HEALTH & MEDICINE

SHOULD GOVERNMENT SUBSIDIZE AND REGULATE ELECTRONIC HEALTH RECORDS?

Current law may be locking in deficient technology.

BY MICHAEL L. MARLOW

Health information technology innovation focuses on electronic health records (EHRs), which can collect, store, and transmit health information within electronic health information exchanges. Exchanges enable doctors, nurses, pharmacists, other health care providers, and patients to gain access to and share medical information electronically in ways that potentially improve the speed, quality, and safety of patient care.

The potential benefits of EHRs are clear, given that the practice of medicine frequently relies on seemingly archaic methods of information delivery. These benefits, along with the perception that providers were too slow in adopting EHRs, motivated passage of the 2009 Health Information Technology for Economic and Clinical Health Act. That act authorized financial incentives of $30 billion to eligible hospitals and professionals through Medicare and Medicaid to adopt and meaningfully use certified EHR technology.

Despite the laudable intent, government subsidies for EHR adoptions have "locked in" immature technology rather than spurred innovations that would otherwise have evolved over time. Lost opportunities for better patient care at lower expense are one major cost of the subsidy program. In place of the subsidies, government should adopt policies that are more likely to promote innovation that will improve public health.

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WHAT ARE EHRS?

Most medical information is still stored on paper—for instance, in filing cabinets at various medical offices or in boxes and folders in patients' homes. When information is shared between providers, it often happens by mail, fax, or by way of patients themselves, who frequently carry their records from appointment to appointment. Current systems thus require users of information to duplicate past information numerous times. These systems are prone to missing data and to other mishaps that burden the health care system.

EHRs can record and store a treasure trove of data, including demographic information; problem list and active and past diagnoses; laboratory test orders and results; current prescriptions; radiological images and reports; hospitalization information; consultant reports; immunizations; pathology reports; social history; allergies; health screening study results; and physician, nurse, social worker, and physical therapy notes. Public health agencies and health care providers can also potentially receive updates on active disease outbreaks, diagnoses, and treatment recommendations.

Fully interoperable systems are a key assumption behind government promises that EHRs will reduce hospital readmissions and medication errors, improve diagnoses, and decrease duplicate testing. Promises rest on the assumption that patient information will need to be recorded only once and will be easily accessible to all future providers through shared informational exchanges.

SUBSIDY PROGRAM BASICS

Barack Obama, at the time the president-elect, summarized his support for EHR subsidies in a speech on January 8, 2009:

> To improve the quality of our health care while lowering its cost, we will make the immediate investments necessary to ensure that, within five years, all of America's medical records are computerized. This will cut waste, eliminate red tape, and reduce the need to repeat expensive medical tests. But it just won't save billions of dollars and thousands of jobs; it will save lives by reducing the deadly but preventable medical errors that pervade our health care system.

THINKSTOCK

Professionals and hospitals participating in the Medicare and Medicaid programs became eligible for financial incentives to adopt EHRs in 2011. Medicare-eligible providers include doctors of medicine or osteopathy, doctors of dental surgery or dental medicine, doctors of podiatric medicine, doctors of optometry, and chiropractors. Medicaid-eligible providers include physicians, nurse practitioners, certified nurse-midwives, dentists, and physician assistants. As of September 2015, more than 478,000 health care providers had received payments for participating in the EHR incentive programs, according to the Centers for Medicare and Medicaid Services.

Recipients must successfully demonstrate "meaningful use" (MU), as defined by the government, for each year of participation in the program. Beginning in 2015, recipients who fail to successfully demonstrate MU of EHRs became subject to Medicare and Medicaid payment reductions that start at 1% and increase each year that the professional does not demonstrate MU, to a maximum of 5%. Hospitals that do not successfully demonstrate MU of certified EHR technology also became subject to payment reductions beginning in 2015.

IS THERE MARKET FAILURE?

Government subsidies are often justified by claims of "market failure"—the notion that obstructions keep certain markets from being

acceptably efficient. Several different types of market failure are said to affect EHRs. Do these claims have merit?

Network externalities / Network effects occur when an increase in the number of users of some good raises benefits for all users. Telephone and fax technology offer good examples: benefits in the overall sharing network grow with the expansion of adopters. Markets fail as long as there are potential adopters who wait for others, because those holdouts are not taking into account benefits that accrue to all others in the network.

EHR technology appears to fit this profile because fully interoperable sharing networks will not emerge as long as network externalities cause potential adopters to delay adoption as they wait for others to adopt first. Businesses that simply focus on how their own costs will change or how treatment will change for only their patients (or both) would likely delay EHR adoption. Underinvestment in EHR—a symptom of market failure—is predictable as long as individuals narrowly focus on their own situation and ignore benefits to others.

But blanket use of the network externalities argument for market failure is not entirely convincing simply because networks currently lack interoperability. The network externalities argument applies to the cases in which fully interoperable systems are available for all potential users—a "perfect" scenario that does not exist today.

