There’s an App for That

17,000 Health Care Apps and Counting

Patients and doctors are jumping on the mobile app bandwagon, changing health care as we know it.

By Howard Larkin
This article first appeared in the April 2011 issue of H&HN magazine.
Got kidney stones? There's an app for that—and for just about every other clinical and administrative function. As mobile applications reshape health care, hospitals will be pressed to keep up.

"The No. 1 thing that patients can do to reduce their risk of kidney stones is to drink more fluid. But people don't drink as much as they think they do, so how do you keep track?" asks William Johnston III, M.D., a urologist practicing at North Shore University Health System in Chicago.

Johnston's answer is a mobile app he developed for the iPhone. Since going live on the Apple Store in June 2010, the free program has been downloaded more than 2,500 times. Every time a patient drinks a glass of water, soft drink or coffee, he opens the app, taps a picture of the beverage and enters the amount. The application automatically tracks the quantity and displays it as a percentage of the daily target. It also charts fluid intake over the last week and month. It can even e-mail the information directly to a doctor.

He's also developing an app to help patients with enlarged prostates monitor urine flow. Other apps will provide prostate surgery patients with day-by-day perioperative and discharge instructions—complete with checklists, warning signs, and automated medication and follow-up appointment reminders.

"If the patient is at the shops and they see blood in their urine after prostate surgery, the information they need is right in their pocket. If they need help, they can call or message right away. It really opens up a new frontier for patient care, patient safety and access to doctors," Johnston says.

17,000 Apps—and Counting

As of November, there were more than 17,000 medical applications available for download from major app stores for the Apple iPhone and iPad, and for smart phones and mobile computers using the Android, Microsoft Mobile, Blackberry, Palm and Symbian operating systems, says Ralf-Gordon Jahns, head of research at research2guidance.com, a Munich, Germany-based IT consultancy specialising in mobile technologies.

And that's just the consumer end of the market, which is dominated by mobile phone operators and specialised health care firms. Countless mobile apps exist or are being developed by traditional health care providers, device manufacturers, pharmaceutical manufacturers and researchers around the world.

They range from dedicated devices linked to glucometers and blood pressure cuffs that have been around for more than a decade to new applications that take advantage of the accelerometer and GPS capabilities of the latest smart phones to detect and automatically report patient falls and even elopements of patients with dementia.

Bluetooth-enabled scales and other detectors that will automate home monitoring of a wide range of clinical conditions also are hitting the market.

Applications for monitoring patients and accessing electronic records inside the hospital using smart phones and tablets also are proliferating. Indeed, many major electronic medical-record suppliers now are developing interfaces that can run as native applications on mobile devices.

"Our Haiku application for doctors and nurses allows users to look up any patient in the system and review the chart, notes, pathology, X-ray results, medications. Everything that is in the chart can be viewed on the iPhone," says Sam Butler, M.D., a pulmonary and critical care specialist. The iPhone app also supports clinical scheduling and dictation, and e-prescribing is in the works. An iPad version also is being developed.

But more significant than the sheer volume of apps is the growing public acceptance of the technology and the increasing ability to integrate capabilities, which heretofore largely have been siloed in phones or dedicated devices, into the mainstream workflow of providers, Jahns says. He points out that many remote applications have been around for years, but haven't gotten past the trial stage because of provider concerns about privacy and a lack of a standardised way to engage patients.

But with the broad acceptance of smart phone apps, he believes the tipping point is at hand.

"In the next three to five years, we see the likelihood that doctors and patients will both realise they have smart phones, and there will be discussions like 'I see an app for my condition. Is there a chance to include it in my treatment plan so I don't have to come in all the time?'" Jahns says. He projects that by 2015, 500 million of an estimated 1.4 billion smart phone users worldwide will use a mobile health (mHealth) app.

Jahns also believes that health care providers, as well as pharmaceutical manufacturers, will supplant mobile phone companies as the primary distributors of mHealth apps, with diabetes management leading the way.
Until now, charges per download and data transmission charges have paid for mHealth apps, but increasingly the funding will come from providers who can leverage the technology to improve efficiency, and pharmaceutical companies that can use it as a promotional and advertising vehicle, he believes.

"Patient demand is driving it," Jahns says.

The iPad Effect

And so will doctor demand, says William Phillips, vice president and chief information officer of University Health System in San Antonio, a 500-bed county-owned facility that conducts more than 550,000 patient visits annually. The main reason is the iPad.

Nineteen million of them were sold in a mere nine months after they were introduced. That caught the e-media punditry off guard, and their popularity among doctors startled hospitals and EMR developers.

"We anticipated that mobile apps were coming, but we weren't quite prepared for the iPad," Phillips says. "They [doctors] are buying their own and asking, 'Can you connect this with the hospital network?' The portability, intuitive interface and 10-hour-plus battery life made it an instant hit with clinicians. The quality of radiology images is actually better on the iPad than on some of the hardwired clinical workstations."

