimicrobial agents are prescribed for inpatients with the potential for toxicity.

Pharmacokinetics and physiology are constantly evolving as the child grows, particularly in the first few months of life. To date, pharmacokinetic data exists in detail for adults, but more studies are needed for different pediatric populations. The pediatric pharmacist must consider body composition and percentage of fat and total body water relative to adults, since changes in development bring changes in absorption and body composition. Moreover, glomerular filtration rate (GFR) is lower in newborns than in toddlers and adolescents.

In summary, clinicians face real challenges when using medications in pediatric patients, particularly when use of medication and its excretion is dependent on ever-changing physiologic responses in growing children. It is our recommendation that, in this special population, multiple experts be consulted in the utilization of nephrotoxic parenteral medications to minimize the potential injury to the growing kidneys and the growing child.

References
1. For more detail about this antibiotic and its uses, see Katzung B. *Basic and Clinical Pharmacology*. 9th ed. New York: McGraw-Hill; 2001: 734-753; 995-1006.

Anthony C. Rudine, MD, MBA, is a third-year resident in the combined internal medicine and pediatrics residency program at the University of Tennessee in Memphis. After residency, he plans to complete a fellowship in neonatal and perinatal medicine and pursue a career as a clinical bioethicist.

Jennifer P. Rudine, PharmD, is a pediatric clinical pharmacist in the emergency department at LeBonheur Children's Hospital in Memphis, Tennessee. She completed a one-year clinical residency in pediatric pharmacy through the University of Tennessee.

Related in VM
Copying and Pasting Patient Treatment Notes, March 2011

Virtual Mentor

HEALTH LAW
THE HITECH ACT—An Overview
Howard Burde, JD

Before the Patient Protection and Affordable Care Act, otherwise known as "Obamacare," or, more generally, health reform, Congress had already passed the most sweeping health care reform measures since Medicare was created nearly 45 years ago. As part of the American Recovery and Reinvestment Act (ARRA), Congress passed the Health Information Technology for Economic and Clinical Health Act (HITECH). HITECH changed the nature of the relationships among health care professionals, organizations, patients, and payors by focusing on the implementation and use of health information technology. It puts particular emphasis on privacy and security, including expanded application and enforcement. HITECH also provides incentives and subsidies for health information exchanges and education, which are outside the scope of this article.

Incentives
HITECH provides financial incentives to "eligible professionals" for the meaningful use of certified qualified electronic health records (EHRs). An eligible professional is generally a physician, though there are incentives for hospitals as well. Certified EHR technology includes those EHRs that have been certified by an authorized testing and certification body (ATCB) [1].

The incentive payments under HITECH are substantial: eligible professionals who demonstrate the meaningful use of an EHR in 2011 or 2012 will be entitled to incentive payments of $18,000 in the first year (only $15,000 after 2012); $12,000 for the second year; $8,000 for the third year; $4,000 for the fourth year; and $2,000 for the fifth year [2]. After 2015, physicians who fail to meaningfully use EHRs will be subject to reductions in Medicare and Medicaid reimbursement [2].

The criteria for meaningful use are based on a series of specific objectives, each of which is tied to a measure that allows physicians to demonstrate that they are meaningful users of certified EHR technology. The final meaningful use standards for Stage 1 (of three) were published by the Department of Health and Human Services in 2010. For Stage 1, which begins in 2011, physicians must meet 15 mandatory (core) criteria and choose 5 of the 10 "menu" criteria. Each objective was evaluated for its potential applicability to all physicians and eligible hospitals. Where it is impossible for a physician to meet a specific measure, an exclusion defined in the final rule will apply [3].

The Stage 1 standards for meaningful use focus on electronically capturing health information in a coded format, using that information to track key clinical conditions, communicating that information for care coordination purposes, and initiating the reporting of clinical quality measures and public health information. All certified EHRs should enable a physician to meet these standards [1, 2]. Examples of meaningful use in Stage 1 include entry of patient demographic and insurance information, use of drug interaction software, and e-prescribing.

Stage 2 and 3 Criteria for Meaningful Use
Stage 2 meaningful use criteria will expand upon the Stage 1 criteria in the areas of disease management, clinical decision support, medication management support for patient access to their health information, transitions in care, quality measurement and research, and bidirectional communication with public health agencies. Information exchange is a critical part of care coordination, and Stage 2 criteria are expected to support health information exchanges and health information exchange activities [3].

Stage 3 criteria are expected to address improvements in quality, safety and efficiency, focusing on decision support for national high priority conditions, patient access to self-management tools, access to comprehensive patient data, and improving population health outcomes [3].

The criteria will become more stringent over time [4].

Privacy and Security under HITECH
HITECH expands on the notions of privacy and security found in the Health Insurance Portability and Accountability Act of 1996, known as HIPAA. The HIPAA regulations, in brief, prohibit the disclosure of individually identifiable health information, otherwise known as protected health information or PHI, without the consent of the patient (or guardian or other responsible person) except for three purposes: treatment, payment, or health care operations. HIPAA applies directly to "covered entities," defined as health care payors, providers, and clearinghouses.

Under HIPAA, "business associates"—a term referring to people or entities who, on behalf of covered entities, perform tasks that necessitate access to PHI—were not directly regulated, but were bound to comply with HIPAA pursuant to mandatory written agreements with the covered entities. HITECH, by contrast, provides for direct regulation of business associates and stipulates that HIPAA's privacy and security rules apply to them.

HITECH also dramatically increases the required response to breaches of PHI and the enforcement of such requirements [5, 6].

Notification of Breach
HITECH mandates public notification of security breaches when "unsecure PHI" is disclosed or used for an unauthorized purpose. ("Secure PHI," on the other

hand, is not subject to such requirements because it is encrypted and cannot be breached [6].) These notification requirements are similar to many state and federal data breach laws pertaining to financial information.

In general, the act requires that patients be notified of any breach of their data security, whether external or internal. If a breach affects 500 patients or more, then HHS must also be notified and the name of the institution where the breach occurred will be posted on the HHS web site. Under certain conditions, local media will also need to be notified. This provision is yet another example of the act's emphasis on privacy and security concerns [4].

Electronic Health Record Access
When a health care practice or organization implements an EHR system, the act gives patients in those practices (or third parties they designate) the right to obtain their PHI in an electronic format. This requirement is similar to state laws that mandate patient access to their own paper medical records. The act specifies that charges for such requests may only cover the labor cost of fulfilling the request. Although one might presume that such a request requires a few clicks, the reality is that even practices with an EHR system already in place may not have this capability.

Penalties and Enforcement
While HITECH is a federal law, it grants both the Department of Health and Human Services and state attorneys general the authority to enforce the law. This dual enforcement authority raises the specter of politically motivated investigations of PHI disclosures by ambitious state attorneys general. As health lawyers have advised physicians for years, the investigation will do as much damage as the penalty. The key is compliance in advance.

Civil penalties are mandatory if there is a violation due to willful neglect. For example, in situations in which a person is unaware of a violation (despite due diligence), the minimum penalty is $100 per violation, with a cap of $25,000 for violations of an identical requirement during a calendar year. If the violation is due to "willful neglect," however, the minimum penalty is $10,000 per violation, with a cap of $250,000 for violations of an identical requirement during a calendar year, and the maximum penalty is $50,000 per violation, with a cap of $1.5 million [7, 8].

Conclusion
HITECH has laid the groundwork for a positive revolution in the delivery of health care. Compliance is key, and HITECH provides both positive incentives in the form of meaningful use payments and negative incentives in the form of civil penalties and the threat of prosecution at the state level.

References
1. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), part 2, subtitle C, sec 13301, subtitle B, sec 3014: Competitive grants to States and

Indian tribes for the development of loan programs to facilitate the widespread adoption of certified EHR technology.

2. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), sec 13301, subtitle B: Incentives for the Use of Health Information Technology.
3. Office of the National Coordinator for Health Information Technology. Being a meaningful user of electronic health records. http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__meaningful_use_-_providers/2998. Accessed February 18, 2011
4. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13402(d): Tiered increase in amount of civil monetary penalties.
5. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13401: Application of security provisions and penalties to business associates of covered entities; annual guidance on security provisions.
6. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13402: Notification in the case of breach.
7. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13409: Clarification of application of wrongful disclosures penalties.
8. HITECH Act of 2009, 42 USC sec 139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13410: Improved enforcement.

Further Reading

Klein K. So much to do, so little time: to accomplish the mandatory initiatives of ARRA, healthcare organizations will require significant and thoughtful planning, prioritization and execution. *J Healthc Inf Manag*. 2010;24(1):31-35.

Howard Burde, JD, provides general counsel and health law advice to health information technology and health care organizations, payors, and associations such as the Health Information Management Systems Society (HIMSS), the bipartisan Pennsylvania Joint Legislative Committee on Health Reform, and the National Governors' Association e-Health Alliance. He serves on the editorial boards of health law publications, including the *BNA Health Law Reporter* and the *Journal of Health and Life Sciences Law*, and has written four books.

