

Death by a Thousand Clicks: Where Electronic Health Records Went Wrong

The U.S. government claimed that turning American medical charts into electronic records would make health care better, safer, and cheaper. Ten years and \$36 billion later, the system is an unholy mess: Inside a digital revolution gone wrong. A joint investigation by Fortune and Kaiser Health News.

By [Erika Fry](#) and [Fred Schulte](#)

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The pain radiated from the top of Annette Monachelli's head, and it got worse when she changed positions. It didn't feel like her usual migraine. The 47-year-old Vermont attorney turned innkeeper visited her local doctor at the Stowe Family Practice twice about the problem in late November 2012, but got little relief.

Two months later, Monachelli was dead of a brain aneurysm, a condition that, despite the symptoms and the appointments, had never been tested for or diagnosed until she turned up in the emergency room days before her death.

Monachelli's husband sued Stowe, the federally qualified health center the physician worked for. Owen Foster, a newly hired assistant U.S. attorney with the District of Vermont, was assigned to defend the government. Though it looked to be a standard medical malpractice case, Foster was on the cusp of discovering something much bigger—what his boss, U.S. Attorney Christina Nolan, calls the “frontier of health care fraud”—and prosecuting a first-of-its-kind case that landed the largest-ever financial recovery in Vermont’s history.

Foster began with Monachelli’s medical records, which offered a puzzle. Her doctor had considered the possibility of an aneurysm and, to rule it out, had ordered a head scan through the clinic’s software system, the government alleged in court filings. The test, in theory, would have caught the bleeding in Monachelli’s brain. But the order never made it to the lab; it had never been transmitted.

The software in question was an electronic health records system, or EHR, made by eClinicalWorks (eCW), one of the leading sellers of record-keeping software for physicians in America, currently used by 850,000 health professionals in the U.S. It didn't take long for Foster to assemble a dossier of troubling reports—Better Business Bureau complaints, issues flagged on an eCW user board, and legal cases filed around the country—suggesting the company's technology didn't work quite like it said it did.

Until this point, Foster, like most Americans, knew next to nothing about electronic medical records, but he was quickly amassing clues that eCW's software had major problems—some of which put patients, like Annette Monachelli, at risk.

Damning evidence came from a whistleblower claim filed in 2011 against the company. Brendan Delaney, a British cop turned EHR expert, was hired in 2010 by New York City to work on the eCW implementation at Rikers Island, a jail complex that then had more than 100,000 inmates. But soon after he was hired, Delaney noticed scores of troubling problems with the system, which became the basis for his lawsuit. The patient medication lists weren't reliable; prescribed drugs would not show up, while discontinued drugs would appear as current, according to the complaint. The EHR would sometimes display one patient's medication profile accompanied by the physician's note for a different patient, making it easy to misdiagnose or prescribe a drug to the wrong individual. Prescriptions, some 30,000 of them in 2010, lacked proper start and stop dates, introducing the opportunity for under- or overmedication. The eCW system did not reliably track lab results, concluded Delaney, who tallied 1,884 tests for which they had never gotten outcomes.

The District of Vermont launched an official federal investigation in 2015.



Photograph by The Voorhes for Fortune

eCW's spaghetti code was so buggy that when one glitch got fixed, another would develop, the government found. The user interface offered a few ways to order a lab test or diagnostic

image, for example, but not all of them seemed to function. The software would detect and warn users of dangerous drug interactions, but unbeknownst to physicians, the alerts stopped if the drug order was customized. “It would be like if I was driving with the radio on and the windshield wipers going and when I hit the turn signal, the brakes suddenly didn’t work,” says Foster.

The eCW system also failed to use the standard drug codes, and in some instances, lab and diagnosis codes as well, the government alleged.

The case never got to a jury. In May 2017, eCW paid a \$155 million settlement to the government over alleged “false claims” and kickbacks—one physician made tens of thousands of dollars—to clients who promoted its product. Despite the record settlement, the company denied wrongdoing; eCW did not respond to numerous requests for comment.

If there is a kicker to this tale, it is this: The U.S. government bankrolled the adoption of this software—and continues to pay for it. Or we should say: You do.

Which brings us to the strange, sad, and aggravating story that unfolds below. It is not about one lawsuit or a piece of sloppy technology. Rather, it’s about a trouble-prone industry that intersects, in the most personal way, with every one of our lives. It’s about a \$3.7-trillion-dollar health care system idling at the crossroads of progress. And it’s about a slew of unintended consequences—the surprising casualties of a big idea whose time had seemingly come.

The Virtual Magic Bullet

Electronic health records were supposed to do a lot: make medicine safer, bring higher-quality care, empower patients, and yes, even save money. Boosters heralded an age when researchers could harness the big data within to reveal the most effective treatments for disease and sharply reduce medical errors. Patients, in turn, would have truly portable health records, being able to share their medical histories in a flash with doctors and hospitals anywhere in the country—essential when life-and-death decisions are being made in the ER.

But 10 years after President Barack Obama signed a law to accelerate the digitization of medical records—with the federal government, so far, sinking \$36 billion into the effort—America has little to show for its investment. Kaiser Health News (KHN) and *Fortune* spoke with more than 100 physicians, patients, IT experts and administrators, health policy leaders, attorneys, top government officials, and representatives at more than a half-dozen EHR vendors, including the CEOs of two of the companies. The interviews reveal a tragic missed opportunity: Rather than an electronic ecosystem of information, the nation’s thousands of EHRs largely remain a sprawling, disconnected patchwork. Moreover, the effort has handcuffed health providers to technology they mostly can’t stand and has enriched and empowered the \$13-billion-a-year industry that sells it.



Joe Biden watches Barack Obama sign the American Recovery and Reinvestment Act in February 2009, which included a stimulus for electronic health records

Charles Ommanney—Getty Images

By one measure, certainly, the effort has achieved what it set out to do: Today, 96% of hospitals have adopted EHRs, up from just 9% in 2008. But on most other counts, the newly installed technology has fallen well short. Physicians complain about clumsy, unintuitive systems and the number of hours spent clicking, typing, and trying to navigate them—which is more than the hours they spend with patients. Unlike, say, with the global network of ATMs, the proprietary EHR systems made by more than 700 vendors routinely don't talk to one another, meaning that doctors still resort to transferring medical data via fax and CD-ROM. Patients, meanwhile, still struggle to access their own records—and, sometimes, just plain can't.

Instead of reducing costs, many say EHRs, which were originally optimized for billing rather than for patient care, have instead made it easier to engage in “upcoding” or bill inflation (though some say the systems also make such fraud easier to catch).

