

Radio Frequency Identification Technology (RFID) Implementation in Surgical Services

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Background

Unintentionally retained surgical items (RSI) are the most reported event to the Joint Commission (1). A sentinel event is a patient safety adverse event that can lead to permanent harm or death.

Retained surgical items can result in patient harm that have included reoperation, readmission, prolonged hospital stay, infection or sepsis, fistulas and bowel obstructions, and death.

OSF Healthcare Saint Francis Medical Center is an acute care hospital, Level I Trauma Center and Magnet certified hospital located in Peoria, Illinois

OSF Healthcare Saint Francis Medical Center has reported 26 RSI in a 10-year period (2014-2024). There are 30 operating rooms that perform approximately 22,000 surgeries annually.

The triggers for practice change are problem-focused consisting of the ineffectiveness of the current policy, the high occurrence of RSI, and the negative budgetary impact of occurrences.

Purpose and Clinical Question

The purpose of this DNP project was to evaluate the impact of radiofrequency identification (RFID) technology as an adjunct to our existing policy for the prevention of RSI.

In surgical cases requiring a surgical count, does the use of RFID technology affect the incidence of RSI in comparison to surgical counts performed without RFID technology within a 12-week timeframe?

References

Literature Review

A review of 20 primary research articles to understand the evidence related to the use of radio frequency technology as an adjunct to the traditional surgical count process.

Samples types used in the research articles.

- Humans (2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16)
- Cadavers (17)
- Pigs (18; 19)
- Combination of manikin and pigs (20; 21).

Settings of research articles were conducted globally.

- United States had 14 of 20 studies including California (5; 8), Florida (17), Massachusetts (3), Minnesota (2), New York (6), North Carolina (10), Ohio (9), Midwest (11; 12; 13).
- Globally six studies completed in Brazil (20; 21), Germany (7; 18), Italy (19), and Japan (16).

Research article designs included:

- Retrospective review (4; 6; 9; 14; 15)
- Prospective observational study (5; 7; 10; 13)
- Randomized control trials (2; 3)
- Preclinical/clinical trials (18; 19; 16)
- Observational blinded study (17; 21)
- Prospective crossover double blinded study (20; 8; 11; 12).

Results showed a reduction RSI when using technology.

- Reduction in the rates of RSI between 68%–100% after implementation of technology (2; 5; 6; 9; 10; 13; 15).
- Sensitivity of 100% for the detection of sponges with technology (20; 17; 18; 19; 8; 11; 21; 16).

Prevailing themes of limitations included:

- Voluntary nature of reporting, inconsistent documentation, and lack of complete documentation (2; 4; 6; 14; 13; 15).
- Study lengths due to the time it takes RSI to become known(2; 5; 10).

Quality Improvement Design

Clinical Scholar Model used to challenge current practice and guide the practice change (22).

Observe and determine the key points:

- Significance of issue
- Identify key stakeholders
- Cost versus benefit
- Risk versus benefit

Analyze and synthesize the evidence:

- Internal evidence included interviews with clinical experts.
- External evidence included the AORN clinical practice guidelines and systematic review of literature.

Apply, evaluate, and disseminate the outcomes:

- Apply: Education presented to all perioperative team members and mandatory hands-on training with the RFID equipment. After the training, the technology was integrated into the current manual count process for 12 weeks.
- Evaluate: The RFID adjunct technology allowed data to be viewed in real time. Data points collected included date, time, case details, close reason, patient identifier, open and closing surgical team member, notes, sponge type and detector use.
- Disseminate: At OSF Healthcare 16 hospitals, a policy change will be made to integrate RFID adjunct technology into the manual count process. Education to all perioperative members and purchase of RFID adjunct technology equipment for every operating room.



Full Text Available

Results

Quantitative analysis of patients having surgery requiring a manual count in a dedicated operating room with the RFID adjunct technology over 12-week period.

Over the 12-week period

- 186 total surgeries reviewed
- 1,875 lap sponges used
- 370 raytec sponges used

For surgery to be considered complete, the RFID adjunct technology requires surgical sponges to be scanned in prior to the start of procedure, and, at the end, individual sponges are scanned out.

- 98.38% of surgeries were successfully completed (183/186).

Three cases were not successfully completed using the RFID adjunct technology; however, it was verified through real-time audit and chart review that manual count of surgical sponges was correct.

- 99.47% (1865/1875) of lap sponges counted out.
- 100% (370/370) of raytec sponges counted out.

Conclusion

A reduction in retained surgical items will benefit an organization by impacting their strategic goals related to quality and safety, patient experience, and operating margin. Adopting RFID technology can improve patient outcomes and prevent the additional costs associated with readmission and prolonged care of patients because of an RSI.

(1) The Joint Commission. (2021, February 1). Most Commonly Reviewed Sentinel Event Types. <https://www.jointcommission.org/-/media/gc/documents/resources/patient-safety-topics/sentinel-event/most-frequently-reviewed-event-types-2020.pdf> (2) Gima, R. R., Kollengode, A., Clark, J., Pool, S., Weisbrod, C., Amstutz, G. J., & Deschamps, C. (2011). Using a data-matrix-coded sponge counting system across a surgical practice: Impact after 18 months. *The Joint Commission Journal on Quality and Patient Safety*, 37(2), 51–58. <https://doi.org/10.1016/j.jcqs.2010.11.007> (3) Greenburg, C. C., Diaz-Flores, R., Lipsitz, S. R., Regenbogen, S. E., Mulholland, L., Mearn, F., Rao, S., Toidze, T., & Gawande, A. A. (2008). Bar-coding surgical sponges to improve safety: A randomized controlled trial. *Annals of Surgery*, 247(4), 612–616. <https://doi.org/10.1097/SLA.0b013e3181656d5> (4) Gunner, W., Soncrant, C., Lynn, M., Neily, J., Tesema, Y., & Nylander, W. (2020). 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