



# **Handhelds and Hot Spots: Success Stories in Healthcare**

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## The Scenario

### Introduction to Wireless

With today's evolving technology, one of the fastest moving trends in the healthcare industry is the use of wireless networks, providing "ubiquitous" access to patient related data. Wireless networks and wireless devices allow mobile access to patient information and results 24 hours a day.

In an October 2004 study of wireless adoption in vertical industries segments, IDC (a subsidiary of IDG, the world's leading technology media, research, and events company) found that more than 80 percent of 34 health care organizations polled said they have deployed wireless LANs, or plan to deploy one in the next 12 months. And in the 2005 Healthcare Information and Management Systems Society (HIMSS) Leadership Survey, 79 percent of 253 health care executives said they would use wireless networks this year, while 54 percent said they would use handheld devices. According to Computerworld, "Doctors were the first large worker-bases that started using PDAs on the job," says Ellen Daley, a principal analyst at Forrester Research. "Here are a bunch of people who have an appetite for carrying PDAs, and here is a cheap way for wirelessly enabling a hospital. Hospitals decided to put the two together to see how they can improve patient care."

Wireless devices and networks transform the methods physicians and caregivers use to provide services. By using PDAs, caregivers are able to spend more time interacting with patients, make fewer errors (which in turn reduces costs), and improve care.

### Benefits of a Wireless Environment

According to an AireSpace Technology web article, wireless LANs and their associated display devices can provide the following benefits:

**Increased Time with Patients** – Wireless connectivity enables healthcare professionals to spend less time on administrative tasks, such as retrieving records, and more time with patients.

**Improved Decision Making** – Real-time access to patient records, drug information, and medical reports can help to ensure that appropriate diagnoses are made in a timely fashion.

**Reduced Errors** – In most healthcare settings, there are a significant number of manual steps and procedures involved when dealing with a patient. Automating these steps and processes, combined with the "error checking" and "reminder" capabilities of an automated system has been proven to significantly reduce errors. Wireless technology and mobile PDAs bring this capability to a much broader range of care settings.

**Response to Patient Needs** – With a wireless network, physicians can pro-actively monitor a patient's vital statistics from almost anywhere and rapidly respond to the slightest of changes. In addition, they can respond with minimal delay ensuring that care is provided as expeditiously as possible.

A recent Computerworld report details how clinicians, armed with mobile devices, and hospitals with wireless devices provide a cheaper and more effective way to maintain connectivity in aging buildings. According to ITPSA (The Information Technology Solution Providers Alliance)

Sales Vice President Chuck Sharp, “The critical function performed by a wireless device is that they put the data entry and retrieval capability at the point of patient care. The saves time and ensures accuracy because the caregiver, whether a doctor or a nurse, doesn’t have to walk to another office or wait until later to enter new information.”

Handheld and other wireless devices give healthcare providers point-of-care data access and data capture throughout the hospital facility. Devices such as a handheld Personal Digital Appliance (PDA) or tablet computer are delivering the following benefits:

- faster response to patient queries;
- process efficiencies and consistent reporting;
- improved data accuracy and reduced errors;
- increased revenue.

In the same Computer world article, Chuck Sharp continues to note that, “The convergence of small computers and cellular phones is making its way into this arena too, along with digital assistance and PDAs.” And, according to a report from WR Hambrecht and Company, practicing physicians lose in excess of \$25 billion per year in denied or reduced fee-for-service claims. This is because of inadequate patient encounter documentation, inaccurate or invalid codes, and failing to bill certain services outside the office setting. Using wireless devices can lead to improved charge coding and boost staff efficiency.

## Potential Issues with Wireless

“Healthcare organizations moving toward mobile computing will demand a high level of security, scalability, and reliable access from their mobile technology,” says Mickey Singer, CEO of Medical Manager Health Systems.

## Security Issues

As wireless networks become more common in healthcare, they are also becoming more susceptible to hackers. When an organization’s wireless network is compromised financial losses and legal ramifications can be the result. Organizations must monitor all wireless activity ensure proper encryption techniques are used and rigorously enforce security and confidentiality policies.