Related in VM

Ethical Dimensions of Meaningful Use Requirements for Electronic Health Records, March 2011

Reassessing "Minor" Breaches in Confidentiality, March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

POLICY FORUM
Ethical Dimensions of Meaningful Use Requirements for Electronic Health Records
Stephen T. Miller, MD, and Alastair MacGregor, MB ChB, MRCGP

The American Recovery and Reinvestment Act (ARRA) [1] will stimulate medicine to adopt and "meaningfully" use electronic health records (EHR) within and across health organizations [2] to improve patient outcomes and accountability, aid in coordination of care, promote effective health management across organizations, and align incentives with good patient and population outcomes—in short, for reasons that appear to be in line with ethical principles. But what does ethical "meaningful use" look like?

To qualify as a "meaningful user" of electronic health records and become eligible for incentive payments and continued Medicare and Medicaid reimbursements, physicians in private practice and hospitals must meet measures for each of three stages of EHR system implementation and process upgrades. These measures derive from projected quality and safety improvements that could result from widespread adoption of EHR, interorganization communication, clinical decision support, and analysis and reporting of patient care. The requirements for physician practices and larger health care organizations differ slightly, but in general, two-thirds of the Stage 1 criteria are mandatory, and the other one-third are to be chosen from a "menu" of 10 additional choices [3, 4].

Medical record keeping has a robust history of promoting patient care [5]. For adoption of EHRs to be an ethical act, patients' need for optimal health outcomes—not a fascination with technology or incentive-seeking—should be the driving force behind it [6].

The next step in meaningful use is the attestation of attainment of Stage 1 goals. At this juncture, electronic reporting will not yet be required, and attestation will occur in more difficult-to-verify written form. Though it would be possible to falsify or fudge paper reporting, health care personnel must avoid any inclination to game the rules or view attestation as a means to a financial end. Not only would such falsification violate the moral imperative against lying—not to mention opening the organization and its senior officers to audits, fraud charges, and reclamation of funds under the False Claims Act [7] and the Deficit Reduction Act [8]—the ethical principle of distributive justice requires that health care facilities support the greater good.

Now we turn to the ethical implications of specific criteria for meaningful use. We have sorted the rules into three categories based on purpose:
A. **electronic extensions** of basic clinical charting;
B. requirements promoting patient **safety**; and
C. **patient**-centered rules.

In category A, **electronic extensions** of basic charting, we place the rules that require:
1. recording of patient demographics;
2. recording vital signs (adding charting changes);
3. listing medication allergies;
4. maintaining problem lists;
5. maintaining medication lists;
6. recording smoking status for patients older than 13 years of age; and
7. incorporating laboratory results into the EHR (requiring structured data that can be analyzed).

The need to bring clinical charting traditions into the electronic format is obvious. Anyone who works in a clinical setting knows that retrieving information from an outdated or otherwise separate chart is burdensome and inefficient. Having that information in a structured, easily retrievable format is a great boon to both health care professionals and patients.

In category B, the **safety** category, we place the rules that require:
1. reminding patients of needed clinical services;
2. transmitting prescriptions to pharmacies electronically (this rule applies only to professionals, not hospitals);
3. checking medication allergies and drug-drug interactions;
4. implementing computerized physician order entry (CPOE) systems;
5. reconciling medication among different care settings;
6. implementing drug formulary checks;
7. exchanging key clinical information among care organizations electronically;
8. providing summaries of care records for patient care transitions;
9. implementing clinical decision rule support and tracking;
10. reporting clinical quality measures;
11. creating patient registries by condition;
12. creating immunization registries;
13. enabling public health syndromic surveillance for disease or condition spikes; and
14. submitting reportable laboratory results.

Although many of these safety rules have already been implemented in paper form, with varying levels of success, electronic recordkeeping will greatly increase the speed, accuracy, and ease of analysis of safety data. Adoption of EHR should improve patient safety by making patient information available across delivery sites, bringing clinical decision support to more points of care, and allowing easy and

detailed measurement of variations in care, leading to more standardization (generally considered to be an expression of justice and equal opportunity for patients).

Medical ethics has long understood the value of public-health-oriented surveillance [9], also expressed in modern notions about "the tragedy of the commons" [10]. Those who wish for complete independence in matters of health and safety can put others in danger—for example, those who refuse vaccination can lower herd immunity and put the community as a whole at risk, and though declining to wear a motorcycle helmet [11] can be justified as an expression of individual rights, recklessness with one's health or safety can incur costs which are partially borne by public dollars. There is a tension here between ethical imperatives—to uphold the respect for individual autonomy and protect the community as a whole.

In category C, the **patient**-centered rules category, we place:
1. providing patients with clinical summaries and instructions;
2. providing patients with an electronic copy of, or electronic access to, their health records;
3. implementing security and safety measures to ensure privacy;
4. identifying patient-specific educational resources; and
5. recording the advance directives of patients 65 years and older.

It is in category C that the ethical discussion gets interesting. In addition to the unsurprising emphasis on preserving patient confidentiality by ensuring data security, which dictates that institutions should deal severely with breaches to protect patients (and to ward off outcry from electronic medical records skeptics), there is a notable enhancement of patient empowerment and self-sufficiency: patients must now be given access to their electronic information.

It may seem peculiar to nonclinicians that patient care information has not traditionally been open-access. Banks, those other keepers of sensitive personal information, do not hide financial data, require the filing of release forms, or charge extra for access to information about one's own accounts. Although they own that information, they share it enthusiastically—and electronically. Many clinicians and health care staff, on the other hand, get nervous when patients want to see their medical records. Does the request indicate a lack of trust? Is a lawsuit soon to follow? Will patients misunderstand or misinterpret information if they read it without a medical professional to interpret it? Will the clinician be deluged with questions about why this laboratory test is one unit above the "laboratory normal" and why the radiologist did not dictate an unequivocal reading? Does the record contain unprofessional and inappropriate remarks?

But there is no turning back. It is time to reevaluate some long-held conventions in patient records, as enshrined, for example, in the American Medical Association's *Code of Medical Ethics*, which contains an opinion asserting that "notes made in treating a patient are primarily for the physician's own use and constitute his or her

personal property" [12]. Patients' access to their own health information is now not only possible [13], it will be a must, and recording habits will change accordingly.

Meaningful use will also necessitate changes in the ethics of EHR vendors. The Office of the National Coordinator for Health Information Technology's certification process for vendors' EHRs will not create a level playing field because vendors may not disclose all costs. Compared to acute care health organizations, many ambulatory health care groups are newcomers to EHR systems. Until the vendor community demonstrates the ethical backbone it takes to offer similar and readily comparable contracts (including details about interface costs, support services, and change management services) to different clients, both health organizations and ambulatory providers should avail themselves of independent third-party reports that use existing client feedback to assess EHRs and related services.

Conclusion
Free-market enthusiasts will point out that our category B, the administrative requirements for meaningful use, contains the largest number of objectives. Critics will ask, "Is meaningful use relevant to clinical practice, or is it an excessive bureaucratic requirement to spend public dollars on doctors' computer systems?" The answer to this question resides in the ethical principle of justice for all. If it is to be ethical, the expenditure of public funds for EHR systems must have a favorable outcome for the public as a whole. Safer prescribing, prevention of medication errors, disease tracking for public health, and public error reporting are goals that justify meaningful use rules.

References
1. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 226 (2009). http://www.recovery.gov/About/Pages/The_Act.aspx. Accessed February 21, 2011.
2. Centers for Medicare and Medicaid Services. EHR incentive programs: overview. http://www.cms.gov/ehrincentiveprograms. Accessed January 16, 2011.
3. Centers for Medicare and Medicaid Services. EHR incentive program eligible professional meaningful use table of contents. http://www.cms.gov/EHRIncentivePrograms/Downloads/EP-MU-TOC.pdf. Accessed on January 17, 2011.
4. Centers for Medicare and Medicaid Services. EHR incentive program: eligible hospital and CAH meaningful use table of contents. http://www.cms.gov/EHRIncentivePrograms/Downloads/Hosp_CAH_MU-TOC.pdf. Accessed on January 17, 2011.
5. Barr MS. The clinical record: a 200-year-old 21st-century challenge. *Ann Intern Med*. 2010;153(10):682-683.
6. Hartzband P, Groopman J. Off the record—avoiding the pitfalls of going electronic. *N Engl J Med*. 2008;358(16):1656-1658.
7. Department of Health and Human Services and the Department of Justice, Health Care Fraud and Abuse Control Program. Annual report for fiscal year

2005 (August 2006): 33.
http://oig.hhs.gov/publications/docs/hcfac/hcfacreport2005.pdf. Accessed on
January 20, 2011.

