ME

RFID technology is hitting its prime, says VA's Charles De Sanno, which is a chief reason the department is rolling out the tags to manage medical gear across its network of VA healthcare facilities.

WIRELESS

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With early issues largely solved,
RFID has become an important
tool for patient care in military
and federal hospitals nationwide.

By Logan Kugler

A HOSPITAL IS a complex and unforgiving environment, made even more so by the fact that mistakes or delays can cost lives. And when those lives are U.S. service members and veterans who have sacrificed in defense of their nation, the cost of failure mounts even higher.

Providing timely, efficient and effective medical care to active and former service members is as much a matter of logistics as of medicine. In the hustle and bustle of a busy hospital, keeping track of both patients and the tools and resources needed to treat them is a challenge.

Advances in the development of radio-frequency identification (RFID) technology promise to greatly ease that challenge, making the location of both patients and hospital equipment easy to pinpoint from any nurse's station. Based on the same technology that libraries use to automate book checkout and stores use to prevent shoplifting, RFID tags can be attached to just about any person or item that a hospital needs to track, emitting a radio signal when prompted that can be picked up and analyzed to determine the exact location of the tag.

"Think of the RFID sensor as a transmitter," explains Charles De Sanno, executive director of enterprise infrastructure engineering and operations for the Veterans Affairs Department, which is rolling out RFID across its network of hospitals, medical centers and storage facilities. "It has the ability to report in as a device, and the software then triangulates where that device is. Using a map of the installation, you would be able to see where the item was. So you would know, for example, that you could go to Room 423, and you would find your EKG machine."

Today's RFID tags can do more than just say "Here I am!" when prompted, though; they can also track and store information about their environment. For example,
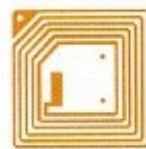
HEAD TO HEAD

Barcodes
· Read individually
· Line of sight required
· Information is read-only
· Limited memory
· Low durability
· Easy to replicate (less secure)

Versus

RFID Tags
· Can read multiple tags simultaneously
· No line of sight necessary
· Dynamic read/write if needed
· Expansive memory
· Tolerates harsh environments
· Difficult to replicate

Active Versus Passive Tags

Radio-frequency identification tags come in two flavors: active and passive.

Active RFID tags contain their own power source, allowing them to broadcast continuously or send out a signal on a schedule or when certain conditions are met (such as temperature rising above a certain point). Passive RFID tags gain their power from magnetic coils in the reader and are inert until brought into the vicinity of a reader.

Because the price of active tags is significantly greater than the price of passive tags (active tags are in the tens of dollars, depending on power source and features, while passive tags are priced under a dollar), it is important to match tags to the functions that best use their particular features.

Active tags' constant broadcasting and ability to be read over long distances makes them useful for tracking high-value goods that move over a wide range. The ability to send alerts under certain conditions also makes them well suited to managing assets such as blood reserves, where they can be set to issue a warning if temperatures exceed the safe level.

Active tags are also commonly used for limited patient tracking, such as operating rooms, where they can issue an alert when patients have spent too long in pre-op or recovery, helping to streamline patient care workflows.

Passive tags can only be read from a few feet away, which makes them better suited to established workflows where patients or equipment travels through a specified set of locations. For example, a reader in a patient room can determine whether a patient is present or not.

Passive tags are also useful where their short range can be leveraged as a benefit, such as in surgical sponges and other equipment that might be left inside a patient. And passive tags work as well for inventory control and loss reduction in hospitals as they do in department stores, allowing workers to quickly determine stock on hand of consumables such as balloon catheters and stents.

tags can record the temperature or send an alert if it rises above or below a specified range, making them useful for monitoring test samples in incubators or pharmaceuticals in cold storage.

Keeping Track

Even without extra features, the ability to easily locate equipment and patients using RFID provides exceptional benefits to military hospitals. Ret. Vice Adm. Harold Koenig, a former surgeon general of the Navy who initiated the first pilot test of RFID at the Naval Medical Center in San Diego, outlines several benefits of RFID tagging beyond the straightforward ability to make sure the right equipment is available when lives are at stake.

"First, RFID maximizes equipment usage," says Koenig, by making it easier to find. "For example, hospitals may have up to 70 percent more infusion pumps than they need." Hospitals over-equip so that procedures are not prevented because a piece of equipment cannot be found; RFID makes it possible to reduce this obvious overhead without jeopardizing patient care.

"Second," continues Koenig, "RFID reduces shrinkage. Hospitals lose up to 20 percent of their gear every year."

By allowing hospitals to keep better track of their gear and get more use out of it, RFID produces a third benefit, says Koenig: "It reduces the need to rent equipment," again saving money.

Robert Dondelinger, senior medical logistician with the U.S. Military Entrance Processing Command, agrees. "RFID allows individuals to locate equipment that is where it should not be — like intravenous pumps stashed in a closet instead of charging in a common area."

Dondelinger, who is in charge of medical supplies and equipment for MEPCOM, explains that one of the reasons RFID is such a great capability is because it allows all tagged inventory to be found for scheduled maintenance and patient use. This capability leads to better management, better utilization,

lower lifecycle costs and reduced fleet investment because the entire inventory is used more efficiently, he says.

Koenig points out a similar advantage: the ability to speed equipment maintenance. With RFID, technicians can easily locate gear that needs inspection or repair, flag it as "out of service" and then quickly return it to the hospital's workflow.

"In one hospital where there was a recall of a faulty piece of equipment," he says, "they found every piece, fixed the problem and sent it back on the floor in two days" — a procedure that, without RFID, would have taken weeks.

Overcoming Interference

There are a few hurdles to adopting RFID tagging. Although Koenig's early adoption of RFID went well, other military medical centers ran into trouble as the RFID signals clashed with wireless networking systems, medical equipment and even military radar.

At Womack Army Medical Center, for example, a new Wi-Fi network operated at the same 900-megahertz frequency as the existing RFID system, throwing off the ability to triangulate the location of the tags.

But these early problems have been largely resolved. For one thing, newer Wi-Fi systems operate in the 2.4-gigahertz band, not the 900MHz range some RFID systems use.

Plus, today's RFID is often piggybacked on top of the existing 802.11 network, eliminating interference entirely because there are no longer clashing separate frequencies, says Timothy Callahan of Firestone-Callahan and Associates, who has worked with military hospitals to correct or prevent interference problems. Early systems often miscalculated signal strength, Callahan says.

"RFID technology is right now in its prime," says the VA's De Sanno. "It's been in use for a long time with early adopters, and the problems have been worked out, ensuring that the quality of care we give to veterans is top-notch — the best care he or she can receive." **FT**