## Challenges with Using Wireless

Even though William Brook, the Children's Memorial Hospital of Chicago Director of IT, says nurses are already reporting increased medication administration accuracy, he also notes that their new bar-coding system has presented some problems. During the pilot of a bar-coding project, the hospital used laptops on rolling carts, but found that they were vulnerable to viruses and unauthorized access by medical students. In addition to these challenges, Brook found installing the wireless access points to be more difficult in the hospital than in an office building. Workers often had to install access points at night when there was less activity, and use sterile curtains and other cloaking techniques to ensure that no dust or other material would get into patient rooms. However, their wireless infrastructure has also allowed the hospital to eliminate dead spots in its paging system, and will be used as the hospital deploys an EMR system with the associated handheld devices.

## Compliance with HIPAA Standards

Focusing on securing the wired network and related infrastructure is a necessary first step to ensure HIPAA compliance; however healthcare organizations also need into secure mobile devices - notebooks, tablet PCs, PDAs and smart phones - that increasingly access and house patient sensitive and protected information. Healthcare organizations are purchasing mobile devices for their staff, however workers are bringing in personal devices as well, which can be a double-edged sword. It is the organization's responsibility to ensure that sensitive information that resides on any device be protected.

## Case Studies / Products

With patient satisfaction surveys voicing a common complaint about slow registration processes, Bloomington Hospital & Healthcare System sought to deploy tools that would enable them to take patient information at bedside or the waiting room—a time saver for both patients and physicians. “We’ve always been focused on patient care and ways to improve,” said Katherine Stroud, Bloomington Hospital’s manager of network and systems technology. From a 2005 web article: “In particular, we wanted to streamline and expedite emergency room procedures as much as possible.” Finally, Bloomington was looking for a solution with inherent flexibility—to accommodate new technological advances, respond to evolving business and end-user requirements, and to ensure the infrastructure would be up to the challenge in the event of a disaster. To address these challenges, Bloomington has deployed Enterasys’ RoamAbout wireless LANs throughout the facility. Currently, the hospital has installed 100 access points, providing wireless access to doctors, nurses and administrative staff. In the ER, patients no longer have to wait at registration; now the hospital comes to them, thanks to mobile “walkaroos”— wireless devices used for gathering patient information anywhere in the facility. These walkaroos are also used bedside by doctors and nurses on other floors for charting patient progress, gathering clinical information, etc. “We’re delighted with the new wireless system,” said Katherine Stroud, Bloomington Hospital’s manager of network and systems technology. “Not only has it increased patient satisfaction, it provides us a secure, emergency network solution if disaster ever struck our facility.” For more information, please visit the website, <http://www.enterasys.com>.

In a 2004 Infologix web article, Florida Hospital administrators wanted to link more than 90 facilities within the health care system to increase their patient caregiver’s efficiency, make network management faster and easier, and reduce overall costs. To accomplish these objectives, they chose a Cisco® Aironet® wireless solution by Cisco Systems. More than 14,670 total users currently access the hospital's wireless network-including bedside clinicians and other health providers. Seven hundred wireless laptops are currently deployed across seven campuses for clinical care purposes, and multiple highly integrated clinical applications are in use throughout the environment. The hospital employees were not only using the WLAN for clinical data collection and charting; but also for e-mail and other back-office functions specific to their jobs. Thanks to the workflow advantages provided by this wireless environment, clinicians have been able to adapt to the transition from manual charting online documentation at a faster pace.

In an August Network World web article, Carolinas HealthCare System (Carolinas) in Charlotte, NC was referenced for their large installed Wi-Fi network. During the past two years, Carolinas has deployed more than 500 wireless access points for 802.11b and 802.11g networks,

providing wireless coverage for more than 1.5 million square feet of space, said Craig Richardville, Vice President of Information Systems. The organization expects to add another 500 access points during the next 18 months to provide wireless access for its 14 hospitals and related facilities. The system allows doctors and nurses to share lab results and patient orders via any Pocket PC device. The advantage of using Pocket PCs is that Carolinas-employed physicians, as well as community-based physicians, have a wide range of handheld choices. VoIP has been enabled for 100 respiratory therapists and dietary personnel, as part of a trial effort to move toward hands-free voice-enabled devices that should help care workers do their jobs more easily.

