



## **Mobile Systems: Will Smart Phones Replace COWs?**

**Smart phones bring clinical information to physicians while they are in remote facilities or on the road.**

By Nathan Read

Will smart phones put COWs out to pasture?

COWs (computers on wheels) have become familiar creatures in hospital corridors. They are rugged and highly functional, but, like their barnyard namesake, they can be cumbersome and hard to maneuver into tight spaces.

Now, the latest generation of smart phones, with touch screens and broadband capability, offer the potential to bring clinical information to physicians while they are in remote facilities or on the road. The phones have smaller screens than laptops, of course, but new advances in software and cell phone technology make it possible for clinicians to access and quickly download almost any kind of medical data in seconds.

### **Smart phone technology**

A smart phone, as defined by an article in *PC Magazine*, is "a cellular telephone with information access. It provides digital voice service as well as any combination of e-mail, text messaging, pager, Web access, voice recognition, still and/or video camera, MP3, TV or video player and organizer."

The use of COWs, laptops and tablets has spread rapidly in the past few years, made possible by the widespread adoption of wireless local area network (WLAN) technology. A WLAN (also known as a Wi-Fi network) uses radio waves to send data over short distances to many computers or other electronic devices.

## **Transmitting data**

Both cell phones and WLAN devices such as laptops use radio waves to transmit data. WLAN devices operate on a different part of the radio spectrum than cell phones and can send more data over shorter distances. But cell phones, including smart phones, operate using cell towers placed throughout cities. Because their signals are dispersed over a wide area, they have historically carried less data than Wi-Fi networks. Cell phones — in their latest incarnation known as smart phones — are rapidly catching up to laptops in terms of functionality, including the ability to access the Internet, display photos and video, and enter data via both keyboard and touch-screen applications.

To understand how COWs and wireless laptops became so widespread in health care, and how smart phones will fit in the future, it is important to trace how mobile technology developed. The first primitive WLAN was created at the University of Hawaii in 1970 using a series of ham radios. By the late 1980s, both the Federal Communications Commission and Institute of Electrical and Electronics Engineers (IEEE) had adopted standards for devices and radio frequencies. By the early 1990s, the technology was sufficiently advanced to be widely deployed by corporations.

A major step forward came in 2003 with the adoption of the IEEE 802.11g standard, which provided for wireless data transmission at speeds up to 54 Mbits (megabits per second). This new, high-speed standard was rapidly adopted by consumers and businesses.

Today, according to a 2008 Health Information and Management System Society (HIMSS) survey, 87 percent of hospitals have some type of wireless information system. Other surveys have shown that WLAN adoption is highest among larger hospitals and lagging in smaller and community hospitals.

Many hospitals have deployed several kinds of mobile hardware and software for various applications, but few have an enterprise-wide strategy for bringing them together. As a communications expert at Tower Strategies, a Houston-based IT consulting firm, noted recently, mobile devices, wireless infrastructure and clinical software are often deployed separately and incompatibly.

For example, a 2007 HIMSS survey found that at hospitals with point-of-care (POC) devices, only 30 percent were integrated with the facility's electronic medical record (EMR). Despite those limitations, COWs, laptops and tablet computers have become ubiquitous features at hospitals. A 2006 survey by Aruba Networks found that 41 percent of hospitals were using mobile EMR applications delivered through COWs, laptops and PDAs. A more recent study, the HIMSS 2008 Leadership Survey, found that 63 percent of hospitals are now using tablet computers for various purposes. Clearly, the current generation of mobile computing devices, including COWs, are widely deployed and have been incorporated into clinicians' workflow. Thus, they are not likely to be retired or put out to pasture in the near future.

## **New capabilities**

We don't expect smart phones to replace COWs, but they will become an increasingly popular alternative for viewing medical information.

In January 2007, Apple introduced the iPhone, a smart phone that achieved widespread popularity because of its many capabilities and ease of use. The iPhone offered a multi-touch screen, Internet access and downloads of photos, music and video, all integrated through an Apple operating system. Soon after, a number of phone manufacturers including Nokia, Samsung, Motorola, Nokia and Blackberry offered smart phones that incorporated many of the iPhone's capabilities, often at a cheaper price.