In a 2013 paper, Michael Furukawa et al. analyzed EHR activity at 2,805 hospitals in 2008 and 2,836 hospitals in 2012. They found that exchanges of clinical information (for example, problem list, medication list, medication allergies, and diagnostic test results) with outside providers increased significantly between 2008 and 2012, but a majority of hospitals still did not electronically exchange clinical care summaries and medication lists. A 2016 paper by Jeanne Madden et al. found that one major EHR system was missing roughly half of the clinical information for its patients in 2009. This study focused on insurance claims for depression and bipolar disorders, mood disorders that affect roughly 10% of the adult population. Apparently, "missing" information is common when patients protect their privacy by seeking behavioral care at a separate location from their somatic care.

In sum, today's technology lacks interoperability. Thus, current adoption rates cannot be deemed symptoms of underinvestment as long as businesses that fail to adopt are reacting to concerns that EHR investments today do not guarantee interoperable systems today or tomorrow.

Free-rider problems / A business that invests in research may find that it is difficult to exclude other firms from benefiting from the knowledge resulting from that research. One firm conducting research must absorb all costs, but other firms "free ride" on benefits without incurring costs. Thus it becomes less likely that any single firm would find such research profitable. Markets are likely to underinvest in beneficial research when such research is subject to "free riding."

Underinvestment in interoperable systems like EHRs is likely as long as it remains difficult to exclude those who do not invest in research from benefiting from the research. Predictably, research is tilted toward non-interoperable systems when it is difficult to exclude free riders from benefiting from investments in interoperable systems. EHR vendors are thus reluctant to fund research on interoperable systems and face incentives to discourage data sharing with other vendors. Government policies that promote EHR systems should thus focus only on research into interoperable systems that allow the seamless sharing of health information with all other health providers.

Incomplete information / Incomplete information on the benefits and costs of goods and services hampers the ability of markets to allocate resources efficiently. Yet a market failure will arise only when there is information that is known to some, such as government policymakers, but that remains unknown or not effectively communicated to market participants.

It is difficult to argue that EHR systems are a classic case of incomplete information market failure simply because the benefits and costs of such systems remain speculative. EHR technology may also be initially disruptive, may pose harm to patients, is not interoperable, and is subject to rapidly changing standards. Recent reports that health records are not entirely safe raise an additional layer of complexity to the uncertainty surrounding EHR adoptions. Research by the Ponemon Institute estimates that of the 2.32 million Americans who have been victims of medical identity theft, almost 500,000 cases were in 2014 alone.

In sum, the evidence indicates that the case for market failure because of lack of information is unpersuasive. Waiting on the sidelines before fully committing to EHR purchases may be an efficient choice for those concerned with the many uncertainties surrounding costs and benefits of EHR systems.

EMPIRICAL LITERATURE ASSESSMENT

The empirical literature indicates ongoing uncertainty over the benefits and costs of EHR systems. Meta-analysis studies that combine the results of multiple scientific studies offer the best evidence to date. The basic idea is to uncover a common signal stemming from similar studies, but whose results have been measured with errors within each study. In effect, meta-analysis produces a weighted average of results from similar studies and requires researchers to identify a statistical measure common to these studies so that a weighted average can be calculated. Weighting usually considers sample sizes of the included studies, but study quality and other factors can also be considered. Meta-analysis is not without problems, but combining similar studies is believed to yield statistical power greater than that derived by examining studies in isolation.

Writing in *Critical Care Medicine* in 2015, Gwen Thompson et al. conducted a systematic review of the literature on whether EHRs

influence mortality, length of stay, and cost in hospitals. Of the 2,803 studies they screened, 45 met selection criteria (1.6%), and the authors extracted data on the year, design, intervention type, system used, comparator, sample sizes, and effect on outcomes. No substantial effects on mortality, length of stay, or cost were determined. The authors noted that the pool of studies examined was small because of the heterogeneity of study populations, interventions, and endpoints, and that the size of the pool may have influenced their findings. For example, they could not quantitatively evaluate costs.

A *Health Affairs* paper that same year by Saurabh Rahurkar et al. examined 27 scientific studies and concluded that the current state of the literature does not provide sufficient rigorous evidence for benefits from EHRs. The authors extracted selected characteristics from each study and then meta-analyzed those characteristics for trends that indicate whether EHRs affected cost, service use, and quality. While 57% of the studies reported some benefit, those employing strong study designs (e.g., RCTs or quasi-experiments) were significantly less likely to report benefits. Among six articles with strong study designs, one study reported negative effects, three found no effect, and two reported that EHRs led to benefits. The authors concluded that little generalizable evidence exists regarding benefits.

Uncertainty pervades the evidence on what effects EHRs can be expected to exert on patient care and health care costs. It thus comes as no surprise that the market response to EHRs has been less enthusiastic than expected.

In sum, uncertainty pervades the evidence on what effects EHRs can be expected to exert on patient care and health care costs. That the market response to EHRs has been less enthusiastic than what the systems' early proponents had speculated comes as no surprise when there is so little evidence of their benefits.

EHR SUBSIDY PROGRAM FAILURES

Not only does the EHR program have questionable justifications, but its implementation has been badly flawed. A review of those flaws raises further questions about the program.

