RTLS yields new data for managing patient logistics

A patient arrives for surgery. As soon as she checks in, she receives a wristband with a small locator tag that monitors her progress as she moves through the surgical process.

Behind the scenes, the tag is signaling the surgical department’s real-time locating system (RTLS), which sends notices to OR personnel about the patient’s status and collects data that can be analyzed later to improve patient logistics.

The 23-OR department at Lehigh Valley Hospital, Allentown, Pennsylvania, has been using the RTLS from Awarepoint since 2007 (www.awarepoint.com).

The system provides detailed data that wasn’t available with manual entry of time stamps, says Brian Leader, MS, MBA, vice president for perioperative services and the orthopedic service line.

“It has given us the data to prove our theories about what we thought was going on and helped identify opportunities to address that,” he says.

In one example, turnover time was trimmed by 7 to 10 minutes by changing the sequence of activities for circulating nurses. Data showed nurses were spending more time in the presurgical process between cases than originally believed.

Patient process

Here’s how the patient-tracking process works:

• After a patient receives the wristband with locator tag in the surgical reception area, the RTLS system sends a message to the surgical staging area that the patient has arrived. No phone call is needed.

• The RTLS system automatically records the patient’s arrival in the staging area based on the tag’s movement into the area. The nurse in the staging area is able to view a summary screen with the patient’s information. If care milestones, such as the anesthesia consent, are incomplete, the nurse initiates an RTLS system alert to the appropriate clinicians. Alerts are also displayed on screens throughout the perioperative departments.

• When all preoperative milestones have been met, and the patient is ready for surgery, the OR staff is notified through the system, and the system records the patient’s arrival in the OR. During surgery, the patient’s wristband is removed and clipped to the chart.

• In the OR, the circulating nurse accesses a screen with the patient’s record, which includes a ribbon with time-stamp buttons. The nurse taps the buttons to record intraoperative events, such as start of prep, surgery start, and so forth. No keyboard entry is required.

During the case, the nurse can view the status of to-follow patients assigned to the same OR and can initiate notices for followup by the appropriate clinician.

At the end of the case, the circulator uses the touch screen to alert the charge nurse in the postanesthesia care unit (PACU) so a recovery bay can be prepared. At the same time, the OR turnover team is alerted so they can begin turnover activities.
When the PACU bay is assigned, a notice is automatically generated for the OR. If the bay is reassigned, the RTLS system automatically displays the new assignment. Again, no phone calls are required.

Tracking ends when the patient leaves the perioperative department.

**Data benefits**

The data the RTLS system collects has 2 major benefits, Leader says.

- real-time simultaneous communication about patient status and location to aid the day-to-day care processes
- data and time stamps recorded by the tags to aid analysis and fine-tuning of processes.

“With this system, we can really dissect our processes, especially on the presurgical side,” he says. “We can see when cases are arriving, know how much time it takes to prepare patients, and understand what the issues are, such as incomplete paperwork.”

One “aha moment” occurred when analysis showed circulating nurses were spending a lot of time between cases in the staging area completing the preop checklist and other steps, leaving them too little time to set up in the OR.

To shorten turnover time, a new process was adopted in which the circulator, after giving report to the PACU nurse, goes to the staging area to see the next patient and then goes back to the OR to complete the setup.

“This new process gets the circulating nurse back to the OR as quickly as possible,” Leader says.

Another benefit of the data is determining the length of stay in the PACU and analyzing patterns of when patients are held in the OR. To help relieve bottlenecks during peak times, a new process allows patients who meet PACU discharge crite-

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**What is the Intelligent OR?**

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The Intelligent OR is a demonstration project showing how clinical devices and systems can be brought together to provide real-time information on patient care and resources.

The Intelligent Hospital was a 10,000 sq ft pavilion at the 2012 Health Information Management Systems Society (HIMSS) conference in Las Vegas.

The systems, integrated with both wired and wireless networks, deliver information in multiple ways, including visual displays, smartphones, and other handheld devices.

The project features RTLS (real-time locating system) and RFID (radiofrequency identification) technologies.

The systems can be both distributed and managed through a central communication center called the “war room.”

Included in the pavilion were an Intelligent OR, ICU, emergency department, and general patient units.

**Intelligent OR**

The Intelligent OR has the traditional infrastructure, including operating tables, surgical lights, equipment booms, and monitoring systems, as well as an integrated information infrastructure.

Physiological monitors, information systems, laparoscopic surgery systems, the electronic health record, and other clinical applications are integrated so images and data can be displayed on boom-mounted screens.

RTLS and RFID enable the identification and tracking of staff, instruments, medications, and supplies, providing for dynamic reporting on these assets.
ria to be transferred back to the presurgical area until a bed is ready on a postop unit.

**RTLS infrastructure**
Lehigh Valley’s RTLS system uses a wired infrastructure. More advanced wireless options are now available. The RTLS tags automatically send wireless signals to software that records patients’ locations and the time-stamp data.

Leader estimates installation of the hardware and software cost about $500,000, noting the price might be less today because of competition and technological advancements.

“The system has done so much for us,” he says, adding that “a different institution might want to see more of a hard ROI (return on investment).

**Realizing the benefits**
“We were interested in it for better communication and workflow, which are sometimes difficult to quantify, and we have definitely realized those benefits.”

As with any technology, he stresses, the system requires time and resources to get the maximum benefit. Resources must be allocated to analyze the data the system collects and use it to make improvements.

“You have to have people who are engaged with the system and want to continually enhance it,” Leader says. “We’re fortunate to have a team that has bought into it.

“You can’t simply plug it in and hope it will improve your processes.”

The orange dots indicate potential applications of RFID/RTLS technology in the OR. Courtesy of Skytron.