More gravely still, a months-long joint investigation by KHN and *Fortune* has found that instead of streamlining medicine, the government's EHR initiative has created a host of largely unacknowledged patient safety risks. Our investigation found that alarming reports of patient deaths, serious injuries, and near misses—thousands of them—tied to software glitches, user errors, or other flaws have piled up, largely unseen, in various government-funded and private repositories.

Compounding the problem are entrenched secrecy policies that continue to keep software failures out of public view. EHR vendors often impose contractual “gag clauses” that discourage buyers from speaking out about safety issues and disastrous software installations—though some customers have taken to the courts to air their grievances. Plaintiffs, moreover, say hospitals often fight to withhold records from injured patients or

their families. Indeed, two doctors who spoke candidly about the problems they faced with EHRs later asked that their names not be used, adding that they were forbidden by their health care organizations to talk. Says Assistant U.S. Attorney Foster, the EHR vendors “are protected by a shield of silence.”

Though the software has reduced some types of clinical mistakes common in the era of handwritten notes, Raj Ratwani, a researcher at MedStar Health in Washington, D.C., has documented new patterns of medical errors tied to EHRs that he believes are both perilous and preventable. “The fact that we’re not able to broadcast that nationally and solve these issues immediately, and that another patient somewhere else may be harmed by the very same issue—that just can’t happen,” he says.

David Blumenthal, who, as Obama’s national coordinator for health information technology, was one of the architects of the EHR initiative, acknowledges to KHN and *Fortune* that electronic health records “have not fulfilled their potential. I think few would argue they have.”



MedStar's Raj Ratwani (standing) studies eyetracking with Dr. Zach Hettinger to see how doctors interact with EHRs

Photograph by T.J. Kirkpatrick for *Fortune*

The former President has likewise singled out the effort as one of his most disappointing, bemoaning in a January 2017 interview with Vox “the fact that there are still just mountains of paperwork ... and the doctors still have to input stuff, and the nurses are spending all their time on all this administrative work. We put a big slug of money into trying to encourage everyone to digitalize, to catch up with the rest of the world ... that’s been harder than we expected.”

Seema Verma, the current chief of the Centers for Medicare and Medicaid Services (CMS), which oversees the EHR effort today, shudders at the billions of dollars spent building

software that doesn't share data—an electronic bridge to nowhere. "Providers developed their own systems that may or may not even have worked well for them," she tells KHN and *Fortune* in an interview this February, "but we didn't think about how all these systems connect with one another. That was the real missing piece."

Perhaps none of the initiative's former boosters is quite as frustrated as former Vice President Joe Biden. At a 2017 meeting with health care leaders in Washington, he railed against the infuriating challenge of getting his son Beau's medical records from one hospital to another. "I was stunned when my son for a year was battling Stage 4 glioblastoma," said Biden. "I couldn't get his records. I'm the Vice President of the United States of America ... It was an absolute nightmare. It was ridiculous, absolutely ridiculous, that we're in that circumstance."

Broken Records: Broken Promises

Years after their adoption, electronic health records still haven't lived up to their potential.

[Play Video](#)

A Bridge to Nowhere

As Biden will tell you, the original concept was a smart one. The wave of digitization had swept up virtually every industry, bringing both disruption and, in most cases, greater efficiency. And perhaps none of these industries was more deserving of digital liberation than medicine, where life-measuring and potentially lifesaving data was locked away in paper crypts—stack upon stack of file folders at doctors' offices across the country.

Stowed in steel cabinets, the records were next to useless. Nobody—particularly at the dawn of the age of the iPhone—thought it was a good idea to leave them that way. The problem, say critics, was in the way that policymakers set about to transform them.

"Every single idea was well-meaning and potentially of societal benefit, but the combined burden of all of them hitting clinicians simultaneously made office practice basically impossible," says John Halamka, chief information officer at Beth Israel Deaconess Medical Center, who served on the EHR standards committees under both George W. Bush and Barack Obama. "In America, we have 11 minutes to see a patient, and, you know, you're going to be empathetic, make eye contact, enter about 100 pieces of data, and never commit malpractice. It's not possible!"

4,000



Approximate number of computer clicks
an ER doctor makes over the course of
a single shift, according to an *American
Journal of Emergency Medicine* study

KHN and *Fortune* examined more than two dozen medical negligence cases that have alleged that EHRs either contributed to injuries, had been improperly altered, or were withheld from patients to conceal substandard care. In such cases, the suits typically settle prior to trial with strict confidentiality pledges, so it's often not possible to determine the merits of the allegations. EHR vendors also frequently have contract stipulations, known as "hold harmless clauses," that protect them from liability if hospitals are later sued for medical errors—even if they relate to an issue with the technology.

But lawsuits, like that filed by Fabian Ronisky, which do emerge from this veil, are quite telling.

Ronisky, according to his complaint, arrived by ambulance at Providence Saint John's Health Center in Santa Monica on the afternoon of March 2, 2015. For two days, the young lawyer had been suffering from severe headaches while a disorienting fever left him struggling to tell the 911 operator his address.

Suspecting meningitis, a doctor at the hospital performed a spinal tap, and the next day an infectious disease specialist typed in an order for a critical lab test—a check of the spinal fluid for viruses, including herpes simplex—into the hospital's EHR.

The multimillion-dollar system, manufactured by Epic Systems Corp. and considered by some to be the Cadillac of medical software, had been installed at the hospital about four months earlier. Although the order appeared on Epic's screen, it was not sent to the lab. It turned out, Epic's software didn't fully "interface" with the lab's software, according to a lawsuit Ronisky filed in February 2017 in Los Angeles County Superior Court. His results and diagnosis were delayed—by days, he claims—during which time he suffered irreversible brain damage from herpes encephalitis. The suit alleged the mishap delayed doctors from giving Ronisky a drug called acyclovir that may have minimized damage to his brain.

Epic denied any liability or defects in its software; the company said the doctor failed to push the right button to send the order and that the hospital, not Epic, had configured the interface with the lab. Epic, among the nation's largest manufacturers of computerized health records and the leading provider to most of America's most elite medical centers, quietly paid \$1 million to settle the suit in July 2018, according to court records. The hospital and two doctors paid a total of \$7.5 million, and a case against a third doctor is pending trial. Ronisky, 34, who is fighting to rebuild his life, declined to comment.

Incidents like that which happened to Ronisky—or to Annette Monachelli, for that matter—are surprisingly common, data shows. And the back-and-forth about where the fault lies in such cases is actually part of the problem: The systems are often so confusing (and training on them seldom sufficient) that errors frequently fall into a nether zone of responsibility. It can be hard to tell where human error begins and the technological shortcomings end.

EHRs promised to put all of a patient's records in one place, but often that's the problem. Critical or time-sensitive information routinely gets buried in an endless scroll of data, where

in the rush of medical decision-making—and amid the maze of pulldown menus—it can be missed.

