

The 747-bed Boston hospital has installed an RFID-based real-time location system throughout its 17 floors, enabling it to track thousands of medical devices.

By Beth Bacheldor

Feb. 20, 2008—With a months-long successful pilot now complete, [Brigham and Women's Hospital](#) (BWH) in Boston is taking its active RFID tracking system to new heights. The 747-bed nonprofit teaching hospital, affiliated with [Harvard Medical School](#), has wired each of its 17 floors with a real-time location system (RTLS) from [Radianse](#), and plans to expand the system to an adjoining facility opening this spring.

Altogether, about 8,000 medical devices will be tagged and tracked using the RTLS. Those devices include infusion pumps, continuous veno-venous hemofiltration (CVVH) machines for removing waste products from blood, and pulse oximeters that measure the oxygen saturation of a patient's blood.

Radianse's active RFID tags operate at 433 MHz and communicate with Radianse receivers via a proprietary air-interface protocol. The receivers—small box-shaped devices typically mounted on walls—plug into BWH's local area network and relay the collected RFID data to a Radianse server. The receivers can interrogate a tag from up to 50 or 60 feet away, and can pinpoint its location within an accuracy of up to 3 feet. When three or more receivers pick up a tag's ID number, Radianse software determines its location based on signal strength.

The system is in use within the hospital's emergency department, surgery units, cardiac care, perioperative units and common areas. It will also operate throughout the new facility, the [Carl J. and Ruth Shapiro Cardiovascular Center](#), which will connect to the main building via a bridge and tunnel.

The hospital's initial deployment of the Radianse system took place in 2005. During that nine-month pilot, says Steve Schiefen, Radianse's chief operating officer, BWH tagged five types of equipment, covering about 350 devices. To date, says Michael Fraai, the hospital's director of biomedical engineering, BWH has tagged approximately 4,000 items.

Printed on each tag is a label printed with a bar-coded number identical to the unique ID number encoded onto the tag's RFID chip. When staffers affix an RFID tag to a device, they use a handheld bar-code scanner to record the tag's bar code. By using a bar-code reader, employees know with 100 percent certainty that the device is correctly matched to the ID of its own tag, and not to the ID number of another nearby tag.

"Bar-code readers have become very inexpensive and easy to use," Schiefen says, making them an ideal solution to affix and associate RFID tags on devices that will be tracked by an RFID-enabled RTLS. Once a tag's bar code is scanned, details about the tagged device, such as its make, model and assigned location—much of which the staff accesses from the hospital's inventory management system—are then input and stored in the Radianse system.

According to Fraai, the system is already helping improve patient care, streamline patient flow and save the hospital money. "For tagging," he says, "we identified the critical devices that can compromise patient flow—those are the devices that, if you can't find them, patients can't be treated." Staff can use a nearby computer to access the Radianse application and select the device being sought. The software then locates the item and indicates its location, down to the room level.

The hospital is now starting to collect usage data that will help it determine just how many of each device it needs to maintain in inventory, as well as whether some items could just be leased. "Let's say you need 10 IV pumps, but you can only get your hands on eight," Fraai says. "So you keep 12 in inventory because with that many, you think you will be able to get your hands on at least 10." But with real-time location data, the hospital will be able to keep close tabs on where each of the 10 IV pumps is at any given time.

And with the historical data, the hospital will be able to track how often each device is in use, and decide whether it would be more cost-effective to lease rather than buy. "Take the CVVH machines, for example," Fraai explains. "According to the clinicians, they are always in use, but this system will provide us with data that is non-biased. "We might discover that 75 percent of the time, three of the CVVH machines were just sitting in the holding area. So maybe we'd decide to lease, rather than buy, additional machines."

Additionally, Fraai adds, the hospital hopes to eliminate incidents in which devices simply go missing. For a while, staffers suspected some items were ending up in the laundry room after inadvertently being wrapped up in dirty linens as rooms were cleaned. To prevent this from occurring, the hospital has installed receivers in the laundry rooms. "We haven't found any devices yet that I'm aware of," he notes, "but that is why we put the antennas there."

BWH expects its RTLS will save it \$300,000 annually. Fraai says the equipment deployed for the 2005 pilot paid for itself within 15 months, and he expects the hospital to recoup the costs of implementing the RTLS throughout its facility (excluding the adjoining cardiovascular center) in about three years. "This system is relatively easy to use," he says. "The staff that is using it, love it now."