Doctors like the device because it allows them to keep tabs on more patients without being physically present. For example, anaesthesiologists at Emory University developed an iPad app that allows them to monitor patients before and after surgery, increasing their efficiency as well as improving patient safety.

Responding to doctor demand, University Health System developed a Citrix interface, which is a commercial program that not only allows remote access to PCs and other computers, but also allows doctors to use their iPads to use the system's Allscripts EMR. Traffic over the hospital's Wi-Fi network has increased by about one-third since the Citrix app went online, Phillips says. Like many emerging eHealth apps, integration with commercially available mobile devices appeared decisive. Allscripts is developing a native iPad interface, and Phillips expects it to be available by year's end.

But the advantages to even the Citrix interface, which may be slower than a native application and restrict access to some EMR functions, are so compelling that he already has begun implementing it in some nursing units. "We wanted to wait for the native app, but we couldn't."

Phillips notes that the cost of the iPad is about one-third of a similarly capable laptop. Essentially, it is set up as a dumb terminal accessing the main EMR database. All data processing takes place on the secure computer system, which communicates wirelessly with mobile devices using appropriate encryption and other data safety features. The battery life and convenience of recharging the device is a huge advance over the typical computer on wheels, or COW, which requires not only a laptop computer, but also an expensive cart and mobile battery to ensure it can make it through an 8- to 12-hour nursing shift.
"The cost of a ‘computer on wheels’ or COW is up to six times [that of] an iPad," Phillips says.

Of course, it’s also a lot easier for nurses to tuck an iPad or similar device under their arm than to push an unwieldy COW from room to room, all the time worrying about when it will need to be recharged. That’s no small advantage for nurses who often are being asked to care for more and more patients. Moreover, iPads eliminate the fight for COWs that can take place at the beginning of shifts.

While the durability of iPad battery life is an open question, so far it is even longer than the 10 hours advertised, Phillips says. In its new inpatient facility, University Health System is incorporating not only iPad docking stations in patient rooms, but also a much more robust mobile wireless network, including antennae in stairwells and lobbies, to support an anticipated geometric increase in clinical mobile use within the hospital.

Moving Target

But while the expansion of mobile health apps seems inevitable, the precise technology that will be needed is an open question. For example, the latest Wi-Fi protocol—802.11n—allows communication over 5 GHz transmitters as well as the earlier 2.4 GHz bands, and may interfere with 2.4 GHz 802.11a-g transmissions from existing devices. The upcoming 802.11ac standard may jam existing 2.4 GHz signals altogether. This could require hospitals to install new antennae to keep up with changing standards, as well as higher-capacity wireless routers to keep up with growing bandwidth demands.

"Ten years ago, who knew that 802.11n at 5.2 GHz would be in place today?" says Scott W. Johnson, vice president of communications planning for engineering firm SSR Inc. "If you installed 2.4 GHz antennae, you may be ripping it out today. The industry has not been very good at future-proofing technology."

Cellular substations inside the hospital also may need to be installed to accommodate doctors who want access over the GSM network used by their service providers. And potential interference with existing hospital telemetry equipment, RF devices as well as medical devices such as pacemakers, must be addressed.

More profound is the impact mobile devices will have on provider workflow—and even the balance of inpatient versus outpatient facilities health systems require. "Transformation care for us means extraordinary care for every patient, compassionate service, coordinated care and exceptional clinical outcomes," says Curt Kwak, CIO for Western Washington State for Providence Health & Services in Washington.

"We believe adoption of mobility technologies will enable us to get there, but mobile technologies are not the only factor in becoming a transformation force." To help determine the strategic role of mobile apps and infrastructure—and the level of investment required to support them—the system regularly addresses the issue in information systems staff meetings and with clinicians.

While the migration to standard commercial devices opens up the market by making mobile apps available to both doctors and patients, it also presents substantial security risks, Phillips notes. Maintaining control over how smart phones and tablets connect to the health system network will be critical, as will constant upgrades to ensure data security.

Given the level of infrastructure investment that may be required—and the uncertainty of future needs—SSR's Johnson recommends that hospital leaders assess where they and their competitors are in the market, and decide how much they need to spend to remain competitive.

In building or renovating facilities, he also advocates a flexible design strategy. It may be wise to invest in wiring or conduits that can support greater bandwidth, and to position mobile antennae stations in places where they can be reached easily for upgrades without disrupting patient care.

"You never know what technology to anticipate," Johnson says. "The iPhone was in development before the iPhone, but they elected to go with the iPhone first. Now that the iPad is here, all the developers are in a reactive mode. The need for CIOs to put connectivity and security in place to accommodate the iPad is one thing we didn't see coming. It's a challenge, but it's the way technology advances."

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This article first appeared in the April 2011 issue of H&HN magazine.