Opus Healthcare Solutions became one of the first clinical software vendors to deploy a system enabling cell phone access to a hospital's clinical data repository in 2007. The new product, OpusMobility, allows physicians to monitor their patients' lab results and diagnostic reports both inside (via WLAN) and outside of the hospital (via cell phone). The mobility product is integrated with OpusClinicalSuite, which includes systems for clinical documentation, order management, medication administration and laboratory workflow. An upgraded version of OpusMobility is now in use at three hospitals, two in Florida and one in Oklahoma.

Although the current installations use smart phones and PDAs with the Microsoft Windows Mobile 5 system, the Opus clinical software is Web-based and thus can be adapted for use on any of the major smart phone devices, including Apple iPhone and Blackberry.

Experience at current OpusMobility sites has shown that the technology is quickly adopted by physicians, most of whom use it on their personal phones. They access the mobile system frequently, both inside and outside the hospital building.

Outside the hospital, the physicians often use their smart phones to check the status of patients when they are on call. An updated version of the software, now in development, will enable hospitals to page individual physicians through their cell phones, so they can get alerts instantly.

Inside the hospital, physicians frequently use the mobile system when making rounds. In many cases, they turn to their cell phone because they simply can't find an available computer. They use their phones to view lab results, check allergies, medications, nursing notes and transcribed information. Using a stylus, they navigate quickly through dozens of pull-down screens that contain different types of patient information.

Within the hospital walls, physicians access the mobile system via the hospital's WLAN. Most of the current generation of cell phones can access WLAN signals; some detect the signals automatically, others require users to turn on an external switch as they enter the building.

### **Security considerations**

Security of medical information has always been a top priority for hospitals. Unfortunately, as more and more electronic devices containing medical information are deployed, security becomes more complex and challenging. During the past year, we have seen numerous reports of stolen laptops containing health care information.

Smart phones using Web-based applications offer an advantage to laptops carrying hard drives and built-in applications. When a clinical information system is Web-based, patient data is stored on the provider group's servers. When clinical data is sent via either WLAN or cell phone network, the clinical data is encrypted and provided in a "view-only" mode; it cannot be stored on the device. Thus, if a smart phone or PDA is lost, it would not contain any significant amount of viewable data and it would be virtually impossible for an unauthorized individual to access protected medical information.

### **Future of mobile health care**

Many physicians are already using mobile devices. A recent report in *Medical Economics* estimated that some 330,000 physicians now use PDAs. The report said that 90 percent of physicians with PDAs use them to look up drug information and about half get some of their continuing medical education online.

We believe that in the next two to three years, more physicians will use PDAs and smart phones to access real-time patient information as the devices improve and new, connected clinical software is deployed. Use of mobile devices will also be spurred by new political and financial incentives.

For example, the October 2006 revision to the Stark Law significantly eased the earlier prohibition on services that hospitals could provide to physicians. Under the new regulations, it is considered acceptable to provide "reasonable access" to clinical records. This includes the ability to view and enter electronic records. One of the main reasons for the change was the government's desire to encourage widespread adoption of EMRs.

Now, hospitals may provide physicians with smart phones and other devices that enable access to clinical information. Previously, the Stark law allowed hospitals to supply devices (e.g., COWs) that display clinical data inside the hospital. The new regulation enables provider organizations to supply devices that can access clinical information outside the walls of the hospital in a secure fashion.

Another factor driving adoption of mobile clinical information systems is the push by Medicare and private payers to collect more data for performance measurement. Government and private payers want the information to improve outcomes and boost patient safety. In some cases, payers offer financial incentives to provider organizations to supply the desired clinical data sets. And clinical decision support tools become much more effective when they can be linked to real-time patient data such as vital signs and lab results.

The long-term trend toward smart phones and other mobile devices is clear; however, it is impossible to predict exactly what they will look like or how they will be used. When Motorola introduced the first commercial cell phone in 1983, the units weighed over a pound and cost \$7,000 each. Within 20 years, technology had made cell phones inexpensive, ubiquitous, personal items. In the coming decade, we are likely to see similar advances in cost and technology in mobile clinical information.

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