Thirteen-year-old Brooke Dilliplaine, who was severely allergic to dairy, was given a probiotic containing milk. The two doses sent her into “complete respiratory distress” and resulted in a collapsed lung, according to a lawsuit filed by her mother. Rory Staunton, age 12, scraped his arm in gym class and then died of sepsis after ER doctors discharged the boy on the basis of lab results in the EHR that weren’t complete. And then there’s the case of Thomas Eric Duncan. The 42-year-old man was sent home in 2014 from a Dallas hospital infected with Ebola virus. Though a nurse had entered in the EHR his recent travel to Liberia, where an Ebola epidemic was then in full swing, the doctor never saw it. Duncan died a week later.



Bobby and Tara Dilliplaine hold a photo of their late daughter Brooke, who suffered complications when she was given medication she was allergic to. (She later died of causes unrelated to the EHR issue.)
Photograph by Heidi de Marco—KHN

Many such cases end up in court. Typically, doctors and nurses blame faulty technology in the medical-records systems. The EHR vendors blame human error. And meanwhile, the cases mount.

Quantros, a private health-care analytics firm, said it has logged 18,000 EHR-related safety events from 2007 through 2018, 3% of which resulted in patient harm, including seven deaths—a figure that a Quantros director says is “drastically underreported.”

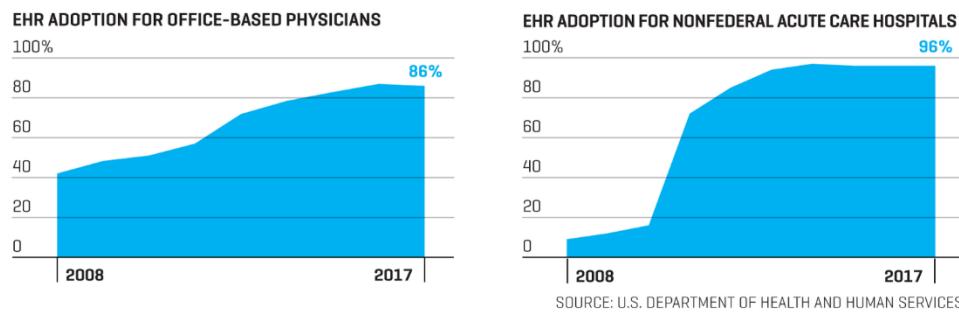
A 2016 study by The Leapfrog Group, a patient-safety watchdog based in Washington, D.C., found that the medication-ordering function of hospital EHRs—a feature required by the government for certification but often configured differently in each system—failed to flag potentially harmful drug orders in 39% of cases in a test simulation. In 13% of those cases, the mistake could have been fatal.

The Pew Charitable Trusts has, for the past few years, run an EHR safety project, taking aim at issues like usability and patient matching—the process of linking the correct medical record to the correct patient—a seemingly basic task at which the systems, even when made by the same EHR vendor, often fail. At some institutions, according to Pew, such matching was accurate only 50% of the time. Patients have discovered mistakes as well: A January survey by the Kaiser Family Foundation found that one in five patients spotted an error in their electronic medical records.

The Joint Commission, which certifies hospitals, has sounded alarms about a number of issues, including false alarms—which account for between 85% and 99% of EHR and medical device alerts. (One study by researchers at Oregon Health & Science University estimated that the average clinician working in the intensive care unit may be exposed to up to 7,000 passive alerts per day.) Such over-warning can be dangerous. Between 2014 and 2018, the commission tallied 170 mostly voluntary reports of patient harm related to alarm management and alert fatigue—the phenomenon in which health workers, so overloaded with unnecessary warnings, ignore the occasional meaningful one. Of those 170 incidents, 101 resulted in patient deaths.

CHARTING A NEW PATH

The stimulus bill accomplished one of its goals in dramatic fashion: driving the rapid adoption of EHRs at physician practices and hospitals.



The Pennsylvania Patient Safety Authority, an independent state agency that collects information about adverse events and incidents, counted 775 “laboratory-test problems” related to health IT between January 2016 and December 2017.

To be sure, medical errors happened en masse in the age of paper medicine, when hospital staffers misinterpreted a physician’s scrawl or read the wrong chart to deadly consequence, for instance. But what is perhaps telling is how many doctors today opt for manual workarounds to their EHRs. Aaron Zachary Hettinger, an emergency medicine physician with MedStar Health in Washington, D.C., says that when he and fellow clinicians need to share critical patient information, they write it on a whiteboard or on a paper towel and leave it on their colleagues’ computer keyboards.

While the FDA doesn’t mandate reporting of EHR safety events—as it does for regulated medical devices—concerned posts have nonetheless proliferated in the [FDA MAUDE database](#) of adverse events, which now serves as an ad hoc bulletin board of warnings about the various systems.

Further complicating the picture is that health providers nearly always tailor their one-size-fits-all EHR systems to their own specifications. Such customization makes every one unique and often hard to compare with others—which, in turn, makes the source of mistakes difficult to determine.

Martin Makary, a surgical oncologist at Johns Hopkins and the coauthor of a much-cited 2016 study that identified medical errors as the third leading cause of death in America, credits EHRs for some safety improvements—including recent changes that have helped put electronic brakes on the opioid epidemic. But, he says, “we’ve swapped one set of problems for another. We used to struggle with handwriting and missing information. We now struggle with a lack of visual cues to know we’re writing and ordering on the correct patient.”

5.9 HOURS



Average time [out of an 11.4-hour workday] doctors spend on EHRs, compared with 5.1 hours spent with patients, according to a 2017 study in the *Annals of Family Medicine*

Joseph Schneider, a pediatrician at UT Southwestern Medical Center, compares the transition we’ve made, from paper records to electronic ones, to moving from horses to automobiles. But in this analogy, he adds, “Our cars have advanced to about the 1960s. They still don’t have seat belts or airbags.”

Schneider recalls one episode when his colleagues couldn’t understand why chunks of their notes would inexplicably disappear. They figured out the problem weeks later after intense study: Physicians had been inputting squiggly brackets—{}—the use of which, unbeknownst to even vendor representatives, deleted the text between them. (The EHR maker initially blamed the doctors, says Schneider.)

A broad coalition of actors, from National Nurses United to the Texas Medical Association to leaders within the FDA, has long called for oversight on electronic-record safety issues. Among the most outspoken is Ratwani, who directs MedStar Health’s National Center on Human Factors in Healthcare, a 30-person institute focused on optimizing the safety and usability of medical technology. Ratwani spent his early career in the defense industry, studying things like the intuitiveness of information displays. When he got to MedStar in 2012, he was stunned by “the types of [digital] interfaces being used” in health care, he says.