8. Centers for Medicare and Medicaid Services. Deficit Reduction Act.
    https://www.cms.gov/deficitreductionact/. Accessed on January 22, 2011.

9. Pellegrino ED, Thomasma DC. *A Philosophical Basis of Medical Practice:
    Toward a Philosophy and Ethic of the Healing Profession*. New York:
    Oxford University Press; 1981.

10. Hiatt HH. Protecting the medical commons: who is responsible? *N Engl J
    Med*. 1975; 293(5):235-241.

11. Mitka M. Findings on youth injuries bolster case for helmet use by all
    motorcycle riders. *JAMA*. 2010;304(24):2683-2684.

12. American Medical Association. Opinion 7.02 Records of Physician:
    Information and Patients. *Code of Medical Ethics*. http://www.ama-
    assn.org/ama/pub/physician-resources/medical-ethics/code-medical-
    ethics/opinion702.shtml. Accessed on January 18, 2011.

13. Delbanco T, Walker J, Darer JD, et al. Open notes: doctors and patients
    signing on. *Ann Intern Med*. 2010;153(2):121-125.

Stephen T. Miller, MD, is a professor of medicine at the University of Tennessee
Health Science Center and senior vice president of medical education and research at
Methodist LeBonheur Healthcare in Memphis, Tennessee. Formerly, he was
program director for an internal medicine residency program.

Alastair MacGregor, MB ChB, MRCGP, is senior vice president and chief medical
information officer at Methodist LeBonheur Healthcare in Memphis, Tennessee.

Disclosure

Related in VM
The Promise of Health Information Technology, March 2011

Reassessing "Minor" Breaches in Confidentiality, March 2011

*The viewpoints expressed on this site are those of the authors and do not necessarily
reflect the views and policies of the AMA.*

Virtual Mentor

MEDICINE AND SOCIETY
Does Health Information Technology Dehumanize Health Care?
James E. Bailey, MD, MPH

Many authors lament that the entry of health information technology (HIT) into health care is likely to make medical practice more impersonal and less humane [1]. We are all aware of instances in which the availability of technology can lead to depersonalization of health care. The availability of CT scans might encourage doctors to neglect thorough history taking and neurological exams in the evaluation of headache. Echocardiograms might lead to declines in auscultation skills. Likewise, HIT could erode human interactions in clinical care.

The danger is that developers, lawmakers, researchers, and quality organizations, in their zeal to demonstrate "meaningful use" of HIT, might establish design requirements for systems that mandate such extensive documentation at every visit that it eats up the already limited time doctors have to actually care for patients. The most common concerns about HIT have little to do with the technology itself, but everything to do with design principles and implementation.

New technologies are simply new tools. Humans have been using tools for a long time. Whether a new tool adds to or detracts from our humanity has less to do with the tool than it does with how and why we choose to use it.

Effect on the Patient-Physician Relationship
Concern that new technology might interfere with the patient-doctor relationship is nothing new. In the 1700s, many physicians worried that the invention of the stethoscope would depersonalize care by allowing a physician to listen to the patient's heart at a distance rather than placing an ear on the patient's chest. In the early 1900s, doctors were concerned that Harvey Cushing's sphygmomanometer would "intervene between patient and doctor" and "dehumanize the practice of medicine" [2, 3]. These concerns are understandable, but depersonalization of practice does not necessarily accompany the introduction of new technology.

Today's "dehumanization" worry centers on documenting patient information on a computer. The truth is that excessive emphasis on documentation can occur even when a paper chart is used. We have all known doctors who kept their noses in the paper chart for the entire visit, completely avoiding eye contact and emotional connection with their patients.

One of the upper-level resident colleagues in the primary care practice where I trained was famous for his ability to legibly write down a full patient history while

maintaining eye contact with the patient nearly the entire time. His patients felt like they were getting his full attention; yet his charting, which he completed in patients' rooms, was impeccable. I've never seen anyone do it better. If we adopt a tool we must be determined to learn how to use it well and for its proper purpose. Both paper and electronic charts are like musical instruments: they require practice to use effectively. Even a good tool can be used poorly.

The scientific literature also suggests that the impact of HIT on patient-centered care is highly variable. Although some studies suggest that use of electronic medical records can adversely affect doctor-patient communication [4], most studies find neutral or positive effects on patient satisfaction [5]. The effect of HIT on communication depends on highly variable design features and implementation.

Effect on Quality of Care
Electronic health records (EHRs) and health information exchanges (HIEs) are purportedly designed to reduce medical errors, make documentation easier, and facilitate the exchange of health information so that it is readily available at the point of care. Optimally deployed, HIT should reduce documentation time, automate critical processes in preventive and chronic disease care, and reduce medical errors. These are good purposes.

Unfortunately, while some studies show that HIT systems can achieve these purposes [6], the literature is rife with examples in which HIT has failed to do so, and recent evidence suggests that EHRs have done little thus far to improve ambulatory care quality [7]. Consider the following case.

Case 1. A 19-year-old woman went to a specialty doctor because of difficulty equalizing ear pressure when flying or swimming underwater. Before she saw the doctor, she spent 30 minutes filling out forms and providing insurance information and underwent complete audiologic testing, despite having no hearing problems. Finally the doctor examined her, talked with her, documented his findings in a state-of-the-art EHR, and referred her to his colleague down the hall. Before she met the second doctor, a nurse prepared her for a nasal endoscopy by packing her nose with gauze laced with analgesic and a vasoconstrictor. The patient felt nervous because she didn't understand what was going to happen.

She was escorted into the second doctor's examining room, but he was busy documenting patient information and didn't look up from his computer for several minutes. He performed the nasal endoscopy, taking plenty of time to explain her prognosis and the alternatives she might take in treatment. During the course of her 3-hour visit she was given acoustic reflex testing, tympanometry, and the nasal endoscopy. The results were all dutifully recorded in the clinic's EHR, and a flurry of computer-generated letters arrived a few days later. The clinic was thorough and provided excellent advice, but the young woman left the clinic with more "care" than she had bargained for and a bill for about $1,000.

The competent and thorough doctors in this case were engaged in electronic documentation and the use of technology. But the case hints at an insidious problem. While the use of the latest HIT was apparent at every phase of her visit, its purpose was less clear. Was the clinic's use of HIT improving the patient's care, or was it functioning primarily as a tool for billing and profit generation, defensive medicine and malpractice avoidance? From the patient's perspective, the purpose for which the HIT is employed determines its benefit.

Effect on Privacy
In addition to fears about quality of care and the patient-doctor relationship, some worry that EHRs may lead to loss of privacy or the misuse of personal information. EHRs must be designed to minimize that risk. No tool is failsafe; in the wrong hands, even a pencil can be used as a weapon. All technologies need safeguards— regulations or guidelines on proper use—to protect us from abuses of the new powers these technologies give us.

The Health Information Portability and Accountability Act (HIPAA) laid out stringent privacy rules for electronic health information, but HIPAA is a long and extraordinarily complex set of rules. It is up to professional associations and trade organizations and is ultimately a core function of the government to ensure that effective rules are designed and established to protect patient privacy. At the same time, we all have a strong interest in making sure that these rules are economical, simple, and not excessively proscriptive.

Will Computers Take over Medical Practice?
A computer takeover is unlikely. Patients' desire for emotional connection, reassurance, and a healing touch from their caregivers is well documented and longstanding [8, 9]. Studies also demonstrate the effectiveness of the "therapeutic touch" of physicians who care and connect emotionally with their patients [10].

Nevertheless, some specialties may diminish in importance or decrease in size as information systems improve, while others will expand. In particular, most experts expect primary care to expand as HIT enables physicians to provide patient-centered, personal, and, at the same time, population-based care in the context of a medical home. Because information systems automate the mundane but essential tasks of preventive care and chronic disease management, they can give physicians more time to spend with their patients. For example, does it improve personalized care for a physician to use pencil and paper to calculate weight-based heparin dosing or to adjust medication dosing for renal clearance? Of course not. Automated drug-dosing systems save physician time for the important human parts of medicine, while augmenting patient safety.

Can Using HIT further Humanize Health Care?
Every other major industry in the world has employed industrial quality-control techniques and computers to standardize and improve products and services, a move that has led to continual improvements in available products, quality, efficiency, and

cost. Why has health care—one of the most complex of industries—been a laggard? Should it not be the first to embrace the enhanced capabilities available through HIT?

Experts suggest that physicians are among the most resistant to change of all professionals. They fear loss of control and want to see medicine remain a cottage industry. But, paradoxically, we may be able to provide more personalized care than ever for our patients if we have the courage to industrialize in the right way for their sake. We can utilize HIT to make sure that every patient gets the right care, at the right time, at the right place. People want to get health care wherever they are—close to home, in their homes, or far away. And numerous examples worldwide now demonstrate that HIT can enable connected doctors to deliver the best evidence-based care to every person they see. Here's an example.

