



## Improving Efficiency, Responsiveness and Patient Care with RFID Location Based Patient Tracking at SunnyBrook Health Sciences Center

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As the largest trauma center in Canada, Sunnybrook Health Sciences Centre sees approximately 13,500 surgical patients per year in the hospital OR department. Sunnybrook OR Information Management Services strives towards excellence in increasing patient satisfaction, being innovative and forward thinking, and enabling senior management to have the tools and information at their fingertips to make important decisions related to patient flow, staffing models, maintaining efficiency and achieving targets.

In order to improve efficiency, patient satisfaction and responsiveness to patients' families, Sunnybrook

OR Information Management Services staff installed an RFID system to provide location based tracking of patients' progress in and out of 19 operating rooms in the OR department. As a result, Sunnybrook has increased visibility into utilization data by 100 percent, enabling the hospital to continuously improve quality of care and operational efficiency for a better and safer patient experience. Building on the success of the initial system, which was deployed in 2015, the hospital has expanded RFID technology to new areas of care and asset tracking.

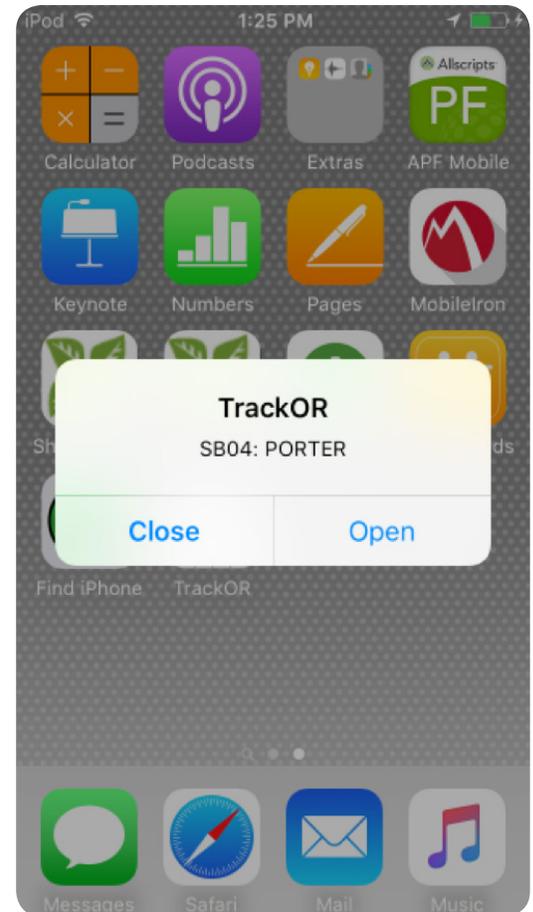
## Streamlining Patient Flow

Previously, Sunnybrook did not have a formal process in place for tracking patients through the perioperative areas. Like many other hospitals, Sunnybrook was forced to rely on a time-consuming, manual process for tracking how much time each patient spends in each area of the surgery department — an important metric for utilization reporting, staffing models, scheduling and patient flow for a better overall patient experience. Yet in Mass Trauma/ Mass Casualty (Code Orange) situations, when every second counts, the lack of automated patient tracking slows down the entire process, hampering the ability to make fast decisions.

With the installation of a fully automated RFID system, communications duties can be streamlined, freeing up valuable time for hospital staff to focus on delivering quality patient care, while still remaining responsive to patients and their families. Moreover, by automatically tracking the time in/ time out of each area in the OR department, the hospital has real-time visibility into patient movements and whereabouts, as well as valuable utilization data to optimize workflow.

It's no longer necessary to wait for personnel to update the computer records to know if a patient arrived in a room before it was ready, for example, or spent more time than expected in post-anesthetic recovery. In this way, Sunnybrook is enabled to continuously improve quality of care and operational efficiency for a better and safer patient experience.

Patient tracking with RFID technology provides surgeons, OR theatre teams, and administrations with real-time workflow summaries and improved utilization data collection to help forecast utilization in real-time and identify bottlenecks and resource needs. By improving and encouraging transparency of patient flow throughout OR, including recovery, pre-op, ambulatory, in-patient and discharge, increased access to patient location information benefits not only the hospital, but also its patients and their family members.



## Anatomy of an RFID System

After conducting significant research, the OR Information Management Services team contacted RFID technology provider RFID Canada and FEIG ELECTRONICS to evaluate their business needs and determine the best RFID solution and strategy to track patients' progress in and out of Sunnybrook's 19 operating rooms.

RFID wristbands were first considered; however, that solution was rejected due to the cost, as well as the fact that staff cannot guarantee the orientation of each patient's wrist when their gurney passes the fixed RFID readers. Because the patient's chart always travels on

the gurney with the patient, sequentially numbered RFID tags are adhered to the binders that contain patients' charts. During pilot testing, the team placed the binders in various locations and positions on the gurney. Testing showed that it was necessary to attach tags to the front and back of each binder, in the event that the attendant might hold the binder under their arm.

Each patient is assigned the unique tag ID number corresponding to their binder, and they have the option to provide that number to family members or loved ones. To read the RFID tags, three antennas were installed at entry doors and check points in the surgical unit — from registration to pre-op, to the operating

room, and on to post-op. The RFID system collects real-time data as each tag passes an antenna and transmits data to a reader.

Pilot testing was done extensively with observation, trial and error, and evaluation of results. FEIG antenna positioning was adjusted based on the test runs of the gurneys from reception to the operating room area; as a result, one antenna was positioned vertically, one horizontally, and one was affixed to the ceiling. In addition, when testing the system it was determined that barriers needed to be installed along the wall-mounted readers to prevent staff from running into them.

