



User Unfriendly

Physicians gripe that EHRs are not easy to use. But the industry is taking steps to improve performance.

By Elizabeth Gardner

As long as there have been electronic health records, clinicians have complained that they're difficult to use. These cries have often been dismissed as resistance to modern technology—ironic considering that the complainers are perfectly comfortable using robots to perform bypass surgery, zapping tumors with proton beams, or mapping brain activity with functional MRIs.

But now that federal EHR incentive programs have inspired more widespread use,

the health I.T. industry and regulators are acknowledging that clinicians have been right all along: many EHR user interfaces are awkward and non-intuitive, and they hinder more than they help.

The design issue is growing in prominence. For one thing, engaging, simple interfaces on the iPad, the iPhone and Android smartphones, and the Internet—all embraced enthusiastically by the health professions—have given users new ways to interact with their devices. The bar has been raised.

Beyond that, poor EHR design might

be a patient safety issue. The Institute of Medicine's (IOM) November 2011 report, "Health IT and Patient Safety: Building Safer Systems for Better Care," cited lack of usability as one potential cause of errors in using EHRs: "Poor interface design that detracts from clinician efficiency and affinity for the system will likely lead to underuse or misuse of the system." While the hazards of poor design haven't been quantified in any large-scale studies, hair-raising anecdotes are plentiful: medication lists broken up over several pages, positive lab results

buried in long lists, and notes cut-and-pasted from one section of the record to another without requiring a check to see whether they're still valid.

There are many factors why EHRs often can be so unpleasant to use. At the heart of the matter, vendors don't understand what clinicians really need, sources say. To make matters worse, vendors often try to limit information sharing about their products. And even among clients of the same vendor, system customization can result in a wide variety of system configurations that make learning from what others are doing difficult. But experts suggest several tips in vendor selection to help sidestep potential problems. And defining the characteristics of a "usable" system helps as well.

There's no doubt that, at best, EHRs often get in the way. "The physician's day is a large set of interleaved tasks, and the tools should be designed to facilitate the safe conducting of that work," says Scott Finley, M.D., senior physician informaticist at the research company Westat, Rockville, Md. "Most health I.T. tools tend to slow users down." Finley consults on usability issues for the Department of Veterans' Affairs, the Agency for Healthcare Research and Quality, and the Office of the National Coordinator for HIT. He says most EHRs are bad at helping physicians juggle the simultaneous tasks they all face, like answering a question about one patient while in the middle of writing a prescription for another.

Much of the power of EHRs lies in their ability to gather structured data for downstream analysis, but Finley says that focus can hurt usability even more by constricting the way clinicians can enter data. "The data capture process needs to be judged on its own merits," he says. "It's easier to make it hard than to make it easy."

A flurry of regulatory activity is likely to result in usability being added—somehow—as a criterion for EHR products to be certified for meaningful use incentives. ONC says it's currently crafting a proposed

rule addressing EHR usability. The office declined to comment on specifics. The National Institute of Standards and Technology, which held a workshop on EHR usability last summer, has at the ONC's behest, developed guidelines for usability testing. They are now out for public comment. The ONC's proposed rule will likely focus on how vendors test usability, rather than on specific characteristics of the user interface.

Why so bad?

Why are EHR user interfaces generally so bad? For starters, many of them originated years, or even decades, ago, before today's sophisticated interface tools were developed. "Sometimes what you want to do on the front end requires significant change on the back end," says Ted Shortliffe, M.D., president of the American Medical Informatics Association. "It's not just a matter of mucking around with the interface. And retrofitting a large base of existing systems is extremely complex and expensive. Many vendors shudder at the thought."

Lack of understanding of what clinicians need is at the heart of problem. It's not that vendors don't ask users what they want—far from it. Every vendor has armies of advisors with medical and nursing degrees, but advice isn't enough—or even useful most of the time, says Paul Tang, M.D., vice president of innovation and technology at Palo Alto Medical Foundation, and a national leader in effective use of HIT. Instead, software developers should be standing at the user's elbow watching what he or she does all day, and then figuring out how the EHR can help. "Observing customers in the field is far more effective than listening to folks tell you what they would like to have," Tang says.