Program rushed to policy / As explained by Margo Edmunds et al., the EHR program was intended as a sort of "arranged marriage" between a Keynesian stimulus effort and a massive introduction of technology. The program significantly underestimated the degree of cultural and organizational change required for its success. Recall that Obama pledged that subsidies would result in all medical records being computerized within five years; that came nowhere close to happening.

A kind interpretation is that the Obama administration was too optimistic about meeting its various promises by 2015. Spurring technological innovation in a health care market that accounted for 17.8% of GDP in 2015 is undeniably ambitious. Consider, as well, a subset of the many interactions involved in a nationwide rollout of EHRs:

- 83.2% of American adults and 92.4% of American children had contact with a health care professional in 2013.
- 929 million physician office visits were made in 2014.
- 126 million hospital outpatient visits were made in 2014.
- The 5,627 hospitals in the United States had nearly 35 million total admissions in 2014.
- In 2014, there were 708,300 physicians and surgeons, 591,300 medical assistants, 297,100 pharmacists, 210,900 physical therapists, 151,500 dentists, 200,500 dental hygienists, 40,600 optometrists, and 45,200 chiropractors operating in the United States.

Subsidies locking in immature and incentivized technology / Risks are abundant when pursuing immature technology. One of those risks involves the costs of not waiting for more developed technology and instead "locking in" immature standards. In a 2009 paper, Michael Christensen and Dahlia Remler argued that the value of delaying EHR investments would be considerable because errors inadvertently introduced by immature technology are more devastating, more salient, more attention-getting, and more prone to engender strong emotions in the health care industry than in other industries (e.g., banking and insurance). The costs of switching to a different system are also especially large in health care because of the many actors: patients, providers, insurers, and government entities.

Aggressive promotion by government also exacerbates existing problems by encouraging the purchase of today's hard-to-use systems that will be costly to replace at a later date. If market forces were allowed to work, providers might drive vendors to produce more usable products than the current systems that have been rushed to market because of time-limited subsidies. Current technology, for example, requires users to read thick manuals, attend tedious classes, and pay for periodic tutoring so that they can "master" the steps required to enter and retrieve data. Locking-in immature technology as a result of government subsidies is not wise public policy.

Subsidy payments also push technology toward incentivized activities and away from non-incentivized activities. A 2014 study by Andrew Ryan et al. examined 143 medical practices that imple-

mented EHRs over 2009–2011, where 71 practices were randomized to receive financial incentives and quality feedback and 72 were randomized to receive feedback alone. The authors estimated the associations between exposure to clinical decision support, financial incentives, and quality of care. They also estimated associations for four cardiovascular quality measures that were rewarded by the financial incentive program and four quality measures that were not rewarded by incentives. Incentives were consistently associated with higher performance for incentivized measures and lower performance for non-incentivized measures. The incentive system may have also encouraged practitioners to pay less attention to non-incentivized measures that may also improve public health, such as reducing the incidence of inappropriate prescribing.

The subsidies simply accelerated an ongoing trend; the rate of adoption realized by 2011 would have been achieved in 2013 without subsidies. That acceleration may not be preferable to awaiting better technology.

Research indicates that government subsidies merely accelerated EHR adoptions that were likely to have occurred without financial subsidies. A 2014 National Bureau of Economic Research paper by David Dranove et al. found that subsidies caused one in five non-adopters to adopt EHR technology by 2011. The authors concluded that subsidies simply accelerated an ongoing trend and therefore the rate of adoption realized by 2011 would have been achieved by 2013 without subsidies. Subsidies thus pushed the adoption rate up by at most two years. The authors question the incentive program because briefly accelerating adoption is not clearly desirable when waiting for better technology is more prudent.

CONCLUSION

The EHR subsidy program is a prime example of how ill-suited government is in attempting to steer technology. Time-sensitive subsidies enticed many health care providers to purchase poorly functioning systems that will either have to undergo substantial and costly modification or simply be scrapped. Federal officials have only recently admitted that their attempts to steer universal data exchange need reform, though it remains unclear what system will replace the original program. Meanwhile, the program has wasted resources, locking in immature technologies by enticing adopters into the government subsidy program. It is thus not surprising that promised gains in patient care and reduced costs have yet to appear.

The best that government can do may be to establish a standard, similar to our convention of driving cars on the right side of the road or our system of weights and measures. In this case, a standard simply could mandate which data must be collected, with the added requirement that all data files must be available for sharing with all health providers at low or zero cost. Of course, the government could err by asking for too much data or by not requiring the right data. But the point is that setting standards on data collection with interoperability mandates makes sense provided that the timeline allows the best system to emerge from the market.

Government is no match for the ability and incentives of market participants in steering innovation. It is foolish to mandate deadlines for the arrival of mature technologies. The prudent role for government is patience with an evolving technology that promises to improve the efficiency of our health care system. A farsighted government allows technology to emerge rather than dictate an evolving technology that promises to improve our health care system. Markets then have a fighting chance at innovating EHR systems that improve public health and lower health care costs. *R*

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