RFID Systems in Healthcare: Tagging Takes Off

Hospitals save large sums with pinpoint equipment location, and by leveraging asset-tracking technology.

A few years ago, the University of Kentucky Medical Center realized it was spending a whopping $400,000 annually renting mobile medical equipment. Within twelve months of that alarming discovery, the healthcare organization was able to slash its rental expenditure by 88%, saving $350,000 while improving the level of patient care.

The reason behind this substantial cost reduction? Radio Frequency Identification or RFID. This fast-growing technology uses radio waves to exchange data between readers/antennas and labels/tags that are attached to or embedded in objects.

By "tagging" 3,000 pieces of equipment, the medical center was able to get a fast and accurate view of where that equipment was at any given moment in time. Through visibility to asset location, they dramatically reduced the need for rental units to make up for devices that could not be easily located.

With hospitals on ever-tightening budgets there's an even greater premium on efficiency, thus their expanded use of RFID for asset tracking. Revenues from RFID technology in the healthcare industry are expected to grow from $442.5 million in 2010 to $1.32 billion in 2017, according to a new report from Frost and Sullivan, a consulting group.

"The application of RFID in the healthcare market has progressed from initial stages of experimentation and early stages of adoption, to large-scale deployments," Frost and Sullivan researcher Neelima Sagar told *Security Systems News*.

The Brooke Army Medical Center (BAMC) in Fort Sam Houston and Ohio State University Medical Center (OSUMC) are just two of the leading healthcare organizations that rely on RFID to track assets across multiple buildings on campuses that are comprised of millions of square feet. These and other medical organizations are finding that using RFID for asset tracking provides multiple benefits (including compliance, operational efficiency, cost reduction, and loss prevention) which in turn can save hundreds of thousands of dollars each year.

Leverage Existing Infrastructure

As recently as a decade ago, RFID was a complicated and costly process that required wireless antennas and hardware to be installed in every room of a medical facility. "The most advanced systems eliminate the need for most of that equipment by running on the existing Wi-Fi networks, which are used in about 90 percent of hospitals today," says Cindi Loveall, a spokesperson for Ekahau Inc., which introduced the first Wi-Fi-based tracking solution a decade ago. The company's technology is now in use at BAMC, OSUMC, and hundreds of other hospitals around the world.

Today, all that's needed for asset tracking are RFID tags and software. Together they leverage sophisticated location algorithms which identify where tags are located with pinpoint accuracy using an existing Wi-Fi network. Sometimes the entire RFID solution is called a Real Time Location System (RTLS) which reflects the advanced technology's ability to find equipment quickly.

Hospitals have, and continue to use, passive tagging for a variety of reasons, particularly in the area of high-value inventory tracking and management. Supplementing those systems with active tagging, RTLS technology has shifted the institution to a more "active" monitoring capability, particularly as it relates to use by hospital security.

Chad Neal, OSUMC's director of technology, notes that RFID technology has improved significantly in the last few years. When he first looked into Wi-Fi-based RTLS,

he found the technology at the time couldn't identify the location of equipment precisely enough to meet his needs. However when he ran a test of the Ekahau equipment in 2008, he found the technology was now able to locate items with an accuracy of less than three meters.

Since then, Loveall notes, with the help of infrared beacons, the location accuracy has improved to bed-level, or about three feet. "A core function of the latest RTLS system is to be able to locate assets, staff, and patients within the hospital down to which room they are or have been in," she says.

Another reason RFID is catching on is that by using the hospital's existing Wi-Fi network it can be installed quickly and easily. Clarian Health, named one of the nation's "Most Wired Hospitals" for nine years running, recently tagged 10,000 pieces of equipment in three downtown Indianapolis hospitals. One of the draws was that the RTLS system could be up and running in just weeks, since it made use of the hospital's existing Wi-Fi infrastructure rather than needing additional equipment to be installed. No construction crews were needed and no hallways had to be torn apart.

Faster, More Accurate Monthly Inventory Assessment

"At Clarian Health, we use leading-edge technologies to help us improve patient care, increase efficiency, and ensure the safety of everyone at our facilities, and we continually seek innovations to support these goals," said Christen M. Mann, director of purchasing and contract services for the organization's supply chain operations division.