Case 2. A 10-year-old American boy went to an emergency room in a small town in Italy after injuring his knee skiing. When he arrived with his family after 5 p.m., no receptionist was on duty. A passerby told his family to go directly into the patient care area of the emergency room. A physician visually assessed the child on arrival and promised to be with him in 30 minutes.

Thirty minutes later, she called the family into a room. He had a laptop open, and the family prepared themselves for the typical barrage of questions about insurance and employment before care began. Instead, she asked three things: boy's name, passport number, and address. Then she began to care for the boy. The physician obtained an X-ray only after performing a thorough physical examination of the knee, and took a few minutes to document in the EHR along the way. The family and child left better informed and reassured, and received a bill by mail a couple months later for about $100.

In this example, the required EHR documentation supported the purpose of the visit, rather than becoming the centerpiece of it. The EHR was virtually invisible in the process of care because it was simply an extension of the physician's caring for the child. Yet it enabled the physician to deliver the needed care at the time and in the place it was needed—thousands of miles from the patient's home.

Most regions in Italy use electronic medical records in the ambulatory sector as well. Italian doctors regularly make home visits, day or night, and they use HIT to do it, bringing your EHR with them to your home when you are sick, so that you can, once again, get the right care, at the right time, in the right place. In this system, inappropriate and unnecessary emergency room visits are prevented, high emergency and hospital costs are avoided, and people get the care they need most when they need it: before they get deathly ill.

If we truly want to provide personalized and humanistic care, we can. We must avoid designing and using technology only to increase profit or help us avoid malpractice litigation. Whenever we are tempted to adopt a new technology, we should carefully

examine our own motives and those of the technology purveyor or seller. Unless we have clear vision and a goal of providing truly good care, we can never hope to use technology to its fullest potential.

References

1. Cochran JH. Continuous healing relationships through connectivity. As the nation edges to widespread implementation of EMRs, physicians are concerned about weakening the important doctor-patient relationship. *J Healthc Inf Manag*. 2010;24(3):19-20.
2. Evans H. Losing touch: the controversy over the introduction of blood pressure instruments into medicine. *Technol Cult*. 1993;34(4):784-807.
3. Goodman RL. Commentary: health care technology and medical education: putting physical diagnosis in its proper place. *Acad Med*. 2010;85(6):945-946.
4. Rouf E, Whittle J, Lu N, Schwartz MD. Computers in the exam room: differences in physician-patient interaction may be due to physician experience. *J Gen Intern Med*. 2007;22(1):43-48.
5. Irani JS, Middleton JL, Marfatia R, Omana ET, D'Amico F. The use of electronic health records in the exam room and patient satisfaction: a systematic review. *J Am Board Fam Med*. 2009;22(5):553-562.
6. Overhage JM, Dexter PR, Perkins SM, et al. A randomized, controlled trial of clinical information shared from another institution. *Ann Emerg Med*. 2002;39(1):14-23.
7. Romano MJ, Stafford RS. Electronic health records and clinical decision support systems: Impact on national ambulatory care quality. *Arch Intern Med*. 2011 [epub ahead of print].
8. Bailey JE. Asklepios: ancient hero of medical caring. *Ann Intern Med*. 1996;124(2):257-263.
9. Wensing M, Jung HP, Mainz J, Olesen F, Grol R. A systematic review of the literature on patient priorities for general practice care. Part 1: Description of the research domain. *Soc Sci Med*. 1998;47(10):1573-1588.
10. Hsiao CJ, Boult C. Effects of quality on outcomes in primary care: a review of the literature. *Am J Med Qual*. 2008;23(4):302-310.

James E. Bailey, MD, MPH, is a professor of medicine and director of the Healthy Memphis Data Center at the University of Tennessee Health Science Center, where he practices internal medicine and educates physicians in training. His research investigates how health system organization and information technology can improve quality and outcomes of care.

Related in VM
Mindful Use of Health Information Technology, March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

HISTORY OF MEDICINE
Development of the Electronic Health Record
Jim Atherton, MD

President Obama's support for a national system of electronic health records (EHR) in his American Recovery and Reinvestment Act of 2009 has focused much attention on the inadequacy of current medical recordkeeping procedures. Since many resident physicians currently use EHR and nearly all will be using them in the future, it may be of value to understand the evolution of the current EHR system, the key players in its development, and resources for further study.

Much interaction with EHR is less than ideal. System crashes paralyze clinics, poor system response times test user patience, multiple system passwords create redundancy and frustration, and overreliance on EHR in lieu of direct interspecialty communication can impair patient care. Despite these problems, there are advantages to using EHR, and its continued existence is as certain as the Internet's.

While the economics of health care in the past few decades has driven the transition to EHR, there are other important reasons for its implementation, and it is advantageous for medical professionals to embrace "the future," as it has become the present. The good news is that EHR provides many benefits to health care personnel. Some benefits are found in the medical record itself: increased legibility and comprehensiveness and easier access to information, to name three. Researchers also can identify subjects and track quality of care more easily. Although new types of errors have been introduced, many errors can be eliminated with features such as computerized physician order entry. Health workers' access to all of a patient's health care information at a given institution is another major advantage. For example, when a nephrologist sees a patient one day, a general practitioner who sees the patient later in the week has access to vital signs, growth changes, physical exams, labs, and interventions documented during the earlier visit. Physicians can also view patient records from home, allowing them to monitor hospital patients closely overnight. Additional benefits include those less tied to patient care but still vital to the health industry, such as workforce efficiency.

The Healthcare Information and Management Systems Society (HIMSS) provides a concise definition of the complicated idea that is the electronic health record:

> The Electronic Health Record (EHR) is 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 EHR automates and streamlines the clinician's workflow. The EHR has the ability to generate a complete record of a clinical patient encounter—as well as supporting other care-related activities directly or indirectly via interface—including evidence-based decision support, quality management, and outcomes reporting [1].

The Evolution of EHR: Early Work
Different types of EHR have been developed by academic medical centers, the government, and industry. The goal—to compile the above information (e.g., patient demographics, progress notes) so they can be readily viewed and managed in one place—is not easily achieved.

Development of EHR can be divided into two major time periods. Early efforts began in the 1960s and '70s, when academic medical centers developed their own systems. Beginning in the 1980s, leaders saw benefits to industry-wide standards and began forming organizations to tackle the broader issues that would facilitate the widespread use of electronic medical information.

The first EHR systems were known as clinical information systems. In the mid-1960s, Lockheed developed one such product, which has since been handed down to the vendor Technicon, then to TDS Healthcare, and then to Eclipsys, now part of Allscripts [2]. It influenced later systems because its processing speed and flexibility allowed many users in the system at once [3].

Around the same time, the University of Utah collaborated with 3M to begin developing Health Evaluation through Logical Processing (HELP), one of the first clinical decision support systems. Then, in 1968, the Computer Stored Ambulatory Record (COSTAR) began at Massachusetts General Hospital. Developed in collaboration with Harvard, COSTAR included some novel features. Its modular design allowed the system to be separated into parts; for example, the accounting portions of such a system need not include clinical information and excluding extraneous information increases efficiency. The system also had a flexible vocabulary; its database recognized multiple terms for the same disease, which allowed users to recognize a given condition across the health system despite variations in terminology at different institutions [3].

The federal government began using EHR in the 1970s with the Department of Veteran Affairs' implementation of VistA, originally known as Decentralized Hospital Computer Program (DHCP). Many former resident physicians and medical students have used the VA's Computerized Patient Record System (CPRS). The VA has unique access to federal resources, of which its EHR has taken full advantage [3]. It is consistently well reviewed for reducing medical errors and improving health-record component integration [4].

More Recent Developments

Since the 1980s, more concerted efforts have been made to increase use of EHR. The Institute of Medicine (IOM) recognized the need for serious analysis of paper health records and, in the mid-1980s, undertook such a study, publishing results in 1991 and again with revisions in 1997 [3]. This report was the first to argue the case for using EHR, identifying it as one of seven key recommendations for improving patient records, and to propose a means of converting paper to electronic records. It also identified barriers to EHR adoption (lack of standards, security issues, cost) and suggested both private and public funding for their development. When private industry became aware of the IOM's findings, supporters formed the Computer-Based Patient Record Institute (CPRI), which helped break down barriers to EMR development. (It has since merged with the Health Information and Management Systems Society, HIMSS.) In 2000, the IOM published a study of medical errors, *To Err is Human,* concluding that health care would be safer with such systems as computerized physician order entry in place [5]. The IOM has also collaborated on the development of an electronic standards organization, HL7 [3].

HL7 is an international, nonprofit standards-developing organization (SDO) that began in 1987. Though not the only such SDO, it is the most widely recognized. HL7 develops electronic standards to ensure that the components of an EHR (such as a health center's billing and clinic information) can communicate more easily, resulting in a working electronic health record system. Since one EHR system often contains components made by many different vendors, standards that specify items, e.g., the computer language components will use, are essential for optimal functioning. HL7 and other standards promoters also hasten industry development [6]. An oversight organization, the Certification Commission for Healthcare Information (CCHIT), has been certifying vendors as HL7-compliant since 2006 [7].