Users generally don't know what they need, says Scott Plewes, vice president of user experience design for software developer Macadamian, which specializes in interface design for health I.T. and medical devices. "They'll say, 'I need a big red button in the middle of the screen,' but they're not designers—they're experts in what they do. It's very hard to get good in-

An iPad EHR Interface?

Using an iPad with an EHR generally involves a remote desktop session of some type, in which the same old text-heavy interface looks even more inelegant than usual. So there was a lot of breathless blog coverage last summer at the unveiling of a slick new iPad EHR prototype done for Seattle Children's Hospital by an industrial design firm called Artefact. Instead of dense text, the app abounds with photos of patients and their care teams. Each patient's "story" is rounded up on one screen with vitals in nice, big, readable type, and presentations are tailored to each user's role. Artefact won an award for the project from the Industrial Designers Society of America.

However, Seattle Children's has no plans to put it into production with its Cerner EHR. CIO Drex DeFord says the firm did the development work for free at the suggestion of one of his physician informaticists, and he has neither money nor inclination to pursue it further at this point. While the project has yielded some interesting ideas and new ways to look at the data, DeFord doesn't think the iPad is ready to be a full-fledged EHR interface. The hospital has been doing its own interface development work using Cerner's Mpages product, which allows it to create customized Web-based and mobile views of its EHR.

"For as long as I've been in information services, I've heard, 'Why can't this be as easy as...?'" DeFord says. "Why does it cost so much to put in a wireless network, when I can do it at home for \$115?' There's a gap between legacy systems and new form factors that needs to be bridged in order to make it simple for me to put them together. I don't want to be the person doing that integration. We're not a development shop and I want to use commercial off-the-shelf products whenever I can."

sight into their needs and then turn it into a good design.”

Lack of information flow among vendor customers is another issue. Vendors are understandably protective of their intellectual property, which includes the appearance and function of user interfaces. Contracts frequently limit how much information customers are allowed to share about the interfaces.

Computer science professor Ben Shneiderman of the University of Maryland specializes in human-computer interaction and has a particular interest in EHRs. Asked whether EHR interfaces have improved recently, he says he so rarely sees them that he has no way of knowing. “The problem is that this industry is closed,” he says. “You talk about the iPad and everyone can buy one and see one, but no one will show me an EHR interface without my signing a nondisclosure agreement. The public has a legitimate right to have these products reviewed by professionals in the usability field.”

There’s also no mechanism for publicizing problems with EHR interfaces, unlike the FDA’s process for issues with medical devices. Shneiderman describes a case where a physician found a bug in an EHR that created a danger to patients. “He contacted the supplier because he thought it was something other users should know about, and the response was, ‘Oh, we know—we’re working on it,’” Shneiderman says. “The physician said, ‘What? You know about it and you haven’t notified everyone?’ Contrast that with the Federal Aviation Administration, where problems with airplanes are publicized within hours.”

The IOM report calls for substantial loosening of those contractual restrictions. “The committee views prohibition of the free exchange of information to be the most critical barrier to patient safety and transparency,” the report says. “The committee urges the [HHS] Secretary to take vigorous steps to restrict contractual language that impedes public sharing of

patient safety-related details. Contracts should be developed to allow explicitly for sharing of health I.T. issues related to patient safety.” The report also says there should be a central place to report and publicize known issues with EHR software.

ONC is committed to getting vendors to open up the flow of information, says Jacob Reider, M.D., the agency’s senior policy advisor. “We respect the need to protect intellectual property, but if there are opportunities for improvement and users feel that they can’t discuss these things, then we have a problem.”

Siemens Healthcare Chief Medical Officer Don Rucker, M.D., says the secrecy issue is overblown. “There are trailer loads of information out there on each of these big systems, and there are so many end users that you can just call up your pal at the next hospital.”