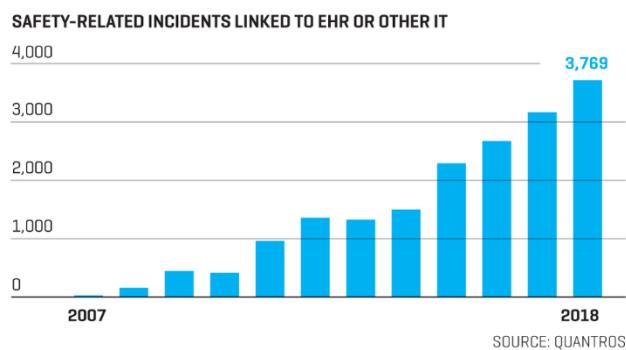
In a study published last year in the journal *Health Affairs*, Ratwani and colleagues studied medication errors at three pediatric hospitals from 2012 to 2017. They discovered that 3,243 of them were owing in part to EHR “usability issues.” Roughly one in five of these could have resulted in patient harm, the researchers found. “Poor interface design and poor

implementations can lead to errors and sometimes death, and that is just unbelievably bad as well as completely fixable,” he says. “We should not have patients harmed this way.”

Using eye-tracking technology, Ratwani has demonstrated on video just how easy it is to make mistakes when performing basic tasks on the nation’s two leading EHR systems. When emergency room doctors went to order Tylenol, for example, they saw a drop-down menu listing 86 options, many of which were irrelevant for the specified patient. They had to read the list carefully, so as not to click the wrong dosage or form—though many do that too: In roughly one out of 1,000 orders, physicians accidentally select the suppository (designated “PR”) rather than the tablet dose (“OR”), according to one estimate. That’s not an error that will harm a patient—though other medication mix-ups can and do.

DANGER SIGNS

Safety events owing to EHR and other health IT issues have been steadily rising. Even so, experts say cases are widely underreported.



Earlier this year, MedStar’s human-factors center launched [a website](#) and public awareness campaign with the American Medical Association to draw attention to such rampant mistakes—they use the letters “EHR” as an initialism for “Errors Happen Regularly”—and to petition Congress for action. Ratwani is pushing for a central database to track such errors and adverse events.

Others have turned to social media to vent. Mark Friedberg, a health-policy researcher with the RAND Corporation who is also a practicing primary care physician, champions the Twitter hashtag #EHRbuglist to encourage fellow health care workers to air their pain points. And last month, a scathing Epic parody account cropped up on Twitter, earning more than 8,000 followers in its first five days. Its maiden tweet, written in the mock voice of an Epic overlord, read: “I once saw a doctor make eye contact with a patient. This horror must stop.”

As much as EHR systems are blamed for sins of commission, it is often the sins of omission that trip up users even more.

Consider the case of Lynne Chauvin, who worked as a medical assistant at Ochsner Health System, in Louisiana. In a still-pending 2015 lawsuit, Chauvin alleges that Epic’s software failed to fire a critical medication warning; Chauvin suffered from conditions that heightened her risk for blood clots, and though that history was documented in her records, she was treated with drugs that restricted blood flow after a heart procedure at the hospital. She developed gangrene, which led to the amputation of her lower legs and forearm. (Ochsner Health System said that while it cannot comment on ongoing litigation, it “remains

committed to patient safety which we strongly believe is optimized through the use of electronic health record technology.” Epic declined to comment.)

Echoing the complaints of many doctors, the suit argues that Epic software “is extremely complicated to view and understand,” owing to “significant repetition of data.” Chauvin says that her medical bills have topped \$1 million and that she is permanently disabled. Her husband, Richard, has become her primary caregiver and had to retire early from his job with the city of Kenner to care for his wife, according to the suit. Each party declined to comment.

Broken Records: Patients

Electronic Health Records' potential for patient care seemed limitless - but in reality technical and design flaws have led to serious patient risk.

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An Epidemic of Burnout

The numbing repetition, the box-ticking, and the endless searching on pulldown menus are all part of what Ratwani calls the “cognitive burden” that’s wearing out today’s physicians and driving increasing numbers into early retirement.

In recent years, “physician burnout” has skyrocketed to the top of the agenda in medicine. A 2018 Merritt Hawkins survey found a staggering 78% of doctors suffered symptoms of burnout, and in January the Harvard School of Public Health and other institutions deemed it a “public health crisis.”

One of the coauthors of the Harvard study, Ashish Jha, pinned much of the blame on “the growth in poorly designed digital health records … that [have] required that physicians spend more and more time on tasks that don’t directly benefit patients.”

GLOSSARY

● ALERT FATIGUE

The phenomenon in which health care workers, exposed to so many alarms, miss the occasional meaningful ones. EHR alerts are well-intentioned safeguards for workers, but many users complain there are too many irrelevant ones.

● NOTE BLOAT

The voluminous form doctors' notes take in the EHR. (Epic says they've doubled in length over the past decade.) Many blame the swelling records on extensive documentation requirements and physicians' tendency to cut-and-paste notes from previous encounters.

● PAJAMA TIME

The hours physicians log after work to complete the documentation and other administrative tasks they have to perform on their electronic health record systems. According to the *Annals of Family Medicine*, it amounts to an extra 90 minutes of work per day.

● INFO BLOCKING

The act of keeping health information from entitled parties, including patients and the health providers they want to share it with. Health systems hold that data dear and often behave as if that electronic information is harder to share than it is.

Few would deny that the swift digitization of America's medical system has been transformative. With EHRs now nearly universal, the face and feel of medicine has changed. The doctor is now typing away, making more eye contact with the computer screen, perhaps, than with the patient. Patients don't like that dynamic; for doctors, whose days increasingly begin and end with such fleeting encounters, the effect can be downright deadening.

"You're sitting in front of a patient, and there are so many things you have to do, and you only have so much time to do it in—seven to 11 minutes, probably—so when do you really listen?" asks John-Henry Pfifferling, a medical anthropologist who counsels physicians suffering from burnout. "If you go into medicine because you care about interacting, and then you're just a tool, it's dehumanizing," says Pfifferling, who has seen many physicians leave medicine over the shift to electronic records. "It's a disaster," he says.

Beyond complicating the physician-patient relationship, EHRs have in some ways made practicing medicine harder, says Hal Baker, a physician and the chief information officer at WellSpan, a Pennsylvania hospital system. “Physicians have to cognitively switch between focusing on the record and focusing on the patient,” he says. He points out how unusual—and potentially dangerous—this is: “Texting while you’re driving is not a good idea. And I have yet to see the CEO who, while running a board meeting, takes minutes, and certainly I’ve never heard of a judge who, during the trial, would also be the court stenographer. But in medicine … we’ve asked the physician to move from writing in pen to [entering a computer] record, and it’s a pretty complicated interface.”

