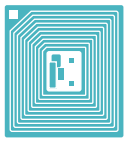
Using technology in the OR to improve efficiency and patient care

Application of technology in the perioperative setting can streamline workflows, prevent errors, and improve efficiency and quality of care. To gain insight into its use, this report outlines subject matter experts' experience with data collection and analysis; workflow or dashboard tools; and room decontamination. They address the issues in the perioperative setting these types of technology can solve, current trends, and future needs.



RADIOFREQUENCY IDENTIFICATION AND DETECTION

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What are the current pain points that this technology can solve?

Supply management in the OR has traditionally been performed using labor-intensive cycle counting, expensive equipment that requires a staff member to push a button to record a transaction, or even weight-bin systems. These methods are often inaccurate, leading to non-value-added tasks and frustration because of incorrect inventory levels. Radiofrequency identification (RFID) solves this problem by providing end-to-end, real-time visibility. It saves time for clinicians, allowing them to spend less time searching for supplies. It improves efficiency when ordering inventory because employees no longer have to monitor supplies daily to know what to reorder. Instead, a perpetual system is created in which consumption drives replenishment.

Tasks such as recall and expiration-date management have also been pain points in any supply chain process. Traditionally, supply chain departments did not track such attributes as unique lot number, serial number, and expiration date for each individual item. When an item was recalled, a staff member had to go site-to-site to verify that the product was not on the shelf. An expired product was often found too late, resulting in a missed opportunity for return or, even worse, potential use on a patient.

Because RFID contains information on lot and serial numbers, it is easy to see when items are recalled. Personnel can quickly determine if these products have ever been received at the hospital, are currently sitting on a shelf, or have even been used on a patient. They can more easily identify products that have expired or are about to expire, and can take action to reduce waste by allowing sufficient time for exchange or rotation to use that product first.

Radiofrequency identification technology also improves the accuracy of documenting supplies in a procedure. During a procedure, it is time consuming to enter supplies and record required features, such as lot and serial numbers. Barcodes have been somewhat effective, but require line of sight and patience. Radiofrequency identification can transmit all of this information simply.

What are some of the usage, application, and implementation trends?

Adoption of passive serialized tracking, such as RFID, for consumable supplies in hospitals has been slow. It requires that each consumable product have an RFID tag. Early adopters are focusing on high-dollar implantable supplies, because this gives them the most immediate value for their investment.

Recently, many companies have been implementing RFID *kanban* systems in which an RFID tag indicates stocked product, but does not specifically identify each product. Each tag represents a par value, and when placed into an RFID-enabled bin, the system will order a predefined amount of items. This is effective for reordering low-dollar, fast-moving supplies, but does not give the real-time visibility of the products on the shelf.

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How will this technology need to adapt to meet changing needs?

The standard RFID tag size is 2 × 2 inches, which works for many products, but can be problematic on smaller items or items with odd packaging because the adhesive becomes exposed and the tag sticks to more than just the product. Smaller and differently shaped tags may be needed to support these products without sacrificing read rates.

Tracking RFID on metallic products is also problematic. Foil packages and products that contain metal block the RFID signal, and if the user places these items too close to a reader, the items cannot be tracked appropriately and, therefore, the visibility that RFID provides is lost.

Many early users of RFID are tagging their supplies internally, but the cost and labor of tagging needs to shift to the supply and device manufacturers. When this occurs, the manufacturers should also standardize the format and information, and load the unique identification numbers into a universal database. This will provide visibility of the supplies throughout the supply chain process

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Dr. Steelman has served as a consultant for Medtronic in New Haven, CT, which could be perceived as posing a potential conflict of interest.

What are the current pain points that this technology can solve?

Retained surgical items are the most frequently reported sentinel events to The Joint Commission,[1] and are estimated to occur in one in 5,500 surgeries.[2] Most retained items are surgical sponges, which result in more serious tissue reactions and negative outcomes than metal items.[2,3] The Centers for Medicare & Medicaid Services no longer pays for patient care resulting from a retained item, and some states fine the facility.[4]

The AORN "Guideline for prevention of retained surgical items" relies heavily on manual counting,[5] which requires time spent searching for missing items to reconcile an incorrect count, and research indicates that counting will identify a retained item only 77% of the time.[6] In addition, a count is usually not performed during emergent procedures because the priority is stabilizing the patient. When the count is incorrect or not performed, radiography is used to determine if an item is retained. The average time to obtain and read an x-ray is 30 minutes, and research shows that it identifies a retained item only 67% of the time.[2]

Recognizing these issues, some health care facilities have adopted low-frequency radiofrequency (RF) sponge detection technology to improve patient safety. An additional benefit is minimizing the loss of efficiency when searching for sponges and taking x-rays during a procedure.

What are some of the usage, application, and implementation trends?

Low-frequency RF sponge detection is used primarily in addition to a manual count. The patient is scanned with a handheld wand or wands built into an underbody mat that indicates whether or not a sponge is in the patient. If the count is incorrect and the sponge is not in the patient, the periphery and trash and linen hampers can be scanned, minimizing time spent searching and delays in completing the procedure. The wand identifies sponges 100% of the time, even in patients who are morbidly obese.[7] The mat identifies sponges 98.1% of the time, and 100% of the time in patients who are not super obese.[8]

Research showed that RF sponge detection identified 11 near misses in trauma procedures over five years, preventing sponges from remaining in a patient at the end of the procedure. Intraoperative x-rays were taken and found to provide no additional benefit; therefore, the researchers recommended using RF sponge detection and discontinuing intraoperative x-rays for emergencies.[9]

Initial implementation is enhanced by elevating the cost analysis to administration, comparing overall costs, and communicating with the multiple departments where these costs can cross over. Thus, the costs (e.g., litigation, fines) that are usually not absorbed by the OR budget can be included.