User variation

Lack of consistency among users is another factor in the poor usability of EHRs. Here’s a chicken-and-egg problem: in order to improve usability, a vendor may allow a hospital to accommodate individual users with customized templates and other modifications that make the system mirror how they work.

If the vendor offers an upgrade that improves usability in the product as a whole, it might not work with the hospital’s modifications. And different hospitals can’t take advantage of one another’s experiences. “It’s difficult even for customers using the same products to compare notes because their implementation is so different,” says Art Swanson, director of user experience for ambulatory EHR vendor Allscripts. “A client will say, ‘Oh, why can’t we do X [that another hospital is doing],’ and then they’ll do some digging and realize it’s because of how the other hospital has customized.” Swanson says Allscripts is trying to supply system configurations that will support most needs right out of the box, without modifications.

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—Ben Shneiderman

Although there are many factors leading to sub-par EHR usability, there are strategies to assure better performance, experts say. It’s almost impossible to gauge how usable an EHR is until it’s actually being used, which makes usability a difficult criterion on which to base a purchasing decision.

But experts recommend a few strategies to improve the odds.

First, demo with real data. “One of the most common mistakes in product selection is just to watch a demo, because it’s scripted and has an expert user,” says Tang of PAMC. “You just have to put in a real patient to find the blemishes and gotchas, but people don’t take that step. Make sure the vendor goes through your scenario.” Second, connect with the vendor’s user group. “Most EHRs have some kind of user group, and if you’re shopping, you can request to attend a meeting,” says Mike Nolte, vice president and general manager of GE Health Information Technology. “Those are great for getting hands-on experiences and talking to a bunch of people at the same time.” Finally, stray off the vendor-charted path. Go to sites of your choosing, not just the vendor’s standard reference sites, Tang says. “Otherwise you’re not likely to get accurate and honest feedback.”

What is “usable”?

Shopping for an EHR is easier when you know what you’re looking for. So what exactly constitutes a “usable” system? It’s a difficult question to answer in a vacuum. To a non-clinician, a paper chart looks like a jumble of tinted forms and scribbled notes, but it makes sense to the people who created it. Every dog-ear and

colored tab carries meaning. That's one reason why physicians new to EHRs often miss the wealth of visual cues in the paper chart and complain that they can't find anything on the computer screen.

What will it take to make them love an EHR just as much (or preferably more)?

Usability experts are still trying to figure that out, given the extreme complexity of how clinicians enter and use information in the chart. Cram too much on one screen and comprehension plummets. Break it up onto separate screens and the user may not be able to find a crucial result or report. Provide too many helpful reminders, and the user may turn them off in exasperation.

"The two things we hear from our members who use EHRs are, 'I would never go back to paper,' and 'We hate our vendors because the products are so difficult to use,'" says David Kibbe, M.D., senior advisor to the American Academy of Family Physicians. He personally gets tired of having to sign into multiple hospital systems to locate data on his patients. Smartphones, iPads and the Internet are so intuitive, so well integrated with one another, and so widely used by clinicians, that they make most EHRs look even worse by comparison, and Kibbe predicts that the gap will drive the market to design better products.

For improved usability, EHRs need several key characteristics, experts say. The first is implicit respect for the user. EHRs have horrible "social" skills, explains Finley, the senior physician informaticist at Westat, who specializes in usability issues. "We have computer systems behaving like badly trained children," he says. "They scream interruptions without regard to how likely they are to be correct, and without regard to their own standing in the relationship."

Instead, he says, an EHR should be like an exquisitely trained butler, quietly anticipating the user's needs, fixing problems before they get out of hand, whispering instead of shouting (and only the nec-

essary information at the right time).

For a better user experience, the EHR should be easy to use—but not too easy, experts say. Part of the iPad's appeal is that even a small child can master the interface in a few minutes, but that simplicity comes with limitations. In the long run, an interface that can do more things might make users happier, even if it takes them longer to get the hang of it initially.