Even if docs may be at the keyboard during visits, they report having to spend hours more outside that time—at lunch, late at night—in order to finish notes and keep up with electronic paperwork (sending referrals, corresponding with patients, resolving coding issues). That’s right. EHRs didn’t take away paperwork; the systems just moved it online. And there’s a lot of it: 44% of the roughly six hours a physician spends on the EHR each day is focused on clerical and administrative tasks, like billing and coding, according to a 2017 *Annals of Family Medicine* study.

Fortune's fourth annual Brainstorm Health conference will be held April 2-3 in San Diego. Please check out the incredible lineup of speakers and topics [here](#).

For all that so-called pajama time—the average physician logs 1.4 hours per day on the EHR after work—they don’t get a cent.

Many doctors do recognize the value in the technology: 60% of participants in Stanford Medicine’s 2018 National Physician Poll said EHRs had led to improved patient care. At the same time, about as many (59%) said EHRs needed a “complete overhaul” and that the systems had detracted from their professional satisfaction (54%) as well as from their clinical effectiveness (49%).

In preliminary studies, Ratwani has found that doctors have a typical physiological reaction to using an EHR: stress. When he and his team shadow clinicians on the job, they use a range of sensors to monitor the doctors’ heart rate and other vital signs over the course of their shift. The physicians’ heart rates will spike—as high as 160 beats per minute—on two sorts of occasions: when they are interacting with patients and when they’re using the EHR.

“Everything is so cumbersome,” says Karla Dick, a family medicine doctor in Arlington, Texas. “It’s slow compared to a paper chart. You’re having to click and zoom in and zoom out to look for stuff.” With all the zooming in and out, she explains it’s easy to end up in the wrong record. “I can’t tell you how many times I’ve had to cancel an order because I was in the wrong chart.”

3,243



Number of medication errors linked to EHR-usability issues at three pediatric hospitals from 2012 to 2017, according to a *Health Affairs* study

Among the daily frustrations for one emergency room physician in Rhode Island is ordering ibuprofen, a seemingly simple task that now requires many rounds of mouse clicking. Every time she prescribes the basic painkiller for a female patient, whether that patient is 9 or 68 years old, the prescription is blocked by a pop-up alert warning her that it may be dangerous to give the drug to a pregnant woman. The physician, whose institution does not allow her to comment on the systems, must then override the warning with yet more clicks. "That's just the tiniest tip of the iceberg," she says.

What worries the doctor most is the ease with which diligent, well-meaning physicians can make serious medical errors. She notes that the average ER doc will make 4,000 mouse clicks over the course of a shift, and that the odds of doing anything 4,000 times without an error is small. "The interfaces are just so confusing and clunky," she adds. "They invite error ... it's not a negligence issue. This is a poor tool issue."

Many of the EHR makers acknowledge physician burnout is real and say they're doing what they can to lessen the burden and enhance user experience. Sam Butler, a pulmonary critical care specialist who started working at Epic in 2001, leads those efforts at the Wisconsin-based company. When doctors get more than 100 messages per week in their in-basket (akin to an email inbox), there's a higher likelihood of burnout. Butler's team has also analyzed doctors' electronic notes—they're twice as long as they were nine years ago, and three to four times as long as notes in the rest of the world. He says Epic uses such insights to improve the client experience. But coming up with fixes is difficult because doctors "have different viewpoints on everything," he says. (KHN and *Fortune* made multiple requests to interview Epic CEO Judith Faulkner, but the company declined to make her available. In a trade interview in February, however, Faulkner said that EHRs were unfairly blamed for physician burnout and cited a study suggesting that there's little correlation between burnout and EHR satisfaction. Executives at other vendors noted that they're aware of usability issues and that they're working on addressing them.)

"It's not that we're a bunch of Luddites who don't know how to use technology," says the Rhode Island ER doctor. "I have an iPhone and a computer and they work the way they're supposed to work, and then we're given these incredibly cumbersome and error-prone tools. This is something the government mandated. There really wasn't the time to let the cream rise to the top; everyone had to jump in and pick something that worked and spend tens of millions of dollars on a system that is slowly killing us."

Broken Records: Doctors

The deeply flawed Electronic Health Record system in America has contributed to the "burnout" epidemic among medical professionals.

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\$36 Billion and Change

The effort to digitize America's health records got its biggest push in a very low moment: the financial crisis of 2008. In early December of that year, Obama, barely four weeks after his election, pitched an ambitious economic recovery plan. "We will make sure that every doctor's office and hospital in this country is using cutting-edge technology and electronic medical records so that we can cut red tape, prevent medical mistakes, and help save billions of dollars each year," he said in a radio address. The idea had already been a fashionable one in Washington. Former House Speaker Newt Gingrich was fond of saying it was easier to track a FedEx package than one's medical records. Obama's predecessor, President George W. Bush, had also pursued the idea of wiring up the country's health system. He didn't commit much money, but Bush did create an agency to do the job: the Office of the National Coordinator (ONC).

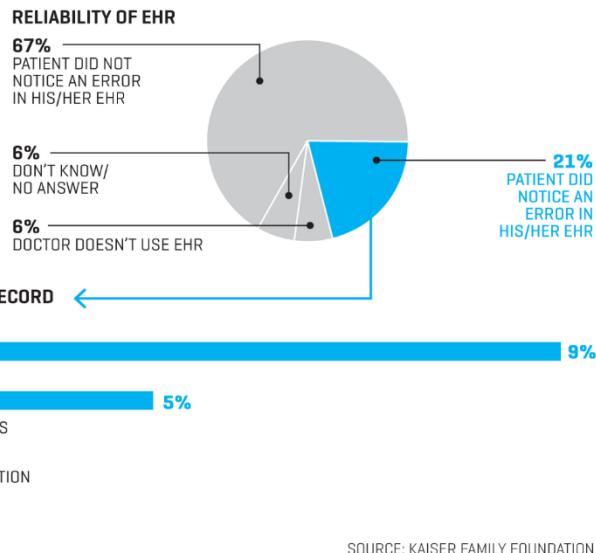
In the depths of recession, the EHR conceit looked like a shovel-ready project that only the paper lobby could hate. In February 2009 legislators passed the HITECH Act, which carved out a hefty chunk of the massive stimulus package for health information technology. The goal was not just to get hospitals and doctors to buy EHRs, but rather to get them using them in a way that would drive better care. So lawmakers devised a carrot-and-stick approach: Physicians would qualify for federal subsidies (a sum of up to nearly \$64,000 over a period of years) only if they were "meaningful users" of a government-certified system. Vendors, for their part, had to develop systems that met the government's requirements.