Echoing those words, many organizations look to RFID first for improvement of operational efficiency. Brooke Army Medical Center (BAMC) in Fort Sam Houston, Texas, demonstrates some of the existing challenges in managing assets on a sprawling campus with traditional methods. As the largest military hospital in the country with 450 beds and 3 million square feet of space, BAMC is set to soon open a new 750,000-square-foot tower which will house an outpatient pediatrics clinic, an expanded emergency and trauma department, an expanded burn unit, and psychiatric nursing units.

In the past, completing monthly inventories and preventative services for high-value equipment required personnel to walk through the areas where the equipment was expected to be located. If any equipment was missing, the staff needed to investigate and fill out forms to account for how or when the items were misplaced. This process, along with monthly inventories, was extremely time-consuming, according to Amy Sheehan, the chief of BAMC's equipment-management branch.

Now BAMC has tagged more than 5,000 pieces of equipment with a unique ID number that is received by the Wi-Fi nodes, which then forwards that ID information to the tracking-system software. A worker who needs to maintain specific assets can request a list of all the equipment due for maintenance, along with the equipment's location. Because the location data is provided in real time, the hospital's staff is spared the lengthy process of searching for it, or filling out paperwork explaining where it was most recently located. For "a facility of this magnitude," Sheehan says, the tracking system "will give us the ability to complete monthly inventories and preventative services efficiently."

Equipment Found in 48 Seconds

Ohio State University Medical Center (OSUMC) also has multiple buildings spread over its 5 million-square-foot campus. Nurses were called "hunters and seekers" because they spent so much time looking for IV pumps, wheelchairs and other mobile medical equipment they needed to care for their patients.

Ohio State University Medical Center estimates it takes 2½ people, working full-time, just to find "lost" equipment.

In a recent study, OSUMC determined that its Ekahau RTLS system took an average of 48.71 seconds to find an asset. What's more, 99.1 percent of the assets were found in less than five minutes. OSUMC estimates the system has saved 20 minutes per employee per shift that used to be spent looking for items.

The total savings of staff time are impressive: OSUMC's material systems division, which maintains the inventory of medical equipment across five hospitals, will save an aggregate of 730 hours a year that used to be wasted looking for lost items. Respiratory therapy will save 1,825 hours of staff time annually, and the perioperative services

department will save 2,433 hours a year. In just these three areas alone, that's the equivalent of two-and-a-half people working full-time just to find items.

Improving Quality of Care—Tied to Reimbursement

In addition to the benefit of staff time reduction, RFID can also help improve scheduling, as well as boost patient and staff satisfaction.

Consider Southeast Alabama Medical Center (SAMC), a not-for-profit community health system that serves approximately 600,000 people in southwest Georgia and the Florida Panhandle. It operates a multi-floor facility with a 370-bed regional referral center. Three years ago, at the urging of the nursing staff, the organization implemented an RFID pilot project to reduce downtime of equipment.

"Patient service and customer satisfaction are our number one goal," says Scott Lapham, a former network engineer at SAMC. To show how RFID impacts those areas, he gives the example of a patient on an acute floor who starts swelling and needs emergency cutdown equipment from the Emergency Department. In the rush of handling the critical situation, the medical staff would sometimes forget to return the equipment. "What if somebody needs it in the ED the next day and nobody knows where it is?" Lapham asks. The tracking system helps ensure that equipment is available to necessary personnel whenever and wherever it's needed.

> *"Since the perioperative department at OSUMC knows where their medical equipment is at all times, more surgeries can now be scheduled each day."*

OSUMC had a similar requirement: their perioperative services department wanted to know where their medical equipment was at all times so there wouldn't be any delay in getting the right device to the right location to support a patient procedure. As a result, more surgeries can now be scheduled each day.