The next step for VoIP is to do communications over Wi-Fi so that doctors and other workers can move between networks easily, and a call can be easily re-established if it is dropped. Carolinas also wants to make sure doctors can stay connected when off campus, which means Richardville and his staff are working with cellular service providers to come up with effective technologies that will improve connectivity for smart phones or other devices. "The intent is that it would be no different to being on campus with Wi-Fi or off campus with cellular," he said. For more information on this product, please visit the website: <http://www.cisco.com>

The Winchester Hospital in Winchester, Massachusetts reached a critical juncture last year when CIO Gerald Greeley was deciding whether to leave the comfort zone of the wired network in favor of a less secure wireless system to run its WinChart nursing documentation system. The wireless option became a no-brainer, he said. "Wireless promised the best functionality, providing a paperless environment and bedside documentation," Greeley said. "It just isn't practical to have a hardwire device alongside every bed. Our goal is to have an electronic medical record and this is one of the steps to get there." Overall, the Bluesocket system has allayed Greeley's security fears. "The firm performing our HIPAA security audit called it 'the most bulletproof wireless install' they had ever seen," he said. For more information, please visit the website: <http://www.bluesocket.com>

## Wireless Networks

According to a September 2005 pdaMd.com article, today the most practical and prevalent form of wireless network in healthcare is the wireless LAN. WLANs (Wireless Local Area Networks) are suited for many clinical and administrative in-office applications, including e-prescribing. Similarly, many of the other wireless technologies, such as Bluetooth, (Bluetooth is a short-range, ad hoc network that provides spontaneous connectivity. In WPANs, as devices move, the network moves.) should provide numerous benefits when polished and integrated with the wireless Internet. Unlike Bluetooth, WLANs provide continuous coverage for devices in the network. As devices may roam freely within the coverage areas, these coverage areas remain fixed. WLANs are useful and address the critical requirements of deployment, stability, and speed that are essential for mobile physicians.

In a Newbury Networks web article, details were given about their WLANs Drive Point-of-Care Healthcare Applications. According to the article, with the ability to real-time track the physical location of all Wi-Fi devices and 802.11-signal traffic, Newbury Networks WLAN solutions make possible many new point-of-care healthcare applications. The product has point-of-care applications using Wi-Fi networks that can provide mobile medical personnel with critical data while enabling faster diagnoses to administer patient care more effectively.

Here are a few real-world examples of point-of-care applications using Newbury's WLAN solutions:

- Registration Systems - patient admissions and registrations systems using wireless tablets for improved efficiency and speed, especially in emergency room situations.
- Patient Record Access - up-to-date patient records following the patient by location (patient room, emergency room area, etc.)
- Electronic Charting - bedside documentation systems to save time, improve accuracy, and provide information views relevant for each caregiver's role (Doctor, Nurse, Technician, Specialist, etc.)
- Prescriptions - authorizing, ordering, distribution, drug interaction checking, and safe dosage monitoring of patient prescriptions via handheld wireless devices and bar-coded (or RDIF-tagged) medicines
- Case Management - case managers can review and process insurance authorizations while mobile, reducing redundant data entry cycles and paperwork flows
- Patient Monitoring - wireless monitoring systems provide real-time telemetry and improved monitoring, while giving patients more freedom and mobility
- Equipment Monitoring - locating the whereabouts of expensive and critical-care equipment through location-based detection and tracking

For more information on this product, please visit the website: <http://www.newburynetworks.com>

In a March 2005 AirWave article, AirWave wireless announced that they will be implementing a system called AirWave Management Platform™ (AMP) to manage and secure a Wi-Fi network distributed across seven hospitals and healthcare facilities. Alverno Information Systems, a subsidiary of the Sisters of St. Francis Health Services, is one of America's largest not-for-profit Catholic hospital corporations.

Alverno Information Systems specifically selected AMP for its RAPIDS Wireline feature, a module that enables network administrators to discover any unauthorized rogue access points from the wired side of the network. The software uses a variety of protocols to discover and interrogate any unauthorized devices – even those that are not within range of an AP or RF scanner.

"RAPIDS' ability to detect rogue access points from the wired side of the network is critical to our security policy, since we cannot assume that all rogues will be located conveniently within RF range of another AP or wireless sensor," said Tony Juarez, network engineer at Alverno Information Systems. "Wireline rogue detection provides essential baseline security across our entire network."

From hospitals with Wi-Fi to law firms without any wireless networks, more and more enterprises from all sectors are turning to AirWave for protection against unauthorized rogue access points. These organizations have selected AirWave's RAPIDS wireline detection software as an immediate, cost-effective solution that provides baseline protection across the entire enterprise.

RF scanning solutions typically require additional expensive, specialized hardware sensors and cannot detect rogue APs that are not within RF range of a sensor. In contrast, AirWave's RAPIDS software can be deployed centrally on any wired network and immediately begin to search and discover unauthorized APs anywhere on the network. For organizations that have an authorized wireless AP infrastructure, the RAPIDS software uses the APs to conduct RF scans in addition to wireline detection. Finally, for organizations that have purchased sensor-based wireless intrusion detection systems, RAPIDS provides an API to enable rogue AP data to be shared efficiently between systems. The RAPIDS wireline solution complements these RF scanning system by detecting rogue devices that are not within range of any scanning device.