They didn't have much time, though. The need to stimulate the economy, which meant getting providers to adopt EHRs quickly, "presented a tremendous conundrum," says Farzad Mostashari, who joined the ONC as deputy director in 2009 and became its leader in 2011: The ideal—creating a useful, interoperable, nationwide records system—was "utterly infeasible to get to in a short time frame."

That didn't stop the federal planners from pursuing their grand ambitions. Everyone had big ideas for the EHRs. The FDA wanted the systems to track unique device identifiers for medical implants, the CDC wanted them to support disease surveillance, CMS wanted them to include quality metrics, and so on. "We had all the right ideas that were discussed and hashed out by the committee," says Mostashari, "but they were *all* of the right ideas."

BROKEN RECORDS

One in five people surveyed this year by the Kaiser Family Foundation has found a mistake in their EHR. Of those, nearly half have incorrect medical histories.



Not everyone agreed, though, that they were the right ideas. Before long, “meaningful use” became pejorative shorthand to many for a burdensome government program—making doctors do things like check a box indicating a patient’s smoking status each and every visit.

The EHR vendor community, then a scrappy \$2 billion industry, griped at the litany of requirements but stood to gain so much from the government’s \$36 billion injection that it jumped in line. As Rusty Frantz, CEO of EHR vendor NextGen Healthcare, put it: “The industry was like, ‘I’ve got this check dangling in front of me, and I have to check these boxes to get there, and so I’m going to do that.’ ”

Halamka, who was an enthusiastic backer of the initiative in both the Bush and Obama administrations, blames the pressure for a speedy launch as much as the excessive wish list. “To go from a regulation to a highly usable product that is in the hands of doctors in 18 months, that’s too fast,” he says. “It’s like asking nine women to have a baby in a month.”

Several of those who worked on the project admit the rollout was not as easy or seamless as they’d anticipated, but they contend that was never the point. Aneesh Chopra, appointed by Obama in 2009 as the nation’s first chief technology officer, called the spending a “down payment” on a vision to fundamentally change American medicine—creating a digital infrastructure to support new ways to pay for health services based on their quality and outcomes.

Bob Kocher, a physician and star investor with venture capital firm Venrock, who served in the Obama administration from 2009 to 2011 as a health and economic policy adviser, not only defends the rollout then but also disputes the notion that the government initiative has been a failure at all. “EHRs have totally lived up to the hype and expectations,” he says, emphasizing that they also serve as a technology foundation to support innovation on everything from patients accessing their medical records on a smartphone to A.I.-driven medical sleuthing. Others note the systems’ value in aggregating medical data in ways that

were never possible with paper—helping, for example, to figure out that contaminated water was poisoning children in Flint, Mich.

But Rusty Frantz heard a far different message about EHRs—and, more important, it was coming from his own customers.

The Stanford-trained engineer, who in 2015 became CEO of NextGen, a \$500-million-a-year EHR heavyweight in the physician-office market, learned the hard way about how his product was being viewed. As he stood at the podium at his first meeting with thousands of NextGen customers at Las Vegas's Mandalay Bay Resort, just four months after getting the job, he tells KHN and *Fortune*, “People were lining up at the microphones to yell at us: ‘We weren’t delivering stable software! The executive team was inaccessible! The service experience was terrible!’” (He now refers to the event as “Festivus: the airing of the grievances.”)

Frantz had bounced around the health care industry for much of his career, and from the nearby perch of a medical device company, he watched the EHR incentive bonanza with a mix of envy and slack-jawed awe. “The industry was moving along in a natural Darwinist way, and then along came the stimulus,” says Frantz, who blames the government’s ham-handed approach to regulation. “The software got slammed in, and the software wasn’t implemented in a way that supported care,” he says. “It was installed in a way that supported stimulus. This company, we were complicit in it too.”

Even that may be a generous description. KHN and *Fortune* found a trail of lawsuits against the company, stretching from White Sulphur Springs, Mont., to Neillsville, Wis. Mary Rutan Hospital in Bellefontaine, Ohio, sued NextGen (formerly called Quality Systems) in federal court in 2013, arguing that it experienced hundreds of problems with the “materially defective” software the company had installed in 2011.

A consultant hired by the hospital to evaluate the NextGen system, whose 60-page report was submitted to the court, identified “many functional defects” that he said rendered the software “unfit for its intended purpose.” Some patient information was not accurately recorded, which had the potential, the consultant wrote, “to create major patient care risk which could lead to, at a minimum, inconvenience, and at worst, malpractice or even death.” Glitches at Mary Rutan included incidents in which the software would apparently change a patient’s gender at random or lose a doctor’s observations after an exam, the consultant reported. The company, he found, sometimes took months to address issues: One IT ticket, which related to a physician’s notes inexplicably deleting themselves, reportedly took 10 months to resolve. (The consultant also noted that similar problems appeared to be occurring at as many as a dozen other hospitals that had installed NextGen software.)

The Ohio hospital, which paid more than \$1.5 million for its EHR system, claimed breach of contract. NextGen responds that it disputed the claims made in the lawsuit and that the matter was resolved in 2015 “with no findings of fact by a court related to the allegations.” The hospital declined to comment.

At the time, as it has been since then, NextGen's software was certified by the government as meeting the requirements of the stimulus program. By 2016, NextGen had more than 19,000 customers who had received federal subsidies.

NextGen was subpoenaed by the Department of Justice in December 2017, months after becoming the subject of a federal investigation led by the District of Vermont. Frantz tells KHN and *Fortune* that NextGen is cooperating with the investigation. "This company was not dishonest, but it was not effective four years ago," he says. Frantz also emphasizes that NextGen has "rapidly evolved" during his tenure, earning five industry awards since 2017, and that customers have "responded very positively."

Glen Tullman, who until 2012 led Allscripts, another leading EHR vendor that benefited royally from the stimulus and that has been sued by numerous unhappy customers, admits that the industry's race to market took priority over all else.