Once the system was up and running, Sunnybrook installed monitors in the waiting area to display real-time updates on each patient's whereabouts, reducing the need for family members to request frequent status reports. The unique patient ID numbers are displayed, instead of names, in order to protect patient confidentiality while engaging patients and their families in an affordable, intelligent health care system. In addition, there is a "Find My Patient" app that can be downloaded to help family members locate their loved ones in real-time.

The hospital's OR Information Management Services staff wrote a custom software program that tracks the patients and their charts coming and going, and records how much time each patient spends

in registration, pre-op preparation, the operating room, post-operative recovery and the surgical short stay unit. When the patient leaves the recovery room the binder is left in the discharge bin and re-used the next day for a cost-efficient system.

Overall, the RFID system project took approximately 4 months total to design, pilot and implement. Working together, the Sunnybrook team, RFID Canada and FEIG Electronics evaluated and tested various system configurations and components to determine the best RFID solution and strategy. The OR Information Management Services team also worked with the nurses to analyze their workflow process and determine how a system could be designed to meet their needs.

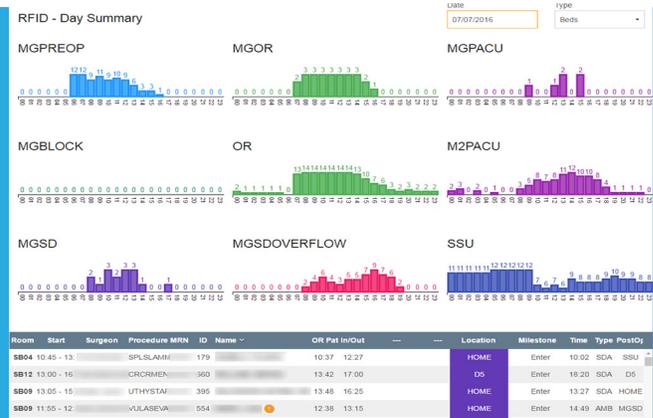
Toward the end of the design project, the OR team approached the in-house IT department and asked for their help to rollout the system in the hospital. To ensure a user-friendly design, nurses were asked to evaluate the software user interface and data input fields, and their specifications were included in the custom software program.

Likewise, patients and family members were surveyed to determine what information would be most helpful, resulting in the team's development of the "Find My Patient" app to provide up to the minute information about patients' whereabouts from a screen or kiosk.



## A Healthy Outcome

The data collected by this RFID system facilitates improvements in scheduling of procedures, staffing and overall operations. This valuable data allows hospital senior administration to make informed decisions and helps Sunnybrook maintain peak efficiency, enabling the hospital to continuously improve quality of care for a better and safer patient experience.



**A Day At A Glance:** Select any day, any patient, any point in time – hour by hour glance. View by patient count or view by bed count.

RFID data details the actual workflow and utilization, and the information is available across the organization, allowing management to see how many patients are actually in each location at any given time. This is the first time the hospital has ever had actual utilization data across the OR department, increasing visibility into utilization statistics by 100 percent. The hospital's custom software program makes it easy to review any day at a glance, providing valuable data that facilitates improvements in scheduling of procedures, staffing and overall operations.

Because the automated RFID system is not dependent on personnel to enter information into a computer, Sunnybrook nursing and allied services staff now are able to focus on taking care of patients first. The resulting efficiency improvements enabled by automatic data collection allow management to significantly improve workflow for operational efficiency, providing more time for nursing, not documentation.

In addition, with 14 beds in the hospital surgical short stay unit, it's important to maximize use of those beds for maximum efficiency. Previously, the hospital used a patient registration system where clerical staff manually counted patients each day at midnight.

However, patients are discharged at all hours, and because RN's are at the bedside, some discharges

happened when clerks were not on shift and the registration system was updated only when RN's had time. This made information outdated, and often the patient census was incorrect. By automating the information, the staff is freed up to tend to patients and management has a better view of bed needs, demonstrating to management that the short stay unit is not underutilized or overstaffed, and indicating when more support and resources are needed. RFID enabled an accurate patient count in real time.

The previous patient information system relied on staff to manually update a software that costs the hospital \$100,000 per year to maintain. Based on the development and implementation of TrackOR, the OR & Related Services has completed moved away from that program to a new custom program based on the RFID scheduling system, saving those annual maintenance costs while improving productivity.

After two years of seeking approval to implement the system, the OR IM team set aside money in their own budget to test and prove the system. After seeing the results, the hospital's executive management team has given approval to expand the solution and take the system "as far as possible."

## RFID Equipment in the SunnyBrook Patient Location Application

### Registration Stations:

- FEIG's MU02 Reader is encased in a USB case on desks in our two areas where patient charts are assembled. The reader is used to scan UHF RFID tags and map to unique patient id.



LRU 1002



MU02

### Patient Activation Stations (Binders/Charts):

- FEIG Readers: Custom Readers (MU02 & NF Antenna) read over 1000+ passive UHF RFID labels affixed to the front and back of the patient binders.

### Patient Tracking:

- FEIG Readers LRU1002 and Times-7 6590C and A6030 antennas were installed in discreet locations, out of view and close to ceiling height. RFID Tags are read by the mounted antennas at key locations to track patient flow. Data is collected and reported on overview screens as well as location specific plasma screens, touch screens and desk computers.

### Patient De-Activation Stations:

- FEIG Readers MRU102 encased in a custom box are designed to hold the completed files. Data is used to study patient flow and for informative decision making for staffing levels. Staff is able to view patient movement data in real time and respond to changes.



Strategically placed RFID antennas capture directional movement and exact location of patient



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