Implementing the Wireless Computerized Patient Record

by Harry Rhodes, MBA, RRA, HIM practice manager

The ability to provide timely, relevant, and accurate in-formation to the healthcare decision maker at the point of care is a critical success factor for any provider. For enterprises that operate in extremely competitive healthcare markets, the ability to meet this challenge could mean the difference between success and failure. In 1994, MacNeal Health Network, a Berwyn, IL-based integrated delivery system encompassing 3000 employees in more than 30 different locations, began its quest for an edge over its competition via an information advantage. Installing its first wireless LAN system in 1995, MacNeal steadily expanded its network to include 10 of its 30 primary care centers. The MacNeal system is now recognized as the largest successful wireless LAN electronic patient record system in the United States. With more than one-third of the ambulatory sites installed, MacNeal is eagerly awaiting the day when it can begin installing the system in its 427-bed hospital.

As vice president of information services and CIO for MacNeal Health Network, David Printz has been instrumental in helping MacNeal achieve its current level of information system technology.

AHIMA: What was the motivation for implementing MacNeal's wireless system?

Printz: The initiative to go wireless was born from MacNeal's collective vision of the future and the health network's anticipated needs for health information. MacNeal began by formulating an information management plan. The physicians and other system users were included in the development of the IM plan from the very beginning. The staff wanted to have real-time access to clinical and administrative information. We wanted to migrate to an electronic medical record system. However, we did not want to maintain both paper and electronic record systems. Because MacNeal is committed to building a network of clinics in the Chicago metropolitan area, it was decided to begin by automating the clinic records before tackling the records at our 427-bed hospital. We worked to make the system meet the needs of the user: Keep the system simple and flexible and reduce the number of key strokes. We began, in January 1995, focusing on 10 of the 30 primary care centers. We installed the 10th center in January 1997, so we have been making good progress toward our goal.

AHIMA: How did you go about performing market research, evaluation, and selection of your current vendor? What criteria did you use to select the system?

Printz: Luck had a hand in deciding which company to use. A venture capitalist learned of MacNeal's plans to investigate a wireless LAN electronic patient record and recommended a company named Azron. Azron had developed an application and was getting ready to site test a wireless LAN electronic patient record. Azron had not selected a pilot site, so when MacNeal expressed an interest in being the alpha site, we were able to work out an agreement. The decision to become an alpha site was easy, because the product itself did not exist in a setting like ours.

AHIMA: What features were most important?

Printz: The total elimination of the paper record. We didn't want only the new records to be paperless, we wanted all of our old records to be paperless as well. To accomplish this we would have to scan more than 40,000 paper records to computer disk. To make the conversion more manageable, paper records were scanned in advance of scheduled visits as part of the registration process. Once scanned, the paper records were taken out of circulation. To cut down on the number of pages being scanned, only information selected according to the clinical requirements of the medical staff was scanned from the paper record. I believe document imaging will prove to be the transitional technology allowing healthcare organizations to move from a paper-based record to an electronic record and, ultimately, a fully functional CPR.

The computer devices and software had to be "doctor friendly."

The system had to follow the client/server model, with LANs located in each center.

The hand-held computers had to communicate live to the LAN. The hand-held device would need to continuously update the LAN without user intervention.

The hand-held computers would need to provide for flexible input, allowing the user the option to perform data entry via computer pen or to use menu choices, point-and-click, or keyboard. The users indicated that flexibility of input was a very important requirement, as they had varying skill levels and needs.

The hand-held computers also needed to be both input and output devices.

AHIMA: How big is your ambulatory clinic network?

Printz: The ambulatory clinic network consists of 30 primary care clinics, 50 physicians, and 175 employees. Presently, 10 of the 30 primary care clinics are utilizing the wireless LAN system. The 10 clinics on the wireless LAN network process 600 patient encounters per day.

AHIMA: Do you have a formal/ approved record content?

Printz: Yes. The system leads users to the content with chart tabs that appear immediately after a patient record is pulled up on the computer. The users click on the appropriate tab to view content.

AHIMA: You mentioned that some of the electronic medical record contains scanned images of the paper record. What percentage of the electronic medical record consists of scanned images?

Printz: Only laboratory reports and transcribed reports enter the system as digital information. Transcribed reports and laboratory reports are transferred in their digital format from other integrated systems. Handwritten entries made using the touch-sensitive pen are in object format. Information can be keyboarded as well as handwritten. All medical records from previous visits, correspondence, radiology reports, and consent and authorization forms received in paper form are scanned into the electronic medical record.