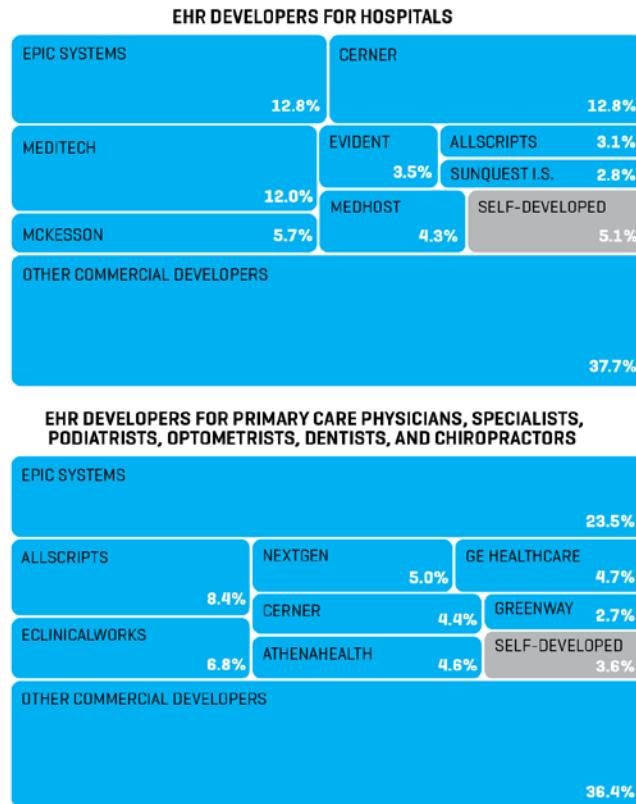
"It was a big distraction. That was an unintended consequence of that," Tullman says. "All the companies were saying, This is a one-time opportunity to expand our share, focus everything there, and then we'll go back and fix it." The Justice Department has opened a civil investigation into the company, Securities and Exchange Commission filings show. Allscripts says in an email that it cannot comment on an ongoing investigation, but that the civil investigations by the Department of Justice relate to businesses it acquired after the investigations were opened.

Much of the marketing mayhem occurred because federal officials imposed few controls over firms scrambling to cash in on the stimulus. It was a gold rush—and any system, it seemed, could be marketed as "federally approved." Doctors could shop for bargain-price software packages at [Costco](#) and Walmart's Sam's Club—where eClinicalWorks sold a "turnkey" system for \$11,925—and cash in on the government's adoption incentives.

The top-shelf vendors in 2009 crisscrossed the country on a "[stimulus tour](#)" like rock groups, gigging at some 30 cities, where they offered doctors who showed up to hear the pitch "a customized analysis" of how much money they could earn off the government incentives. Following the same playbook used by pharmaceutical companies, EHR sellers courted doctors at fancy dinners in ritzy hotels. One enterprising software firm advertised a "cash for clunkers" deal that paid \$3,000 to doctors willing to trade in their current records system for a new one. Athenahealth held "invitation only" dinners at luxury hotels to advise doctors, among other things, how to use the stimulus to get paid more and capture available incentives. Allscripts offered a no-money-down purchase plan to help doctors "maximize the return on your EHR investment." (An Athenahealth spokesperson says the company's "dinners were educational in nature and aimed at helping physicians navigate the government program." Allscripts did not respond directly to questions about its marketing practices, but says it "is proud of the software and services [it provides] to hundreds of thousands of caregivers across the globe.")

LEADERS OF THE PACK

Although there are more than 700 federally certified EHR vendors in the U.S., most of the business is concentrated among a handful of top sellers. Here are the market-share leaders among hospitals and doctors' offices participating in the Medicare incentive program.



SOURCE: U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

EHRs were supposed to reduce health care costs, at least in part by preventing duplicative tests. But as the federal government opened the stimulus tap, many raised doubts about the promised savings. Advocates bandied about a figure of \$80 billion in cost savings even as congressional auditors were debunking it. While the jury's still out, there's growing suspicion the digital revolution may potentially raise health care costs by encouraging overbilling and new strains of fraud and abuse.

In September 2012, following press reports suggesting that some doctors and hospitals were using the new technology to improperly boost their fees, a practice known as "upcoding," then-Health and Human Services chief Kathleen Sebelius and Attorney General Eric Holder warned the industry not to try to "game the system."

There's also growing evidence that some doctors and health systems may have overstated their use of the new technology to secure stimulus funds, a potentially enormous fraud against Medicare and Medicaid that likely will take many years to unravel. In June 2017, the HHS inspector general estimated that Medicare officials made more than \$729 million in subsidy payments to hospitals and doctors that didn't deserve them.

Individual states, which administer the Medicaid portion of the program, haven't fared much better. Audits have uncovered overpayments in 14 of 17 state programs reviewed, totaling more than \$66 million, according to inspector general reports.

Last month Sen. Charles Grassley, an Iowa Republican who chairs the Senate Finance Committee, sharply criticized CMS for recovering only a tiny fraction of these bogus payments, or what he termed a “spit in the ocean.”

EHR vendors have also been accused of egregious and patient-endangering acts of fraud as they raced to cash in on the stimulus money grab. In addition to the U.S. government’s \$155 million False Claims Act settlement with eClinicalWorks noted above, the federal government has reached a second settlement over similar charges against another large vendor, Tampa-based Greenway Health. In February, that company settled with the government for just over \$57 million without denying or admitting wrongdoing. “These are cases of corporate greed, companies that prioritized profits over everything else,” says Christina Nolan, the U.S. attorney for the District of Vermont, whose office led the cases. (In a response, Greenway Health did not address the charges or the settlement but said it was “committing itself to being the standard-bearer for quality, compliance, and transparency.”)

Tower of Babel

In early 2017, Seema Verma, then the country’s newly appointed CMS administrator, went on a listening tour. She visited doctors around the country, at big urban practices and tiny rural clinics, and from those frontline physicians she consistently heard one thing: They hated their electronic health records. “Physician burnout is real,” she tells KHN and *Fortune*. The doctors spoke of the difficulty in getting information from other systems and providers, and they complained about the government’s reporting requirements, which they perceived as burdensome and not meaningful.

What she heard then became suddenly personal one summer day in 2017, when her husband, himself a physician, collapsed in the airport on his way home to Indianapolis after a family vacation. For a frantic few hours, the CMS administrator fielded phone calls from first responders and physicians—Did she know his medical history? Did she have information that could save his life?—and made calls to his doctors in Indiana, scrambling to piece together his record, which should have been there in one piece. Her husband survived the episode, but it laid bare the dysfunction and danger inherent in the existing health information ecosystem.



Seema Verma, the administrator of the Centers for Medicare and Medicaid Services, is taking on health “information blockers,” gag clauses, and more.

Photograph by T.J. Kirkpatrick for *Fortune*

The notion that one EHR should talk to another was a key part of the original vision for the HITECH Act, with the government calling for systems to be eventually interoperable.

What the framers of that vision didn't count on were the business incentives working against it. A free exchange of information means that patients can be treated anywhere. And though they may not admit it, many health providers are loath to lose their patients to a competing doctor's office or hospital. There's a term for that lost revenue: "leakage." And keeping a tight hold on patients' medical records is one way to prevent it.

There's a ton of proprietary value in that data, says Blumenthal, who now heads the Commonwealth Fund, a philanthropy that does health research. Asking hospitals to give it up is "like asking Amazon to share their data with Walmart," he says.

