The Mayo Clinic in Rochester, Minnesota, added bar-coded sponge technology in February 2009 as part of a comprehensive 4-year effort to improve prevention of retained foreign objects (RFOs).

The Mayo Clinic in Rochester has 98 ORs, 3 obstetrical ORs, and 8 labor and delivery birthing rooms in 2 hospitals and performs about 50,000 procedures a year. The project was described in the *Joint Commission Journal on Quality and Patient Safety*. The Clinic reported its data on retained objects and near miss reports in the *Journal of the American College of Surgeons* (side-bars).

The result of the project was to improve from an average of 1 retained object or near miss every 16 days to an average of 1 every 69 days, a level that had been maintained for over 2 years. The Sigma performance level rose from 5.6 to 6.0, and remains essentially unchanged. (A process is considered to be at Six Sigma when there are 3.4 defects per 1 million opportunities.)

**Careful planning needed**

Adding technology is a step that must be carefully analyzed and planned, says Robert Cima, MD, MA, associate professor in the Department of Surgery and vice chairman of quality and safety.

“I would not even consider looking at any technology for this problem without an assessment of the need in an individual operating room environment,” he told *OR Manager* in an e-mail.

“We spent 3 years preparing our staff so they understood the issues, saw the value leadership placed on this effort, and had engaged them in trying to improve performance.”

**Why add technology?**

Traditionally, RFO prevention at the Mayo Clinic in Rochester has included manual counts as well as routine screening x-rays for open-cavity cases. The x-rays are performed in dedicated imaging rooms after patients leave the OR.

X-rays do not take the place of manual counts, stresses Cheryl Weisbrod, RN, MS, nurse administrator of surgical services, noting she has fielded many questions about this.

The decision to add bar-coding technology was made for several reasons. First, definitions of retained objects by the Joint Commission and State of Minnesota have become more precise in recent years, Dr Cima notes. Under these definitions, objects are considered retained if not detected before the incision is closed. If there is no wound being closed, the defining point is when the procedural team withdraws from the patient.
“Clearly, our x-rays did not allow us to meet these definitions,” he said.

**The problem of accounting**

The second reason was that the Clinic’s analysis showed 50% of its retained objects were sponges.

“Our main problem was one of ‘accounting,’” Dr Cima notes. Bar coding is an “accounting” technology. In addition, he said, bar coding is an established technology, is well understood by staff, and made sense economically.

Even with bar coding, he noted, “We continue to obtain postop survey films to make sure needles or instruments are not in the patient, even though we would still consider them RFOs because they would be found outside the OR.”

**Adopting bar coding**

A key to implementing the bar-coding system was to understand in detail how the system would work in the OR. A perioperative nurse educator guided the process, walking through the steps with the staff and gathering feedback.

The team learned, for example, that the bar-code scanner did not work as well when it was held in the hand as when it was left in its holder on the IV pole. But nurses said it was easier to use when held.

“The scanner is not held at the same angle as when it is in the holder,” Weisbrod explains. As a result, some staff thought the scanner didn’t work. The solution was to leave the scanners in the holders, at least until more experience is gained.
Other key steps were to educate the department’s 15 nurse managers and to develop a group of “super-users” who could mentor others.

**White boards, red rules**

To make sure counts are performed in a standardized manner, the Mayo Clinic has adopted “red rules” and standardized white boards (illustrations, p 13).

Every OR has a wall-sized poster with the “red rules” for counts. Red rules are clear, simple directives intended to foster patient safety that are supported by the entire organization. Any deviation causes activity to cease until the situation is addressed.

The red rules now state that the final count includes, in addition to the usual steps, scanning out of all sponge material and closing of the bar-coding report.

Every OR has a standardized white board for recording counts.

“We have had erasable boards for years, but we found different people wrote the information in different ways,” Weisbrod notes. The boards make the count visible to the entire team.

“Before the end of the procedure, everyone looks at the white board and says, ‘Are the counts correct?’” she says.

In addition to sponge, needle, and instrument counts, the white boards have space to record tucked items. If a tucked item has not been erased and is not accounted for, the team knows to conduct a wound exploration and possibly have an x-ray taken.

**An ongoing effort**

OR personnel are updated regularly on how the surgical service is performing on quality measures, including preventing retained objects. An analyst collects data daily on these and other measures, which are reported on control charts posted throughout the department and on a surgical services scorecard.

The staff is encouraged to report any concern or near miss to the surgical services leadership. A Surgical Event Team reviews these reports and debriefs team members involved. The process does not take the place of root cause analysis nor does it seek to place responsibility. The focus is on what can be learned to improve the process.

But regardless of the technology and other interventions, Weisbrod says, “it comes down to the fact that we are human beings, and we need to talk to each other. I have been in the OR a long time, and we used to have more time to talk with the surgeons and residents. Now, with more technology to manage, there seems to be less time for those face-to-face discussions.”

The ORs are introducing briefings and debriefings to encourage communication. The department has provided education in Crucial Conversations, a program by VitalSmarts (www.vitalsmarts.com) that teaches people how to bring up and discuss difficult issues effectively.

“There are events that will occur,” she says. “We tell the staff, ‘Be respectful. But don’t be afraid to speak up.’ We are here. We will support you.”

—Pat Patterson
Mayo Clinic's project phases

Phase 1: Defect analysis and policy review

Researchers analyzed all retained objects and near misses reported over 4 years. A major finding—in 62% of 34 retained-object events, counts at the end of the case were considered correct. The most common root cause was a communication failure.

A multidisciplinary team then reviewed and revised all policies and procedures for retained objects and counting. Many policies had changed over time but had not been completely revised or reconciled with other policies.

Phase 2: Awareness and communication

A communication and education campaign was conducted for all physicians, nurses, and allied health personnel. The primary goal was to ensure all team members understood the problem and the need to improve communication.

A Conscientious Count Campaign was conducted to educate nurses, surgical technologists, and surgical assistants on proper counting and revised count policies.

Phase 3: Monitoring and control

The Surgical Event Team responds to any near miss or actual retained object. Within 12 to 24 hours, the team meets with all OR personnel involved to debrief team members about the event.

This process does not replace a root cause analysis nor seek to assign responsibility for the event. The purpose is to determine any potential system weaknesses. Within 24 to 48 hours, the team prepares a memo and shares it with all OR personnel.


Retained items at the Mayo Clinic

Reviewing reports of retained objects at their institution over 4 years and 191,168 operations, researchers at the Mayo Clinic in Rochester found:

• 34 actual retained objects, a rate of 1 in 5,500 operations. Of these, 23 (68%) were sponges.
• For 21 events (62%), the count was recorded as correct.
• 59% of the retained objects were found unexpectedly through the Clinic’s routine use of postoperative x-rays—in all, the counts were reported as correct.
• None of the retained objects happened during emergencies or high blood-loss procedures. Objects were retained most commonly in routine operations.
• The most common contributing factor was a breakdown in communication, such as failing to communicate with other team members when an item was placed in a body cavity.