

AUTOMATED SYSTEM FOR SURGICAL INSTRUMENT AND SPONGE TRACKING (ASSIST). Nilo Rivera¹, Rosemary Mountain¹, Lia Assumpcao², Allen A. Williams¹, A.B. Cooper¹, Douglas L. Lewis³, Richard C. Benson³, Joseph A. Miragliotta³, Russell H. Taylor¹, and Michael R. Marohn²;

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An infrequent error that occurs during surgical procedures is the unintentional retention of an instrument or sponge within a patient. This error can lead to inflammation, obstruction, perforation, sepsis, and sometimes death. Despite the safeguards that are employed within the operational room environment, approximately 1 in 1500 surgical cases results in an object being left within a patient.

We are developing ASSIST, an Automated System for Surgical Instrument and Sponge Tracking to increase the safety of surgical procedures. In ASSIST, RFID (Radio Frequency Identification) technology is used to detect and uniquely identify the presence of each surgical item at various stages during surgery. The use of low frequency RFID enables reliable detection of tags even when soaked in body fluids, in the vicinity of metallic objects such as surgical tools, or inside a patient's body. A software-based component keeps track of every item, and enables users to quickly identify the state of the procedure through a color-coded interface.

Our initial investigation shows that our system can reliably account for 100% of tagged sponges during surgery. This high level of reliability is attained by RFID verification at a check-in station, and detecting used sponges with multiple orthogonal antennas at a check-out kick-bucket. The measured check-in time for a 10-sponge packet is just 2 seconds, while regular check-out time is between 1 to 5 seconds when several sponges are thrown into the bucket at the same time. Preliminary tests also show that we can reliably detect missing sponges inside an in vivo porcine model.

Future endeavors aim to develop a system for detecting every type of surgical instrument that can be retained in a surgical procedure. Also, we plan to test our system in a more rigorous clinical trial.