Blumenthal acknowledges that he failed to grasp these perverse business dynamics and foresee what a challenge getting the systems to talk to one another would be. He adds that forcing interoperability goals early on, when 90% of the nation's providers still didn't have systems or data to exchange, seemed unrealistic. "We had an expression: They had to operate before they could interoperate," he says.

ELECTRONIC LEAPS FORWARD

● FHIR

Much optimism lies around FHIR [pronounced “fire”], a standard for an open API that allows for health data exchange [and which the government has proposed requiring].

Developers are working furiously on innovative applications that layer on top of existing EHRs [like apps for an iPhone] to make data more searchable and actionable. Apple uses FHIR to pull records onto its HealthKit.

● VOICE

Doctors won’t have to document a thing when the EHR understands what’s being said and can write the note itself. Advances in voice recognition make this a not-too-far-off reality.

● MOBILE

The major EHR vendors have introduced mobile platforms that allow physicians to chart on more intuitive and portable touch screens.

● HUMAN SCRIBES

Doctors rave about this low-tech EHR “accessory.” Hired to shadow doctors and take notes for them, scribes lighten the load but cost a lot.

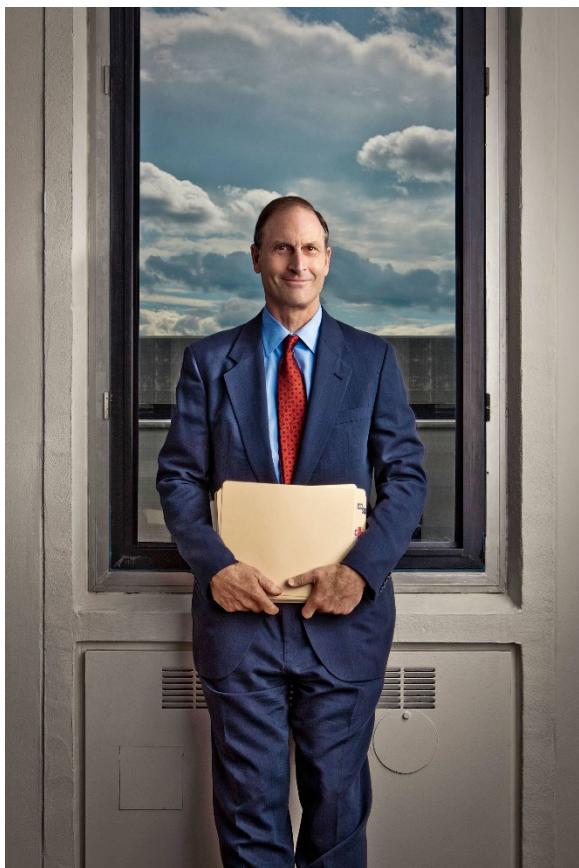
In the absence of true incentives for systems to communicate, the industry limped along; some providers wired up directly to other select providers or through regional exchanges, but the efforts were spotty. A Cerner-backed interoperability network called CommonWell formed in 2013, but some companies, including dominant Epic, didn’t join. (“Initially, Epic was neither invited nor allowed to join,” says Sumit Rana, senior vice president of R&D at Epic. Jitin Asnaani, executive director of CommonWell counters, “We made repeated invitations to every major EHR … and numerous public and private invitations to Epic.”)

Epic then supported a separate effort to do much the same.

Last spring, Verma attempted to kick-start the sharing effort and later pledged a war on “information blocking,” threatening penalties for bad actors. She has promised to reduce the documentation burden on physicians and end the gag clauses that protect the EHR industry. Regarding the first effort at least, “there was consensus that this needed to happen and that it would take the government to push this forward,” she says. In one sign of progress last summer, the dueling sharing initiatives of Epic and Cerner, the two largest players in the industry, began to share with each other—though the effort is fledgling.

When it comes to patients, though, the real sharing too often stops. Despite federal requirements that providers give patients their medical records in a timely fashion, in their chosen format, and at low cost (the government recommends a flat fee of \$6.50 or less), patients struggle mightily to get them. A 2017 study by researchers at Yale found that of America’s 83 top-rated hospitals, only 53% offer forms that provide patients with the option to receive their entire medical record. Fewer than half would share records via email. One hospital charged more than \$500 to release them.

Sometimes the mere effort to access records leads to court. Jennifer De Angelis, a Tulsa attorney, has frequently sparred with hospitals over releasing her clients’ records. She says they either attempt to charge huge sums for them or force her to obtain a court order before releasing them. De Angelis adds that she sometimes suspects the records have been overwritten to cover up medical mistakes.



David Blumenthal, Obama's national coordinator for health information technology from 2009 to 2011.
Chris Crisman—Redux

Consider the case of 5-year-old Uriah R. Roach, who fractured and cut his finger on Oct. 2, 2014, when it was accidentally slammed in a door at school. Five days later, an operation to repair the damage went awry, and he suffered permanent brain damage, apparently owing to an anesthesia problem. The Epic electronic medical file had been accessed more than 76,000 times during the 22 days the boy was in the hospital, and a lawsuit brought by his parents contended that numerous entries had been “corrected, altered, modified and possibly deleted after an unexpected outcome during the induction of anesthesia.” The hospital denied wrongdoing. The case settled in November 2016, and the terms are confidential.

More than a dozen other attorneys interviewed cited similar problems, especially with gaining access to computerized “audit trails.” In several cases, court records show, government lawyers resisted turning over electronic files from federally run hospitals. That happened to Russell Uselton, an Oklahoma lawyer who represented a pregnant teen admitted to the Choctaw Nation Health Care Center in Talihina, Okla. Shelby Carshall, 18, was more than 40 weeks pregnant at the time. Doctors failed to perform a cesarean section, and her baby was born brain-damaged as a result, she alleged in a lawsuit filed in 2017 against the U.S. government. The baby began having seizures at 10 hours old and will “likely never walk, talk, eat, or otherwise live normally,” according to pleadings in the suit. Though the federal government requires hospitals to produce electronic health records to patients and their families, Uselton had to obtain a court order to get the baby’s complete medical files. Government lawyers denied any negligence in the case, which is pending.

“They try to hide anything from you that they can hide from you,” says Uselton. “They make it extremely difficult to get records, so expensive and hard that most lawyers can’t take it on,” he said.

Nor, it seems, can high-ranking federal officials. When Seema Verma’s husband was discharged from the hospital after his summer health scare, he was handed a few papers and a CD-ROM containing some medical images—but missing key tests and monitoring data. Says Verma, “We left that hospital and we still don’t have his information today.” That was nearly two years ago.

A version of this article appears in the April 2019 issue of Fortune with the headline “Death by a Thousand Clicks.”