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The Clipboard of the Future
Why Health Care Records Are So Low-Tech

The electronics and computing revolutions of the past several decades have reshaped much of medicine, giving us advanced imaging techniques, microchips for monitoring and regulating heart function, and countless new diagnostic tools—not to mention the ubiquity of computers in the labs where basic research is conducted and new treatments are developed. But while the practice of medicine has been transformed, the information infrastructure of health care lags behind. The clinical information system, consisting of patient records and the data needed for determining what constitutes effective medical practice, remains decidedly low-tech. Just about every other American industry—financial services, travel, entertainment, communication, you name it—has been radically remade by new information technology (IT) applications in the last two decades. But not health care.

Most Americans have instantaneous access to their banking records over the Internet. They can see cancelled checks, pay bills, switch investment portfolios, and schedule alerts to help them stay on top of their finances. But they never see their medical records, do not have ready access to their children's immunization history, forget the last time they had their cholesterol checked, do not know if their blood pressure is normal or elevated, and generally have no idea what all the tests they have had over the years mean for the likelihood they may face a serious illness, like cancer or heart disease.

In a field as important and data-dependent as health care, this lack of useful and reliable information is difficult to understand and accept—especially since the needed data is generally collected and stored, just not in a format that is usable.

The problem starts in doctors' offices. Most physicians—at least four out of five, according to researchers

at RAND—continue to keep their patients' records on paper or in isolated computer files which cannot be shared or accessed by others. When doctors see patients, it remains the norm to fill out a paper form to record their observations. When a diagnostic test is performed, even if a report is generated by a computer, a paper copy is what gets kept in the patient's file. No electronic copy is transmitted to the doctor or the patient. When the patient is sick and needs a prescription drug, that too is written down, with a scribbled note given to the patient to take to the pharmacy, and a copy or similar record placed in their file.

All of this data could be permanently recorded electronically, but it generally isn't. Moreover, those doctors and medical institutions that do store their clinical records in an electronic format do so mainly for their own internal, operational reasons. By and large, this data is not accessible by patients, and, more often than not, it cannot even be shared with other health care professionals using computerized recordkeeping because there is no uniform standard for medical data systems.

The paper-based nature of most medical records can make coordination among a team of physicians attending to a patient much more difficult than it needs to be. Frequently, when a patient goes to see a specialist for the first time, none of the records kept by his primary care physician are accessible to the new doctor. The specialist will typically order a whole new series of diagnostic tests to ensure the file he starts

contains records he can trust, even if the same tests were just performed at the request of the other physician. Not only is this duplication costly, it also undermines quality care, as the patient is in danger of getting conflicting treatment plans based on competing and incomplete patient records.

Paper-based clinical records also hinder the evaluation of what should constitute standard medical practice. Today, much of what physicians do for patients has surprisingly little support in clinical evidence. New technologies, surgical procedures, and drug treatments are all too often brought into mainstream medical practice based on narrowly-constructed trials and intuition, not hard evidence. With patient records stored on paper instead of on computers, it is much more difficult to aggregate and analyze the actual data in order to determine what works and what doesn't work in the real world. Consequently, as cost increases put pressure on family and government budgets, the country remains poorly equipped to make distinctions between wasteful and necessary services.

Why is it that entrepreneurial initiative has harnessed science and technology to make dramatic advances in the practice of medicine but the health information system remains archaic and paper-bound? This paradox gets to the heart of why health care in the United States is simultaneously so impressive and so frustrating. American hospitals and clinics can perform what amount to medical miracles when confronted with patients in crisis. But good health

care requires more than just access to spectacular technology in emergencies. It requires accurate, timely and complete patient medical records, which form the basis for making sound ongoing decisions about the care patients need, including when it is appropriate to use the impressive but expensive array of advanced medical technology and when less heroic measures are called for.

The opportunity cost of inaccessible and unused data is particularly high for the millions of Americans suffering from chronic conditions such as diabetes and heart disease. These patients would benefit from regular, systematic analyses of their condition based on automated reviews of their key health indicators. A well-functioning system would send electronic alerts to these patients—as well as to those at risk of developing such chronic diseases—to help reinforce an effective prevention plan. Unfortunately, given the current state of automation and electronic recordkeeping, it will likely be many years before such a system can be put into place.

Perhaps there is some comfort in knowing that federal health officials are on the case, so to speak. One lengthy government report sums up the situation this way:

> Today's medical care institutions encounter problems coordinating and communicating massive quantities of data necessary for clinical care.…Physicians are also faced with the task of memorizing

information about new diagnostic tests and treatments, knowledge that must be constantly updated.…The application of computer technology offers a possible solution to these problems.…[New information technology] promises to change the medical record from a historical document to timely, accurate information that is instantly available to all those involved with the patient.