EHRs have appeared in the national political forum, indicating widespread concerns about recordkeeping's effect on public health. President Bush made mention of the topic in his 2004 State of the Union address [2], and President Obama incorporated EHR into his American Recovery and Reinvestment Act of 2009 as part of the Health Information Technology for Economic and Clinical Health Act (HITECH). This act provides for higher payments to health care providers that meet "meaningful use" criteria, which involve using EHR for relevant purposes and meeting certain technological requirements [8]. "Meaningful use" has become controversial because it mandates transition to EHR for physicians and hospitals that treat patients covered by government insurance. More specific definitions of meaningful use and acceptable technologies are available on the U.S. Department of Health and Human Services web site [9].

References

1. Health Information and Management Systems Society. EHR: electronic health record. http://www.himss.org/ASP/topics_ehr.asp. Accessed February 15, 2011.

2. Amatayakul M. *Electronic Health Records: A Practical Guide for Professionals and Organizations*. 3rd ed. Chicago: American Health Information Management Association; 2007.
3. Dick RS, Steen EB, Detmer DE, eds; Institute of Medicine. *The Computer-Based Patient Record: An Essential Technology for Health Care.* 2nd ed. Washington, DC: National Academies Press, 1997.
4. Baker R. Testimony of Roger Baker before House Committee on Veterans' Affairs, Subcommittee on Oversight and Investigation; July 14, 2009. US Department of Department of Veteran Affairs. http://www4.va.gov/OCA/testimony/hvac/soi/090714RB.asp. Accessed February 15, 2011.
5. Kohn LT, Corrigan JM, Donaldson MS, eds; Institute of Medicine. To Err is Human: Building a Safer Health System. Washington, DC: National Academies Press: 1999.
6. Health Level International. About HL7. http://www.hl7.org/about/index.cfm?ref=common. Accessed February 15, 2011.
7. Certification Commission for Health Information Technology web site. http://www.cchit.org. Accessed February 15, 2011.
8. US Department of Health and Human Services. Electronic health records and meaningful use. http://healthit.hhs.gov/portal/server.pt?open=512&objID=2996&mode=2. Accessed February 15, 2011.
9. Centers for Medicare and Medicaid Services. Meaningful use. http://www.cms.gov/EHRIncentivePrograms/30_Meaningful_Use.asp#TopOfPage. Accessed February 15, 2011.

Further Reading
National Institute of Health. Electronic Health Records Overview; April 2006. http://www.ncrr.nih.gov/publications/informatics/ehr.pdf. Accessed February 15, 2011.

Collen MF. *A History of Medical Informatics in the United States, 1950 to 1990.* Indianapolis, IN: American Medical Informatics Association; 1995.

Jim Atherton, MD, is a third-year pediatric resident at the University of Tennessee in Memphis. He is pursuing fellowship training in pediatric nephrology.

Related in VM
THE HITECH ACT—An Overview, March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

OP-ED
The Promise of Health Information Technology
Alon B. Neidich

In a sweeping overhaul of the nation's health care delivery system, the 111th Congress recently passed the Patient Protection and Affordable Care Act (Affordable Care Act) and the Health Information Technology for Economic and Clinical Health Act (HITECH). Health information technology (IT) serves as a foundation within these reforms to improve quality, reduce costs, and increase access to care. President Obama has stated his deep commitment to the improved health of America and to this end has set an ambitious goal for every American to benefit from an electronic health records (EHRs) by 2014. Here are the highlights:

Enhanced Clinical Care and Quality Improvement
HITECH allocates $27 billion in incentives to support adoption and "meaningful use" of electronic health records (EHRs) by eligible professionals and hospitals. In July 2010, the Centers for Medicare and Medicaid Services (CMS) released the Phase 1 framework defining criteria for "meaningful use" that must be met if an EHR user is to earn incentive payments. The standards consist of 15 core data points and 10 menu options, out of which users must choose five. Standards include medication lists and automated drug-allergy interaction checks to ensure patient safety. In the interest of population health, the framework institutes syndromic surveillance to notify public health officials of reportable conditions. Overall, the goal of the "meaningful use" framework is to enhance clinical care and quality by empowering medical caregivers with information that is both instantaneous and patient-specific.

Those who meet these goals and become "meaningful users" can be rewarded by the government with $44,000 in Medicare and $63,750 in Medicaid payments. The government's investment is a once-in-a-lifetime possibility no eligible physician group, hospital, or other medical care organization should pass up.

Health IT Web
The ultimate goal of health IT is a national, interoperable, private, and secure electronic system within which information is exchanged among all the sites where patients receive care. The Nationwide Health Information Network (NHIN) and the State Health Information Exchange Cooperative Agreement were allocated funds totaling more than $600 million to create a common platform for health information exchange. In its nascent stage, the NHIN is already being integrated into the operations of provider organizations such as Kaiser Permanente, the Cleveland Clinic, and the Veterans Administration.

Results of mammograms, colonoscopies, and blood work will be shared electronically among specialists and primary care physicians to ensure safe monitoring of disease. No longer will results rely upon the mail and office administrators' placing of paperwork in the paper chart, but will be sent automatically to the proper EHRs. To assure the security and privacy of a patient's health record and protect against the unlawful distribution of patient information, the legislation also established chief privacy officers.

Reducing Costs
Adoption of EHR affords a unique opportunity to reduce cost—a primary goal of health reform. Because information seamlessly follows the patient, redundant tests and imaging are avoided. Some early adopters of EHRs, like Partners Health Care in Boston, are providing point-of-care decision support already as doctors prescribe tests, medications, and imaging requisitions.

Health IT facilitates the creation of innovative cost-saving programs. "Shared savings" or gain-sharing allows hospitals and other care providers to collaborate to reach quality metrics. EHRs serve an integral role by enabling users to measure desired outcomes and report this data more readily. The Affordable Care Act requires the Secretary of Health and Human Services to establish payment bundling options to complement the current payment-by-procedure option. Bundling options reward coordinated care during hospitalizations as reported by EHRs. These initiatives merely cover the surface of the range of programs that will promote system-wide reductions in cost in a patient-centered manner.

Catalyzing the Transformation: Training and Implementation
Health IT is challenging work. The addition of IT to our health care system should not be viewed as merely a technological upgrade, but rather a fundamental change in our approach to the practice of medicine. The precise role of health IT will evolve over time, but from now on it will serve the professional competency of a doctor as integrally as a stethoscope.

The federal government recognizes the difficulty of implementing health IT and has made significant investments to facilitate this process. It has supported new funding for regional extension centers (REC) to reach out to more than 100,000 primary care physicians across the United States with advice and technical assistance with the purchase of medical record systems. The Beacon Community program granted fifteen communities $250 million to demonstrate how EHRs can achieve breakthrough improvements in care. Lessons learned from these leading examples will be transferred to communities across the nation.

There is a national shortage of health IT professionals who can aide clinicians and hospitals in achieving meaningful use. To meet the growing demand for health IT professionals, the Workforce Training Programs ($118 million) support the education of up to 45,000 new workers with funds directed toward curriculum development, community college programs, and competency examinations.

Additional programs improve health information exchange and the security and privacy of health information and address other impediments to the adoption of novel health IT systems.

This constellation of initiatives moves us closer to President Obama's stated goal of an EHR for every American by 2014. Health IT is the critical component the health care community must embrace as we work together to deliver the highest quality of care to Americans in the 21st century.

Alon B. Neidich is a second-year medical student at Tufts University School of Medicine in Boston. He graduated from the University of Chicago with honors and a bachelor's degree in law, letters and society. During the summer of 2010, he served as an intern in the Office of the National Coordinator for Health Information Technology at the U.S. Department of Health and Human Services.

Related in VM
[Mindful Use of Health Information Technology](), March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

OP-ED
Mindful Use of Health Information Technology
Kenneth Robertson, MD, MBA

EHR, EMR, HIT, HIE. The letters themselves evoke emotion. The young find their pulses quickening with excitement about the new world order. Members of the older generation of doctors are more likely to experience tachycardia when they read these letters, due to the dread they evoke. One thing is certain: the digital age is invading health care and not about to retreat.

Now that my hair is thinning and turning to a white-gray mix (probably prematurely as a result of my interface with the "digitization" of health care), I get to share some of my thoughts on the many new and interesting ethical issues for physicians as we "go digital." I hope to stimulate us all to consider this change with excitement tempered by due introspection. It goes without saying that the privileges of being a physician impose a mandate to do the right thing, as we see it. This will always be true, even when there are strong motivations to accede to expectations that are contrary to what we judge to be the right thing for patients and their families. Our first responsibility should always be to our patients.