Reducing the Loss of $10,000 Medical Pumps

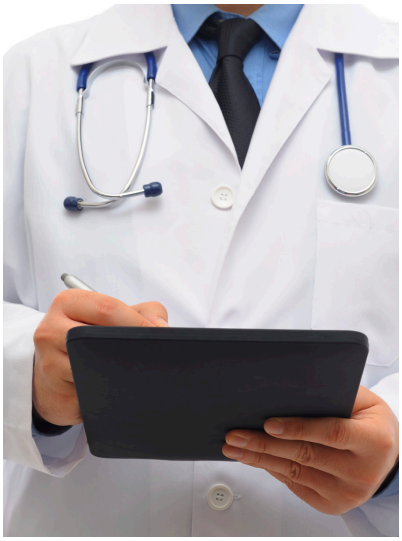
Better asset tracking also allows organizations to get a more accurate idea of their equipment needs, so they can focus already scarce resources where they are needed the most.

Using the RFID system, the material systems group at OSUMC now has clearer visibility into the optimal number of pumps or other devices it needs to ensure a high level of patient care. Chad Neal, director of technology, says that by tracking the deep vein thrombosis (DVT) pumps, the hospital realized that more than half of their devices were not being used. As such, the hospital reduced their inventory — and their associated costs — accordingly.

RFID also helps to curtail equipment losses in many other ways. OSUMC found the tags reduce equipment hoarding among staff members, since they no longer worry about the difficulty of finding equipment if needed later. And mitigates the problem of pumps being accidently thrown away.

"We've come across people who were hiding equipment in the ceiling tiles and then selling them on the black market," Loveall says. The RFID system not only identifies those items, but security can be alerted if the equipment is being taken out of the facility.

Satisfies Joint Commission Directives



RFID systems can also help meet directives from the Joint Commission on equipment maintenance, calibration, and temperature control. In addition to RFID tags that track assets, other "smart" tags are available that monitor temperature and humidity. This technology provides alarm settings that are customized to follow hospital/department policies on a per unit basis. At OSUMC, the perioperative services department uses the RFID system to ensure the proper temperature is maintained in environmentally sensitive areas, such as operating rooms or refrigeration units.

Neal notes that on more than one occasion, alarms issued by temperature monitoring tags alerted the staff to problems in the emergency room that would have delayed surgery or refrigeration problems that, if not attended to, would have caused costly items to spoil and become unusable, all at a substantial cost to the institution.

As hospitals expand their use of RFID systems, they are finding even more ways to improve compliance. For example, hospitals sometimes employ inexpensive

assistance technology, such as infrared (IR) light, to boost the accuracy between the Wi-Fi tag and access point in certain locations. This approach, called micro-zone location detection, can also be used to tell if staff members are washing their hands, which in turn decreases hospital-acquired infections. By reviewing compliance reports, administrators can then determine who may not be washing their hands when required, and respond accordingly.

Conclusion: ROI in 18 Months

Among leading medical healthcare organizations, RFID is fast becoming an important tool for asset location, loss management, disposal and hoarding prevention, inventory management, temperature monitoring, and protection of perishable items.

As RFID systems mature, many case studies are emerging that demonstrate the ROI of the technology. Initially Lapham, of SAMC, estimated cost savings from his RFID pilot would result in a return on investment (ROI) within 24 months. "We were quickly able to identify other opportunities within our environment that could also take advantage of the technology and we were able to realize ROI in just 18 months," he said before a conference presentation about the project in 2010. "It could potentially be even better. As we grow, we're expecting to see more benefits than we actually realized to start with."

New uses for the technology are growing as well. After saving $365,000 in the first year of its RFID deployment, OSUMC is considering other applications, including location-enhanced dispatch for the transportation services group, which moves patients, stretchers and wheelchairs around the hospital, and tracking of high-risk patients, such as those with dementia or those in the emergency department who may pose a risk to others in the hospital. While healthcare has been a slow adopter of RFID technology, analysts expect that to change rapidly because of the triad of technology advances, imperatives for operational efficiency, and stricter government compliances.

Ohio State University Medical Center (OSUMC) found that its RFID system provided huge cost savings in its first year alone:

- *Rental equipment reduction: $50K+*
- *Lower inventory par levels*
  - *No new DVTs needed*
  - *Hoarding has stopped*
- *Asset theft prevention/detection: $25K*
- *Asset disposal prevention/detection: $10K+*
- *Asset expiration prevention/detection: $50K*

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