"Over time, users do the same things hundreds of times a day and it gets old quickly," says Art Swanson, director of user experience at Allscripts. "We can make things efficient and fast to use, but more complicated to learn." Allscripts is working on designing its products so that users can toggle into more advanced modes as they master the system.

Steep curve=better users

Harry Greenspun, M.D., senior advisor, healthcare transformation and technology at Deloitte, says a steeper learning curve can create more power users. He recently took up bicycling, and uses cycling shoes that clip onto his pedals. It took him awhile to learn to work the clips so that he could reliably release his feet and not fall over when he stopped, but now that he has, he can pedal with almost twice the power. Clinicians are smart, he points out, and are not daunted by complex technology if there are clear advantages to mastering it. "If people are adequately trained, they can do very complicated things," he says.

Some experts contend that reducing the amount of typing required is the key to EHR acceptance by physicians. "One thing that drives physicians batty is having to do so much data entry themselves," Kibbe says. "The more it's entered by other people, the happier physicians tend to be with the interface."

Beyond minimizing data entry, effective EHRs should allow for interfaces that reflect different purposes. Not every device needs to do everything. "There's a big difference between reviewing and

creating information," Greenspun says. A physician on call may want to find a few crucial pieces of information and can use a smartphone or touchscreen tablet with specialized views, whereas one that's catching up on documentation or e-mail will need a full keyboard.

Allscripts, for one, is developing separate workflows for mobile devices and desktop computers, and will focus on touch, speech recognition, and other non-keyboard interfacing techniques over the next year or two, Swanson says.

The trickiest balancing act may be choosing which information is displayed where. Scott Plewes, vice president of user experience design for software development firm Macadamian, Ottawa, Ontario, took on a project to improve the interface of an EHR (whose vendor he declines to name because he says so many have the same problem). When he first looked at the opening screen, he noticed a string of tabs along the top, intended to give the user immediate access to many sections of the record. So far, so good. "It wasn't until a week later, after I'd been in and out of the system, that I realized the screen scrolled to the right to reveal more tabs," he says. In its eagerness to provide quick access to anything the user might want, the vendor ended up making the interface intrinsically confusing, and potentially hiding vital data.

On the other hand, an interface can easily provide too little information. "Everything may look great, but it takes seven clicks to see two pieces of information that should be contiguous, and then you can't get back to where you started," says Ross Koppel, a sociology professor at the University of Pennsylvania who specializes in analyzing how clinicians use EHRs. "I hear that frustration a lot. People ask, 'How the hell did I get here?'"

Plewes says vendors should analyze how the information is used, and structure it to pop up when needed. An initial screen for a clinic visit should offer the patient demographics, a medication list,

the reason for the visit, and any recent results. There's no need to clutter the initial screen with a link to e-prescribing, for example, because it won't be needed until later in the visit.

While smartphones and tablets seem red-hot, experts say the single most useful recent technological development is large high-definition screens. "We've been constrained by screen real estate for so long," says Scott Lind, director of user experience at Siemens Healthcare. "Bigger screens let us make better use of space, using white space to frame information and focus the user's attention."

As engaging as the iPad interface is, its screen is just not big enough to deal with the amount of data clinicians typically want to see all at once, says Tang, the chief innovation and technology officer at Palo Alto (Calif.) Medical Foundation, which spans some 1,000 affiliated physicians. "We're trying to increase screen size, which helps us with the key problem of having to flip through screens."

Clinicians at Salt Lake City-based Intermountain Healthcare want the same thing, says CIO Marc Probst. "They want to be able to access multiple screens of data at the same time and navigate between them," he says.

And while some safety experts worry that too many screens open at once can lead to errors, Probst says it hasn't been a problem so far. "There's an infinite number of ways to screw up how you use an information system, but we have not experienced that one."

All too often, EHRs have looked like an engineer's rendition of a paper chart, and usability experts should be able to do better with the next generation, says Nolte, the vice president and general manager of GE Health IT.

"There were lots of good reasons to do it that way—it felt familiar to the users and didn't ask a lot of them—but the developers weren't thinking about how to best use software to enhance productivity and change the way physicians work." ■

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