With that backdrop, I will turn to a discussion of competing motivations triggered by the digital interface with health care that can challenge our duty and desire to do the right thing.

Health care is a business as well as a service. Statements like "No money, no mission" have been around for years. So it is no surprise that if you ask any private practitioner who is thinking about installing an electronic medical record (EMR) system why he or she is considering doing so, you will invariably hear about potential increases in reimbursement and productivity as key reasons. Indeed, not considering money as a key driver would be irresponsible and even unethical. After all, to survive and fulfill our mission, we have to make money at some point or we close the door. Not counting the cost means someone else will foot the bill or we will be out of business.

Financial motivations to move into the electronic world in health care delivery center around billing and improving efficiencies. These were key considerations I brought to my group practice in 2002, when we made the decision to install our first EMR system. Much had been written about our tendency as pediatricians to undercode our billing and the EMR vendors said they could help alleviate this tendency by capturing coding opportunities we were missing. With the computerized physician order-entry (CPOE) system I helped implement at our children's hospital in January

of 2010 came the hope that the system would better capture our charges. These are reasonable and expected advantages of an electronic health record.

The ethical dilemmas develop when we allow the electronic record to drive our care and decision making inappropriately. What we frequently see in electronic records is the use of templates for charting or ordering. This is certainly desirable in many instances; it helps us remember to order that medication or test we might have forgotten. It helps us remember to ask that particular review-of-systems question that points us in the right direction for our differential diagnosis, but conflicts arise when we move down the form and fill in the blanks without justification. For example, the patient who comes in to have sutures removed doesn't necessarily qualify for or need a review of systems or family history-taking that includes a discussion about porphyrias. I'm not saying the questions never need to be asked of a patient who is having sutures removed, but the instances in which that would be appropriate are few and far between. If it is in my template and I ask the question and then think this justifies "up-coding" the visit from a level-two to a level-four or -five visit, I've just committed fraud. If I do this knowingly, I commit a real ethical injustice, but even doing it mindlessly, so to speak, because it was on the electronic form I happened to be using and then billing for it is wrong. Ordering the rare chemistry test because it happened to be on my convenience order set and then billing my patient for the counseling it generated is also wrong. The digital age offers us many opportunities for help, but we must be ever vigilant about using that help and we must be certain that our reason is not simply increased remuneration.

Why do I want to use my iPad to care for patients? For one thing, it is a cool toy. Sure, there are other reasons; it allows me to interact with my patient without a computer between us. But the fun-toy factor can't be ignored, and adopting technology for the cool-toy factor can be cause for ethical concern. The cost of health care continues to grow in spite of all efforts to contain it, consuming resources that are needed in many other arenas. Every time we purchase a supply or good to help us deliver health care, we drive up the cost of that care. All of us would agree that urging a patient to undergo an elective surgical procedure so that I can earn enough to purchase a new Porsche is not ethical. I'm suggesting that, on a much smaller scale, we need to take care that our purchase of health care technology enhances patient care more than it drives up cost.

What about speed? When shopping for my first EMR system, one selling point I heard from other early adopters was that speedier documentation significantly increased the number of patients I could see, which resulted in more income. Those of us who have lived in the electronic documentation world for any time may be wondering about the validity of this argument. So often it seems that electronic recording slows us down instead of speeding us up. There are those, however, who design their electronic medical record for speed. They use templates or copy and paste all their notes. They then typically enhance their billing by having a more detailed note than was justified by the reason for the patient's visit. I will repeat that health care is still about the patient-physician interaction and not simply about seeing

as many patients as one can. Avoid the temptation to use an electronic record to decrease your need to provide true patient care. Don't document what you don't do and don't do what's unnecessary, given the reason for the patient's visit, without clear medical justification.

The digital age brings with it huge promises about decision support and knowledge management. No one still believes it is possible to read every new journal article and stay on top of ever-expanding medical science knowledge. We will by necessity become more and more dependent on computers to help us stay abreast of the latest treatment recommendations and options. The risk comes when we trust the computers to think for us and fail to continue a path of lifelong study. Medical education is full of questions about the right amount of help to give medical students and residents. Too much help and they will be more prone to "cookbook medicine" and failing to think. Not enough help and we take the risk of teaching outdated medicine and losing patient safety advantages an electronic health record can provide.

Now for a word about privacy. Physicians have traditionally been the custodians of very private information about our patients and their families. It is my contention that abdication of this responsibility by a few has led to the establishment of legislation such as the Health Insurance Portability and Accountability Act (HIPAA). Computers can greatly enhance our ability to do our work effectively. Teenagers all over the world have taught us, however, that any computer can be hacked. It is clearly incumbent on us to do what we can to protect the private information we receive about our patients and families. In the digital age of health care, we must stay informed on how best to protect our patients' privacy; anything less is irresponsible and will lead to further regulation from outside the profession.

The list of ethical issues raised by the digital interface with health care will grow year by year. I haven't even addressed how we should deal with the new types of medical errors created by electronic health records or the process changes that the digital age is bringing to health care. For example, every order set we create to help us remember also brings an increased risk of ordering inappropriate tests. I hope I have demonstrated that each time-saving, patient-safety-guarding attribute in digital health care technology brings with it opportunities to offer unnecessary care, reap unnecessary payment, and add to the country's overall cost of health care. This is why I advise that, each time we are about to perform an action prompted by an electronic system, we stop and ask ourselves whether that action is appropriate and effective for this patient and whether our motives go beyond "capturing billing opportunities."

Kenneth Robertson, MD, MBA, is associate chief medical officer and pediatric physician informaticist at LeBonheur Children's Medical Center in Memphis, Tennessee. He entered hospital administration in 2006, after a 13-year stint in private practice as a pediatrician and practice manager. Dr. Robertson is a member of the

American Academy of Pediatricians and represents LeBonheur in the Child Health Corporation of America's chief information officer forum.

Related in VM
The Promise of Health Information Technology, March 2011

Will Health Information Technology Dehumanize Health Care? March 2011

The viewpoints expressed on this site are those of the authors and do not necessarily reflect the views and policies of the AMA.

Virtual Mentor

Alexander GL. Issues of trust and ethics in computerized clinical decision support systems. *Nurs Adm Q*. 2006;30(1):21-29.

Amatayakul M. *Electronic Health Records: A Practical Guide for Professionals and Organizations*. 3rd ed. Chicago: American Health Information Management Association; 2007.

American Medical Association. *Code of Ethics of the American Medical Association; May 1847*. 1st ed. Chicago: American Medical Association Press; 1897. http://www.ama-assn.org/ama1/pub/upload/mm/369/1847code.pdf. Accessed February 15, 2011.

American Medical Association. Opinion 7.02 Records of Physician: Information and Patients. *Code of Medical Ethics*. http://www.ama-assn.org/ama/pub/physician-resources/medical-ethics/code-medical-ethics/opinion702.shtml. Accessed on January 18, 2011.

American Medical Association. Resolution D-120.958: Federal Roadblocks to E-Prescribing. https://ssl3.ama-assn.org/apps/ecomm/PolicyFinderForm.pl?site=www.ama-assn.org&uri=/ama1/pub/upload/mm/PolicyFinder/policyfiles/DIR/D-120.958.HTM. Accessed February 14, 2011.

American Medical Association. Resolution D-478.982: Redefine "Meaningful Use" of Electronic Health Records. https://ssl3.ama-assn.org/apps/ecomm/PolicyFinderForm.pl?site=www.ama-assn.org&uri=/ama1/pub/upload/mm/PolicyFinder/policyfiles/DIR/D-478.982.HTM. Accessed February 14, 2011.

American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 226 (2009). http://www.recovery.gov/About/Pages/The_Act.aspx. Accessed February 21, 2011.

Asaro PV, Sheldahl AL, Char DM. Physician perspective on computerized order-sets with embedded guideline information in a commercial emergency department information system. *AMIA Annu Symp Proc*. 2005;6-10.

Bailey JE. Asklepios: ancient hero of medical caring. *Ann Intern Med*. 1996;124(2):257-263.

Baker R. Testimony of Roger Baker before House Committee on Veterans' Affairs, Subcommittee on Oversight and Investigation; July 14, 2009. US Department of Department of Veteran Affairs. http://www4.va.gov/OCA/testimony/hvac/soi/090714RB.asp. Accessed February 15, 2011.

Balas EA, Boren SA. Managing clinical knowledge for health care improvement. In: Bemmel J, McCray AT, eds. *Yearbook of Medical Informatics 2000: Patient-Centered Systems*. Stuttgart, Germany: Schattauer Verlagsgesellschaft; 2000: 65-70.

Barr MS. The clinical record: a 200-year-old 21st-century challenge. *Ann Intern Med*. 2010;153(10):682-683.

Bates DW. Using information technology to reduce rates of medication errors in hospitals. *BMJ*. 2000;320(7237):788-791.