"Whether an organization has an authorized Wi-Fi network or not, they must open their eyes to the reality that their networks are extremely susceptible to security breaches through unauthorized rogue access points," said Gary Hegna, CEO of AirWave Wireless Inc. "RAPIDS provides organizations with the peace of mind that their networks are protected on the most fundamental level – the wired side. It is an especially key solution for hospitals because it provides them with a cost-effective security tool that enables them to better comply with HIPAA regulations."

In a July 2005 Forbes web article, Overlake Hospital Medical Center in Bellevue, Washington was featured for its wireless network system. According to the article, the 256-bed, not-for-profit private hospital has a wireless network that gives doctors and support staff access to equipment, patient records, and most importantly, to each other. Being wireless allows the staff to see prescriptions, charts and lab results right by the patient's bedside. Support staff carry Internet phones that work on voice-over-Internet Protocol (VoIP) wireless networks. Administrators say being wireless improves and speeds up patient care, cuts down errors, improves records management, prevents lost test results and speeds up decision-making in emergencies. "We wanted to get the computer to the patient," says Kent Hargrave, the hospital's chief information officer. "We also had a 'build it, and they'll come' mentality in terms of finding ways to use the network." Overlake Hospital worked with Airespace, a wireless switch division that was acquired by Cisco Systems, to expand the network throughout the hospital. After about four weeks and over 100 access points later, the hospital boasts 95% wireless coverage on its 19-acre campus. For more information on this product, please visit the website: <http://www.cisco.com>

Implementation specialists at Microsoft have made security for wireless networks a focusing an army of resources on products such as the Wi-Fi Protected Access 2 (WPA2) for the Windows XP Service Pack 2. Available as a free download, the update provides users with a new level of protection from wireless threats, officials from the Redmond, WA based computer giant said. "We have now brought wireless security up to the highest standards in accordance with HIPAA," said Taranjeet Athwal, program manager for the Microsoft wireless team. Products such as Maitland, FL based Galvanon's MediKiosk start appearing at hospitals much like the automated check-in stands that now populate airports. CEO Raj Toleti said he developed the wireless self-service application because patient registration has long been a pain point at hospitals.

An April 2004 web article by PDA Cortex, it was reported that Illinois Central DuPage Hospital had taken steps towards installing two new Sprint wireless networks. The new wireless networks provide physicians, patients and visitors virtually unrestricted use of Sprint wireless phones and high-speed Internet access (Wi-Fi). Both wireless signals extend throughout the hospital, reaching all the way to patients' bedsides. The innovative wireless solutions will allow nurses, physicians and administrators to communicate instantly with each other and obtain

mobile access to important patient information from virtually anywhere within the hospital, resulting in optimal patient care. Central DuPage Hospital will deploy the Sprint PCS Vision Smart Device Treo 600 by palmOne, along with the Horizon Mobile Care Rounding application by McKesson. This combination of mobile handset and software will allow physicians remote access to patient information both in and outside the hospital, including real-time access to laboratory and radiology results, vital signs, medication updates and patient history. This point-of-care communication system contributes to improved patient safety and reduced costs, and is part of a continuing joint effort by Sprint and palmOne, the world's leading maker of handheld computers and highly acclaimed smartphones, under their business solutions agreement to provide best-in-class mobile solutions to the Healthcare industry. With wireless carriers playing an influential role in the adoption of mobile technology for the healthcare industry, we are seeing a growing trend of hospitals starting to lift restrictions on cell-phone use inside their facilities," says senior analyst Philip Fersht at The Yankee Group. "And, with Wi-Fi Hot Spots popping up in public places across the country, I think we will see more and more hospitals making their existing 802.11 networks available to the public so that visitors and patients can, just like at a hotel or an airport, enjoy the benefits of wirelessly connecting to friends and family during a long stay at the hospital." For more information about these innovations, please visit the website: <http://www.cdh.org>

A wireless solution by MobileAccess Networks offers healthcare organizations a flexible multi-service wireless platform that provides reliable in-building wireless coverage for critical wireless services and applications throughout their facilities. With healthcare providers under constant pressure to balance operating costs while improving the quality of patient care, MobileAccess is ideally suited to address the needs of healthcare CIOs. For more information, please visit the website: <http://www.mobileaccess.com>

