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Massachusetts General Expands RFID System for Inventory Management

Massachusetts General Hospital (MGH), the Boston-based, 1,000-bed teaching hospital of Harvard Medical School, is expanding its use of radio frequency identification to automate

inventory management. Robert M. Sheridan, the director of interventional radiology in the facility's department of imaging, told attendees at the RFID in Health Care 2012 conference and exhibition, held earlier this month in Boston, that Mass General plans to install approximately 40 additional cabinets (the exact number has yet to be finalized). The cabinets will be provided by Mobile Aspects.

The new RFID-enabled storage cabinets will bring the total number deployed at the hospital to at least 120. According to Sheridan, the decision was made after cabinets were deployed within the facility's interventional radiology (IR) department, where implantable medical-surgery supplies are used to support minimally invasive image-guided procedures, such as the insertion of stents, aneurysm coiling and angioplasty balloons. Thanks to the RFID system, he said, the hospital was able to capture an additional \$2.1 million in charges that would not have otherwise been recorded over the course of a year, thereby resulting in approximately \$1 million in additional reimbursements from insurance companies.



MGH's Robert Sheridan at RFID in Health Care 2012

MGH performs about 650,000 radiology examinations annually, and the IR department carries out around 15,500 procedures. In 2001, Sheridan installed a bar-code system to better track its inventory. The system brought major improvements—"we thought it was the bee's knees," Sheridan said—but about 20 percent to 30 percent of the information in the inventory-management system was incorrect due to manual errors, and inventory accuracy was off because, during stressful clinical situations, workers do not always remember to scan bar codes.

When Mass General's neurointerventional radiology (NIR) department deployed the first Mobile Aspects cabinets in 2007, Sheridan's team decided that 70 percent of the cabinet space would be allotted to the 10 percent of the items with the highest value, such as stent grafts that cost as much as \$7,500 apiece, as well as embolization coils priced at \$1,000 to \$1,800 each. This would not only guarantee that critical

devices required for patients would remain in stock, but also help ensure that the RFID cabinets delivered a return on investment (ROI). Lesser-value items, such as \$15 guide wires and catheters, would be tracked via bar codes, as staff members had been doing since 2001.

To obtain the initial investment funds for the RFID-enabled cabinets, Sheridan said, he had to show management that there would be value in the technology. He focused on the six IR suites, where workers are often highly stressed since a patient might be dying, and looking for items would only increase their stress. "We needed to figure out how to use RFID to enhance what they are doing," Sheridan said, "so we mapped the current work process to find where we were losing data capture and, ultimately, revenue. We found we were losing 10 to 20 percent from missed charges related to data loss. We do procedures valued at tens of millions of dollars, so the amount was not insignificant. This [RFID deployment] is not about cutting costs. You are capturing revenue that you have been leaving on the table."

The installation began small, with five Mobile Aspects cabinets in a single IR suite. Stent graphs and other high-cost items, such as coils, were tagged using passive high-frequency (HF) 13.56 MHz RFID inlays compliant with the ISO 15693 standard, and were then stored in the cabinets. If an IR technologist required an item, that worker would have to scan his or her RFID-enabled badge, choose the patient from a daily work-list screen on the door and remove the item needed. The asset would be automatically associated with the particular patient's record, and then be decremented from inventory. Ultimately, Sheridan said, the cabinet eliminated five manual tasks associated with managing inventory levels, including the process steps most prone to mistakes: entering product codes, lots and serial numbers.

"We had six neurointerventional techs, and we trained them on the workflow, and what we expected to get out of [the RFID

system],” Sheridan told attendees. “We had weekly meetings with the staff, and shared with them the reports and data. We got them to buy into it and use the system.”

Training continued for three months, and Sheridan’s team began measuring the collected data in January 2008. Improvements in capturing patient charges led to an expansion of the system to 13 cabinets. “We outfitted the entire neurointerventional suite, which includes two full labs, a workup area and a recovery room,” Sheridan explained. “That allowed us to have a full look of everything we had. We tracked approximately 1,400 products worth several million dollars.”

The system was then integrated with MGH’s PeopleSoft enterprise-management software. The team was able to set minimums, maximums and par levels for monitoring the inventory levels of items within the cabinets. Every day at 2 p.m., two inventory managers for that group received a reorder file that they could look over in order to catch any possible mistakes before placing orders. “This was huge, because it gave us accurate consumption,” Sheridan said. “We were ordering exactly what we needed, when we needed it. Reordered items came to the back of the hospital at 8 a.m. next morning, and were delivered by 10 a.m. to the department. They were then tagged and put in an RFID-enabled cabinet. That shortened our life cycle by a day and a half. It was pretty amazing stuff, and our inventory managers were thrilled at that point.”

Over the past few years, MGH added 22 cabinets within its IR labs, as well as 35 units in operating rooms and three in the MGH Bone Bank. It also installed 10 wall-mounted consoles equipped with RFID and bar-code readers for tracking orthopedic supplies.

For phase three, the team began talking to staff members regarding where RFID could deliver greater benefits. For example, billing personnel must take a dictation for a given patient—a record of everything performed on that

individual—and type the information into a billing system. This creates errors, Sheridan said, since workers may write down the wrong serial number or lot number on paper-based patient logs, and they sometimes make errors when transcribing information into the billing system.

The team set up a separate workstation and created an interface that sent information about products consumed directly to the dictation. Physicians could remove anything taken out of a cabinet but not used, or just sign off on it if everything was in order. As soon as the doctor signed off on the products used, the system would send a message to the radiology information system, enabling the billing department to see exactly what was consumed, whether it was chargeable or not chargeable, the price and so forth.

“So we brought clinical people, end users, technologists, administrators, coding and billing people, and the physicians” into the system, Sheridan reported. “We touched the five different work forces to make the transaction involved with one patient happen. It was a pretty amazing thing for us.” “The physicians loved being able to go online and see that a particular stent graft for this particular patient is on this shelf in this cabinet, and is available for them to treat the patient,” Sheridan said. “They thought it was the Holy Grail of being prepared for procedures.”

Sheridan’s team conducted a six-month study to quantify the return on investment, as well as performing time-and-motion studies. Improvements in charge capture led to approximately a 400 percent ROI, he reported—and there were other benefits as well. Stock-outs were reduced, but not by a huge amount, since with the old system, inventory managers made sure items remained in stock. Sheridan’s team ultimately determined that the RFID solution reduced the amount of time that the clinical staff spent counting inventory each day by approximately 66 percent—from three hours down to only one.

What's more, responding to product recalls became easier with RFID—which is important since the quantity of recalls ordered by the U.S. Food and Drug Administration (FDA) have increased by 400 percent since 2001. And in one case, the RFID solution alerted the staff that they were about to implant expired coils worth \$6,800 within a patient.

The newest deployment will be in cardiology, Sheridan said. The contract has not been finalized, with the exact number of RFID-enabled cabinets yet to be determined, but he noted that it would be around 40 additional cabinets.

“In the beginning, I was unconvinced RFID was the way to go,” Sheridan stated. “Now, I am convinced.”



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