Bates DW, Cullen DJ, Laird N, et al. Incidence of adverse drug events and potential adverse drug events. *JAMA*. 1995; 274(1):29-34.

Bauer BA, Lee M, Bergstrom L, et al. Internal medicine resident satisfaction with a diagnostic decision support system (DXplain) introduced on a teaching hospital service. *AMIA Annu Symp Proc*. 2002;31-35.

Bergman LG, Fors UG. Decision support in psychiatry - a comparison between the diagnostic outcomes using a computerized decision support system versus manual diagnosis. *BMC Med Inform Decis Mak*. 2008;8:9.

Berner ES, Maisaik RS, Heudebert GR, Young KR Jr. Clinician performance and prominence of diagnoses displayed by a clinical diagnostic decision support system. *AMIA Annu Symp Proc*. 2003;76-80.

Blumenthal D. Launching HITECH. *N Engl J Med*. 2010;362(5):382-385. http://www.nejm.org/doi/full/10.1056/NEJMp0912825. Accessed February 15, 2011.

Braund J, Sutton DG. The case of Heinrich Wilhelm Poll (1877-1939): a German-Jewish geneticist, eugenicist, twin researcher, and victim of the Nazis. *J Hist Biol*. 2008;41(1):1-35.

Centers for Disease Control. HIPAA privacy rule and public health: guidance from CDC and the US Department of Health and Human Services. *MMWR*. 2003;52 Suppl 1:1-17, 19-20. http://www.cdc.gov/mmwr/preview/mmwrhtml/m2e411a1.htm. Accessed February 16, 2011.

Centers for Medicare and Medicaid Services. Deficit Reduction Act. https://www.cms.gov/deficitreductionact/. Accessed on January 22, 2011.

Centers for Medicare and Medicaid Services. EHR incentive program: eligible hospital and CAH meaningful use table of contents. http://www.cms.gov/EHRIncentivePrograms/Downloads/Hosp_CAH_MU-TOC.pdf. Accessed on January 17, 2011.

Centers for Medicare and Medicaid Services. EHR incentive programs: overview. http://www.cms.gov/ehrincentiveprograms. Accessed January 16, 2011.

Centers for Medicare and Medicaid Services. EHR incentive program eligible professional meaningful use table of contents. http://www.cms.gov/EHRIncentivePrograms/Downloads/EP-MU-TOC.pdf. Accessed on January 17, 2011.

Centers for Medicare and Medicaid Services. Meaningful use. http://www.cms.gov/EHRIncentivePrograms/30_Meaningful_Use.asp#TopOfPage. Accessed February 15, 2011.

Certification Commission for Health Information Technology web site. http://www.cchit.org. Accessed February 15, 2011.

Chan DS, Callahan CW, Sheets SJ, Moreno CN, Malone FJ. An Internet-based store-and-forward video home telehealth system for improving asthma outcomes in children. *Am J Health Syst Pharm.* 2003;60(19):1976-1981.

Cochran JH. Continuous healing relationships through connectivity. As the nation edges to widespread implementation of EMRs, physicians are concerned about weakening the important doctor-patient relationship. *J Healthc Inf Manag*. 2010;24(3):19-20.

Code of Federal Regulations. Institutional review boards. 21 CFR 56 sec110. http://edocket.access.gpo.gov/cfr_2002/aprqtr/21cfr56.110.htm. Accessed February 16, 2011.

Cooper LA, Roter DL, Johnson RL, Ford DE, Steinwachs DM, Powe NR. Patient-centered communication, ratings of care, and concordance of patient and physician race. *Ann Intern Med*. 2003;139(11):907-915.

Dalton AR, Alshamsan R, Majeed A, Millett C. Exclusion of patients from quality measurement of diabetes care in the UK pay-for-performance programme. *Diabet Med.* Feb 5, 2011. [epub ahead of print].

Delbanco T, Walker J, Darer JD, et al. Open notes: doctors and patients signing on. *Ann Intern Med*. 2010;153(2):121-125.

Department of Health and Human Services and the Department of Justice, Health Care Fraud and Abuse Control Program. Annual report for fiscal year 2005 (August

2006): 33. http://oig.hhs.gov/publications/docs/hcfac/hcfacreport2005.pdf. Accessed on January 20, 2011.

Dick RS, Steen EB, Detmer DE, eds; Institute of Medicine. *The Computer-Based Patient Record: An Essential Technology for Health Care.* 2nd ed. Washington, DC: National Academies Press, 1997.

Dimick C. No harm done? Assessing risk of harm under the federal breach notification rule. *J AHIMA*. 2010;81(8):20-25.

Embi PJ, Yackel TR, Logan JR, Bowen JL, Cooney TG, Gorman PN. Impacts of computerized physician documentation in a teaching hospital: perceptions of faculty and resident physicians. *J Am Med Inform Assoc*. 2004;11(4):300-309.

Evans H. Losing touch: the controversy over the introduction of blood pressure instruments into medicine. *Technol Cult*. 1993;34(4):784-807.

Fanjiang G, von Glahn T, Chang H, Rogers WH, Safran DG. Providing patients web-based data to inform physician choice: if you build it, will they come? *J Gen Intern Med.* 2007;22(10):1463-1466.

Frieden TR, Collins FS. Intentional infection of vulnerable populations in 1946-1948: another tragic history lesson. *JAMA*. 2010;304(18):2063-2064.

Gardetto NJ, Greaney K, Arai L, et al. Critical pathway for the management of acute heart failure at the Veterans Affairs San Diego Healthcare System. *Crit Pathw Cardiol*. 2008;7(3):153-172.

Goodman RL. Commentary: health care technology and medical education: putting physical diagnosis in its proper place. *Acad Med*. 2010;85(6):945-946.

Hammond KW, Helbig ST, Benson CC, Brathwaite-Sketoe BM. Are electronic medical records trustworthy? Observations on copying, pasting and duplication. *AMIA Annu Symp Proc*. 2003;269-273.

Hartzband P, Groopman J. Off the record—avoiding the pitfalls of going electronic. *N Engl J Med*. 2008;358(16):1656-1658.

Health Information and Management Systems Society. EHR: electronic health record. http://www.himss.org/ASP/topics_ehr.asp. Accessed February 15, 2011.

Health Level International. About HL7. http://www.hl7.org/about/index.cfm?ref=common. Accessed February 15, 2011.

Hersh W. Keeping up your fund of knowledge: how teaching physicians can access clinical knowledge, answer questions, and develop skills for lifelong learning. In: *Theory and Practice of Teaching Medicine*. Philadelphia, PA: ACP Press; 2010: 95-114.

Hiatt HH. Protecting the medical commons: who is responsible? *N Engl J Med*. 1975; 293(5):235-241.

Hirschtick RE. A piece of my mind: copy-and-paste. *JAMA*. 2006;295(20):2335-2336.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), part 2, subtitle C, section 13301, subtitle B, sec 3014: Competitive grants to States and Indian tribes for the development of loan programs to facilitate the widespread adoption of certified EHR technology.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), sec 13301, subtitle B: Incentives for the Use of Health Information Technology.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13402(d): Tiered increase in amount of civil monetary penalties.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13401: Application of security provisions and penalties to business associates of covered entities; annual guidance on security provisions.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13402: Notification in the case of breach.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13409: Clarification of application of wrongful disclosures penalties.

HITECH Act of 2009, 42 USC sec139w-4(0)(2) (February 2009), subtitle D, part 1, sec 13410: Improved enforcement.

HSBC admits huge Swiss bank data theft. *BBC News*. March 11, 2010. http://news.bbc.co.uk/2/hi/business/8562381.stm. Accessed February 15, 2011.

Hsiao CJ, Boult C. Effects of quality on outcomes in primary care: a review of the literature. *Am J Med Qual*. 2008;23(4):302-310.

Institute of Medicine. *To Err Is Human: Building a Safer Health System*. Washington, DC: National Academies Press; 1999.

Institute of Medicine Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academies Press; 2001.

Irani JS, Middleton JL, Marfatia R, Omana ET, D'Amico F. The use of electronic health records in the exam room and patient satisfaction: a systematic review. *J Am Board Fam Med*. 2009;22(5):553-562.

Katzung B. *Basic and Clinical Pharmacology*. 9th ed. New York: McGraw-Hill; 2001: 734-753; 995-1006.

Kazemi A, Ellenius J, Pourasghar F, et al. The effect of computerized physician order entry and decision support system on medication errors in the neonatal ward: experiences from an Iranian teaching hospital. *J Med Sys*. 2009;35(1):25-27.

Kohn LT, Corrigan JM, Donaldson MS, eds; Institute of Medicine. *To Err is Human: Building a Safer Health System.* Washington, DC: National Academies Press: 1999.