Sadly, this report was written three decades ago, in 1977. The authors, analysts in the congressional Office of Technology Assessment (OTA), were clearly ahead of their time. But, even so, it is startling how little has changed in thirty years. It remains the case that "computer technology" holds great promise to dramatically improve the quality of health care in the United States. But, just as in 1977, it remains a promise, not a reality. (Alas, OTA's analysts were apparently so far ahead of their time that no one seemed to have remembered their prescience when Republicans took over Congress and closed the office in the mid-1990s.)

In recent years, national political leaders, including Newt Gingrich, the former Speaker of the House of Representatives, have sounded the alarm, urging doctors and hospitals to make health information technology (HIT) a major priority. They have been spurred on by high profile research efforts which have laid bare the surprisingly widespread shortcomings in the quality of U.S. health care. One

recent study showed that Americans get appropriate care from their doctors only about half of the time. The landmark Institute of Medicine study from 2000, *To Err Is Human: Building a Safer Health System*, estimated that between 44,000 and 98,000 Americans die each year in American hospitals due to avoidable mistakes. A more recent study from the institute shows that 7,000 Americans die annually from erroneous prescriptions, often due to illegible writing or undetected contraindications with other medications. Many of these deaths would have been prevented with a better health information system, including electronic communication between doctors and pharmacies.

This deadly status quo is especially frustrating because, unlike in 1977, it is now easy to conceive how a better system could be built using existing technology. Most HIT proponents envision a system built around every American having a personalized, Internet-based electronic health record. The patient would always be able to view this record, but could only enter data into certain sections of the record set aside for such a purpose, such as self-administered glucose tests. The main sections of the record would be reserved for physician and hospital-generated data—using standardized formatting—that could be viewed but not altered by others to ensure consistent ownership and data integrity. Pertinent clinical information in this permanent online health record could be automatically uploaded into patient records in compatible physician and hospital electronic filing systems.

Once such a system is in place, a patient would be able to take his "file" with him wherever he goes. Every time he sees a new physician, he could provide that doctor with access to his full, lifelong medical file, and the data generated by his visit would get recorded for the next physician to view. Physicians would also be able to issue orders for lab tests and prescriptions over the Internet, with the lab results and prescription history automatically uploaded into the medical record as well.

Still, the question remains: If the imperative for dramatic improvement and the desired goal are both clear, why is it taking so long?

Some observers have surmised that the slow pace of HIT adoption is due to concerns about the privacy and security of the data. But the willingness of many Americans to accept some risk to their privacy in exchange for convenience is apparent in the wide use of the Internet for banking, shopping, and other services involving personal information. If patients could make greater use of the Internet to improve their interactions with their doctors, many millions would, even if a segment of the population refused to participate because of concerns over privacy.

Another reason sometimes offered to explain the slow progress of HIT has been the lack of clear standards for the format of the data and its transmission. For an HIT system to be fully functional, it needs to be

interoperable—which is to say that one doctor's computers need to be able to transmit and receive data in a format recognizable by the computers of other participants in the system, such as hospitals, other physicians' offices, and diagnostic labs. Otherwise, the lack of data coordination prevalent today would continue, even if an individual physician fully automated his own patient records. Many physicians and hospitals say that it simply makes no sense for them to invest in automation before the federal government helps sort out what standards will apply to everyone.

They have a point, of course, and the Bush administration agrees this is a serious problem. Mike Leavitt, the Secretary of the Department of Health and Human Services (HHS) has been President Bush's point man for HIT adoption. He has made achieving consensus on data standards one of his department's priorities, and the effort is beginning to bring results. HHS recently announced initial electronic standards for recording a patient's medication history, which will lay the groundwork for a full-scale e-prescription effort. It is possible that, after years of haggling, there may soon be consensus on at least the barebones basics of what an electronic system might look like.

Still, although lack of standards has clearly contributed to the slow adoption of HIT, it isn't the primary reason. Other industries have faced a similar obstacle and overcome it more quickly as consensus emerged on standards.