In October 2004, the Baylor Sammons Breast Imaging Center in Waco, Texas, installed the MediKiosk, which can be an ATM, desktop unit or tablet device. Baylor uses the tablet, called E-Clipboard, and so far about 7,500 patients have registered with it. Check-in times have been lowered to about three minutes. For more information on MediKiosk please visit the website: <http://www.galvanon.com>

Featured in a July 2004 Health Informatics web article, Lancaster General Hospital, Lancaster, PA, is fairly typical. In essence, buildings in the Lancaster orbit are hardwired together, but they also have 11-mpbs 802.11b wireless LANs, strung together with about 140 wireless access points inside each of three main facilities. "We mainly built the wireless network for clinical applications, but as it's growing and people are becoming more aware of it, we're opening it up to email access through PDAs," Ernie Thompson, Networking Services and Support Manager says. Wireless, browser-based emergency room patient tracking, from Ibox Healthdata Systems Inc., Rosemont, IL, is used. For more information, please visit the website: <http://www.picis.com>

In a March 2005 web article, Unbound Medicine, a provider of knowledge management solutions for healthcare, introduced a wireless medical resource for physicians and other healthcare professionals. In partnership with Merck & Co., Inc., Unbound Medicine now gives clinicians 24-hour access to select medical information from the Merck Medicus Internet site using their wireless Personal Digital Assistant (PDA), Blackberry, or smart phone. "We are pleased to extend our partnership with Merck to deliver trusted medical information to the point of need," said William Detmer, MD, president and CEO of Unbound Medicine. "As physicians are constantly on the go during the average day, the new wireless Merck Medicus will help them find answers when questions arise and stay abreast of the latest advances in medicine."

Using Unbound Medicine's mobile platform, current medical resources can be accessed using a wireless internet connection to [www.merckmedicus.com](http://www.merckmedicus.com), including: The Merck Manual of Diagnosis and Therapy, MEDLINE Journal abstracts, Pocket Guide to Diagnostic Tests, and Reuters Medical News. The Personal Search Assistant allows clinicians to query more than 11 million medical articles in the MEDLINE database from their handheld or wireless device in real-time without access fees or advertising content.

The wireless option is compatible with cellular phones with web-browsing capabilities, smart phones, and other wireless devices that use Pocket PC, Blackberry, or Palm OS operating systems. It follows the launch of Mobile MerckMedicus, which was designed for non-wireless PDAs and introduced by Unbound Medicine and Merck in 2004. For more information on wireless MerckMedicus, or to register, visit [www.merckmedicus.com](http://www.merckmedicus.com).

Medical Manager Health Systems' ULTIA provides physicians wireless access to patient chart information. Also, it allows instant access to daily schedules, hospital rounds information, clinical tasks needing special attention, and other data all from their office. The ULTIA clinical view can be personalized for each physician to ensure that the proper clinical data is available for viewing.

"Basically, a physician can walk around anywhere in the facility or organization and have all the information needed to provide appropriate care for a patient," explains Mickey Singer, CEO of Medical Manager Health Systems. "With ULTIA they have instant access to patient information like demographics, insurance, referring physicians, diagnostic history, lab results, procedure histories, medications, progress notes or transcriptions and other EMR-type functions. They can order lab tests and prescribe medications. And it's all completed in real-time with the touch of a stylus. There is no need to synchronize the systems."

## Summary

According to "Health Informatics", wireless coupled with mobile devices offers the most direct route to improved efficiency and safety at the point of care. With mobile communications and computing devices caregivers are able to access patient records, review drug databases, access lab tests and results, transcribe and prescribe medications; all without completing redundant paperwork. Caregivers are able to spend more time interacting with patients, make fewer errors, reduce costs, and improve care. As wireless technology has evolved, so has the array of options for improving healthcare applications and functions. Some healthcare decision makers are looking for mobile technologies that foster better and faster decision making, as well as allow them to access patient medical information more rapidly. Mickey Singer, CEO of Medical Manager Health Systems, provides an overview of the anticipation of use of wireless devices in a healthcare environment, "Ultimately, it's about the information that the system makes available. Information is critical in the delivery of healthcare. And when the right information is there for the doctor, we'll see an increase in patient safety and the quality of care that's available. We'll also make the healthcare environment more efficient and make it easier for providers to do their jobs."

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