AHIMA: What is the method of wireless transmission? How does the information get to the server from the hand-held unit?

Printz: The technology is referred to as spread spectrum technology. It involves the use of low-frequency radio waves. By the end of the year there should be an international standard for a frequency of 802.3 from ISO. The program we run was developed by Solectek, which is now supported by Lucent. The remote access application is Citrix. Initially we considered both Proxim (the largest manufacturer of wireless technology) and Solectek. The information from the hand-held unit is continuously transmitted to the LAN via low-frequency radio signals. There are two transervers mounted in the ceiling of the clinic. The range is only about 100 yards; the shorter range makes the system more secure than standard cellular phones, which have a wider range.

There were some concerns initially about throughput speeds on a wireless network. The average page of typed text has about two kilobytes of information, and a scanned image of the same page has about 50 KB of information. Transporting these files over an Ethernet connection with a 10 megabit theoretical throughput but about 5.5 megabits in practice presents no problem; no visible transport delay is detected. Transporting the same files over a wireless network with a theoretical throughput of one megabit is slower, but not as slow as one might think. Given the option to wait a bit for a chart or not have the information at all, the physicians find a one- to three-second response time on their mobile wireless laptops tolerable. The idea that physicians must have everything at "think speed" is false.

AHIMA: Besides the slower throughput speeds, are there other limitations to the technology, such as storage, features, battery life, processing power, integration, or security?

Printz: The only other major limitation is battery life, which is about two hours. We deal with that problem by keeping extra battery packs and putting power jacks in all the exam rooms.

AHIMA: How are the view screens for the wireless hand-held computers designed?

Printz: The transcribed reports and lab results use traditional electronic form design. The remainder of the chart that is not transcribed from dictated reports or downloaded from the laboratory system is based on scanned pages of the traditional handwritten chart. Medical record forms are designed on the word processor. Once they are approved, they are scanned into the Azron electronic medical record. When physicians wish to document patient information, they select the needed report form from a drop-down menu. Once the form appears on the screen, they write the information using a touch-sensitive pen.

AHIMA: What are the components of your computerized patient record?

Printz: Windows 95 and Windows NT operating system; Fujitsu Stylistic 500 and 1000 handheld devices (the main difference between the 500 and 1000 is a color screen); Citrix remote access application, and Solectek wireless technology.

AHIMA: How has introducing wireless technology improved patient care?

Printz: Traditionally, one of the problems with the paper record was that it was never where it should be when it was needed for patient care. For example, in the past when a patient would call the clinic to speak to a physician, the receptionist would take a message. The physician would then have the patient's record pulled for review before calling the patient back, and a progress note of the telephone conversation could be recorded in the record. This very often would take hours; delayed first while the chart was located, and then delayed again if the patient was not available when the physician called back. Now, when patients call they are often put through to the doctor immediately. Using the hand-held computer, the physician is now able to review the patient's history within seconds, take action, record the conversation in the progress notes, and write orders if needed. A six-month study of four physicians revealed that three of the four were able to see 13.6 percent more patients per day. This improved productivity is attributable to the elimination of chart retrieval delays.

AHIMA: How has the introduction of the wireless electronic medical record reduced operating costs at MacNeal?

Printz: The 10 primary care centers now using the wireless system are saving more than $1000 a month on file room supplies, paper, and printing. Labor costs associated with filing, chart retrieval, and chart assembly have also been eliminated. Clinics have seen office supply costs reduce by half within the first six months and then further reduce by half within the year following installation. The savings per patient per year amounts to about $1.50 for existing patients and $4.27 for new patients. The clinic also reaps the benefit of gaining back the floor space where the paper records were once stored. Many of the old record rooms have been converted to exam rooms and offices.

AHIMA: Any advice to pass along to other facilities considering wireless technology?

Printz: The success of any new system is dependent upon acceptance by the system users. Systems designed only by information service professionals may not be so readily embraced by the system users. Involve the system users early in system development and keep them involved through the entire life of the system. The organization that begins introducing this technology first will be ahead of the rest and as a result will gain a definite competitive advantage.

Article citation:
Rhodes, Harry. "Implementing the Wireless Computerized Patient Record." *Journal of AHIMA* 68, no.7 (1997): 44-46.