Instead, the most fundamental impediment to widespread HIT adoption is *money*. Doctors and hospitals don't want to invest in electronic records and convenient HIT systems—and may not want to even when agreement on standards is reached—largely because such investments do not produce a financial return. The main beneficiaries of an improved HIT system are, first, the patients who will gain new and more convenient access to their medical records, and second, the health care system at large, which will operate more efficiently. The physicians and hospital owners—those expected to buy the HIT hardware and software—stand to lose their monopoly control over clinical information and get paid nothing more for their efforts. Indeed, if all goes well, many experts believe HIT will bring about reduced demand for physician services and cut hospital admissions, as better information improves prevention and discourages the ineffective use of medical services.

Other sectors of our economy do not work that way. In financial services, for instance, when a bank invests in new and convenient ways for customers to access their personal financial information, the bank does so with the full expectation that the investment will attract new customers and improve its bottom line. But the health care industry is different. The primary payers of medical bills are not the consumers—that is, the patients—but rather insurance plans and government programs like Medicare and Medicaid. Consequently, the normal marketplace

dynamic of suppliers competing with each other based on price and services is weak, almost nonexistent. Doctors and hospitals do not need to add convenient electronic information to their service provision because their payments will be the same either way. Indeed, most health insurers are mildly supportive of an improved HIT system—so long as they do not have to pay higher reimbursement rates for medical claims.

An illuminating contrast can be found in the development of other health care technologies, like new tools for diagnosing and treating patients. There are strong financial incentives to develop such new tools because of Medicare's payment system, under which physicians and hospitals are paid a fee for each service they perform on behalf of Medicare patients. Manufacturers of innovative medical technologies know this and work very hard to make sure their products are either treated as new line-items in the payment system or are accommodated with increased reimbursement of an existing test, service, or procedure. Once Medicare begins paying for a new technology, private insurers generally do so as well, and the product quickly becomes part of standard practice, all but guaranteeing that the investment will pay off for both the manufacturer and the doctors or hospitals who buy it.

Investments in HIT are different. While they help to improve the use of hospital and physician services in general, they do not involve the direct provision of medical services to patients—so it is much more difficult to finance HIT with higher payments for Medicare-covered services.

The slow movement toward HIT has left a vacuum that non-traditional players are seeking to fill. WebMD and Revolution Health are high profile, Internet-based businesses that want to be on the cutting edge of consumer-empowerment in health care. (The latter was founded by Steve Case, the cofounder of America Online.) Many other tech companies are investing and exploring their business options, including Cisco and Google, although they are proceeding with caution given the complexity of the issues and the potential for investing much and gaining little. There is a smattering of other efforts, too, like Dossia, a joint project by several major companies (including Wal-Mart, AT&T, and BP America) to develop a system of lifelong personal health records for their employees.

So far, the most noteworthy system for storing electronic medical records is Health Vault, launched by Microsoft in October 2007. It allows enrollees to create a free-of-charge, patient-controlled account for storing medical information in a secure, Microsoft-owned, data repository. For the immediate future, it is likely that Health Vault will be used mainly to house patient-generated information such as self-administered tests. Neither Microsoft nor the account-owners can compel physicians and hospitals to upload their patient records into the web-based accounts. Still, it's a start, and, in time, Microsoft is clearly hoping Health Vault will

become the *de facto* industry standard. To build momentum, the company is signing agreements with hospitals and physician networks to use the Health Vault system to upload and share their patient medical records. If enough patients, hospitals, and physicians affiliate with Health Vault, Microsoft could in time find itself in the same dominant position in HIT that it has held in personal computing and the Internet for years (think Windows and Internet Explorer).

But it's a long way from here to there. Not even Microsoft has the reach and resources to finance a nationwide network on its own if the participants are unwilling and need compensation to overcome their natural resistance. Over the long run, an HIT system will be built, maintained, and used efficiently when physicians and hospitals have an interest in using it in order to maintain their market share. To get there will require strengthening the normal supplier-consumer relationship that works so well to promote productivity and improve quality in other markets. In health care, a larger role for direct consumer purchasing of services—instead of the present near-total reliance on third-party payments—is crucial. If consumers begin paying for more medical services with their own money, they will be in a much stronger position to demand the convenience and higher quality associated with an efficient and reliable electronic system of recordkeeping and transactions.

The shift to more consumer-directed financing, however, is not around the corner. Low deductible employer-based insurance and Medicare and Medicaid are so dominant that it will take many years before alternative arrangements, like Health Savings Accounts, can have a significant impact. HIT adoption is therefore likely to remain an uphill struggle for the foreseeable future, necessitating an ongoing campaign of cajoling and financial support from the government to overcome the understandable if frustrating reluctance of physicians and hospitals to pay for an information system that produces gains for the overall system but losses for themselves.

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