Ling CY, Kajioka E, Luu V, Phanthawimol W, Honda H, Kuribayashi L. A quality improvement project - use of a computerized medical database and reminder letters to increase preventive care use in Kaiser Permanente patients. *Perm J*. 2009;13(3):19-24.

McDonald R, Mead N, Cheraghi-Sohi S, Bower P, Whalley D, Roland M. Governing the ethical consumer: identity, choice and the primary care medical encounter. *Sociol Health Illn.* 2007;29(3):430-456.

McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348(26):2635-2645.

Mitka M. Findings on youth injuries bolster case for helmet use by all motorcycle riders. *JAMA*. 2010;304(24):2683-2684.

Morrison RS, Meier DE, Fischberg D, et al. Improving the management of pain in hospitalized adults. *Arch Intern Med*. 2006;166(9):1033-1039.

Naraine R. Nasdaq confirms servers hacked via web-facing application. *ZD Net*. February 7, 2011. http://www.zdnet.com/blog/security/nasdaq-confirms-servers-hacked-via-web-facing-application/8087. Accessed February 15, 2011.

Office of the National Coordinator for Health Information Technology. Being a meaningful user of electronic health records. http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__meaningful_use_-_providers/2998. Accessed February 18, 2011

Overhage JM, Dexter PR, Perkins SM, et al. A randomized, controlled trial of clinical information shared from another institution. *Ann Emerg Med*. 2002;39(1):14-23.

Oxentenko AS, West CP, Popkave C, Weinberger SE, Kolars JC. Time spent on clinical documentation: a survey of internal medicine residents and program directors. *Arch Intern Med*. 2010;170(4):377-380.

Pellegrino ED, Thomasma DC. *A Philosophical Basis of Medical Practice: Toward a Philosophy and Ethic of the Healing Profession*. New York: Oxford University Press; 1981.

Poon EG, Keohane CA, Yoon CS, et al. Effect of bar-code technology on the safety of medication administration. *N Engl Journal Med*. 2010;362(18):1698-1707.

President's Council of Advisors on Science and Technology, Executive Office of the President. *Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward*; December 8, 2010. http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-health-it-report.pdf. Accessed February 17, 2011.

Riggio JM, Sorokin R, Moxey ED, Mather P, Gould S, Kane GC. Effectiveness of a clinical-decision-support system in improving compliance with cardiac-care quality measures and supporting resident training. *Acad Med*. 2009;84(12):1719-1726.

Romano MJ, Stafford RS. Electronic health records and clinical decision support systems: Impact on national ambulatory care quality. *Arch Intern Med*. 2011 [epub ahead of print].

Rouf E, Whittle J, Lu N, Schwartz MD. Computers in the exam room: differences in physician-patient interaction may be due to physician experience. *J Gen Intern Med*. 2007;22(1):43-48.

Siegler EL, Adelman R. Copy and paste: a remediable hazard of electronic health records. *Am J Med*. 2009;122(6):495-496.

Smith A, Steinman M. Datasets for research on hospitalized adults. *SGIM Forum*. 2010;33(12):7. http://www.sgim.org/userfiles/file/SGIM%20December%202010.pdf. Accessed February 16, 2011.

Society of General Internal Medicine. Dataset compendium. http://www.sgim.org/go/datasets. Accessed February 16, 2011.

Stelter B. Hackers disrupt sites run by Gawker Media. *New York Times*. December 12, 2010.

http://www.nytimes.com/2010/12/13/business/media/13gawker.html?_r=1&src=busl
n. Accessed February 15, 2011.

Straus S, Haynes RB. Managing evidence-based knowledge: the need for reliable, relevant, and readable resources. *CMAJ*. 2009;180(9):942-945.

Sucher JF, Moore FA, Todd R, Sailors M, McKinley BA. Computerized clinical decision support: a technology to implement and validate evidence based guidelines. *J Trauma*. 2008;64(2):520-537.

Swenson SL, Buell S, Zettler P, White M, Ruston DC, Lo B. Patient-centered communication: do patients really prefer it? *J Gen Intern Med*. 2004;19(11):1069-1079.

Thielke S, Hammond K, Helbig S. Copying and pasting of examinations within the electronic medical record. *Int J Med Inform*. 2007;76 Suppl 1:S122-S128.

Thomas SB, Quinn SC. The Tuskegee Syphilis Study, 1932 to 1972: implications for HIV education and AIDS risk education programs in the black community. *Am J Public Health*. 1991;81(11):1498-1505.

US Department of Health and Human Services. Certificates of confidentiality kiosk. http://grants.nih.gov/grants/policy/coc/. Accessed February 16, 2011.

US Department of Health and Human Services. Electronic health records and meaningful use. http://healthit.hhs.gov/portal/server.pt?open=512&objID=2996&mode=2. Accessed February 15, 2011.

US Department of Health and Human Services. Protection of human subjects. 45 CFR sec 46. http://ohsr.od.nih.gov/guidelines/45cfr46.html. Accessed February 16, 2011.

Wensing M, Jung HP, Mainz J, Olesen F, Grol R. A systematic review of the literature on patient priorities for general practice care. Part 1: Description of the research domain. *Soc Sci Med*. 1998;47(10):1573-1588.

Virtual Mentor

About the Contributors

Theme Issue Editor
Anthony C. Rudine, MD, MBA, is a third-year resident in the combined internal medicine and pediatrics residency program at the University of Tennessee in Memphis. After residency, he plans to complete a fellowship in neonatal and perinatal medicine and pursue a career as a clinical bioethicist.

Contributors
Jim Atherton, MD, is a third-year pediatric resident at the University of Tennessee in Memphis. He is pursuing fellowship training in pediatric nephrology.

James E. Bailey, MD, MPH, is a professor of medicine and director of the Healthy Memphis Data Center at the University of Tennessee Health Science Center, where he practices internal medicine and educates physicians in training. His research investigates how health system organization and information technology can improve quality and outcomes of care.

Howard Burde, JD, provides general counsel and health law advice to health information technology and health care organizations, payors, and associations such as the Health Information Management Systems Society (HIMSS), the bipartisan Pennsylvania Joint Legislative Committee on Health Reform, and the National Governors' Association e-Health Alliance. He serves on the editorial boards of health law publications, including the *BNA Health Law Reporter* and the *Journal of Health and Life Sciences Law*, and has written four books.

Nabeel Farooqui, MD, is an instructor and serves as director of medical informatics in the Department of Medicine at the University of Tennessee Health Science Center in Memphis.

Timothy Hotze is a senior research assistant in the Institute for Ethics at the American Medical Association in Chicago. His research interests include reducing health care disparities, ensuring equal access to care, and how technological change affects medical ethics.

James B. Lewis Jr., MD, is a professor of medicine at the University of Tennessee Health Science Center and associate chief of staff for education at the VA Medical Center in Memphis. His interests are consultative medicine and medical education.

Alastair MacGregor, MB ChB, MRCGP, is senior vice president and chief medical information officer at Methodist LeBonheur Healthcare in Memphis, Tennessee.

Stephen T. Miller, MD, is a professor of medicine at the University of Tennessee Health Science Center and senior vice president of medical education and research at Methodist LeBonheur Healthcare in Memphis, Tennessee. Formerly, he was program director for an internal medicine residency program.

Alon B. Neidich is a second-year medical student at Tufts University School of Medicine in Boston. He graduated from the University of Chicago with honors and a bachelor's degree in law, letters and society. During the summer of 2010, he served as an intern in the Office of the National Coordinator for Health Information Technology at the U.S. Department of Health and Human Services.

Deborah D. Nelson, MD, is an associate professor at the University of Tennessee Health Science Center in Memphis. Her principal research interest is resident education.

Rexann G. Pickering, PhD, CIP, RN, is the administrator for human protection and administrative director of the institutional review board (IRB) at Methodist LeBonheur Healthcare in Memphis, Tennessee. She is a member of the University of Tennessee Health Science Center IRB.

Kenneth Robertson, MD, MBA, is associate chief medical officer and pediatric physician informaticist at LeBonheur Children's Medical Center in Memphis, Tennessee. He entered hospital administration in 2006, after a 13-year stint in private practice as a pediatrician and practice manager. Dr. Robertson is a member of the American Academy of Pediatricians and represents LeBonheur in the Child Health Corporation of America's chief information officer forum.

Jennifer P. Rudine, PharmD, is a pediatric clinical pharmacist in the emergency department at LeBonheur Children's Hospital in Memphis, Tennessee. She completed a one-year clinical residency in pediatric pharmacy through the University of Tennessee.

Kathryn Ryder, MD, MS, is an associate professor of medicine and preventive medicine at the University of Tennessee Health Science Center and assistant chief of the medical service at the VA Medical Center in Memphis. Her interests are quality improvement and preventive medicine.

Angeline Wang is a second-year medical student at the University of Michigan Medical School in Ann Arbor and a member of the AMA Medical Student Section (AMA-MSS) Committee on Bioethics and Humanities.