

Hospital Meets High Demand for Scrubs With RFID

Montreal's [Jewish General Hospital](#), along with its technology providers, took a strategic and measured approach when it deployed an RFID-based solution for tracking healthcare workers' uniforms. The medical facility is the largest hospital in a group known as [CIUSSS](#) (Le Centre intégré universitaire de santé et de services sociaux), an integrated healthcare provider with multiple centers that employs 10,000 individuals.

In September 2018, the hospital deployed an RFID solution to track scrubs and other healthcare worker clothing from dispensing to laundry, then back into clean cabinets for reuse. The deployment planners spent months examining solutions, piloting the technology and training the targeted users—physicians and nurses in the OR—to employ the system. The result, according to the hospital, was a well-received and effective solution.



Montreal's Jewish General Hospital

Then the COVID-19 pandemic struck Montreal. Quebec's prime minister, François Legault, announced that no one could enter a hospital's emergency area (or other frontlines, or eventually any healthcare center) without scrubs, and the RFID system's developers had only a day to address the unprecedented new requirements.

That COVID-19 containment-based decree, issued on Mar. 24, served as a new test for the year-old RFID solution, says David Diachidos, CIUSSS's chief of laundry and linen services. Thousands of new uniform clothing items have been acquired and tagged, he reports, while the OR RFID reading units are now in the emergency department, with additional units in place in other strategic locations. All of the devices are tracking every item received and returned by staff members, and the collected data related to each item of clothing accessed, used and returned enables the hospital to manage its large number of uniforms, says Georges Bendavid, CIUSSS's director of

technical services.

In 2018, Jewish General Hospital sought a solution to better manage its OR uniform inventory. Typically, the facility washes scrubs and linens onsite at a volume of 3.5 million kilos (3,860 tons) per year. A lack of visibility into the uniforms led to excessive purchasing of replacements, Bendavid explains. To access uniforms, staff members traditionally proceeded to the shelves where those items were stored and helped themselves. Once they finished their shift, they took the scrubs home and laundered them, or put them in the dirty linens receptacle to be washed and sanitized in the facility's laundry department, with little oversight regarding who had which items.

Because of a perceived risk of shortage, workers sometimes hoarded sizes that matched their needs, exacerbating the problem. As a result, the hospital had to make redundant purchases to ensure it never ran out of uniforms required for surgical procedures. Additionally, the shelving area in which uniforms were stored tended to be disorganized, which led to multiple workers handling the garments while seeking their size. Sometimes, uniforms could end up in lockers and offices as well, and both scenarios could increase the risk of infection.

The hospital had worked on other RFID projects with the [ESG Uqam IoT Lab](#), at the Universite du Quebec a Montreal, and it began planning with that group of researchers to develop a solution to control and bring visibility to uniform use, cleaning and availability. The team launched a solution provided by [ABG Systems](#), which makes textile-management technology, and integrated by systems integrator [Altel](#), to link the hospital's uniform-distribution system to an intermediary database.

That database was then linked to the security database in

order to maintain confidentiality and provide seamless access to the distributor for new arrivals. Since the COVID-19 pandemic began, the hospital has removed this access, so as to have better control of the database. “They opted to take the measured approach,” Bendavid recalls. “We decided, ‘Let’s implement a prototype, validate [it], and if it’s a success, we’ll deploy.’”

The group tested RFID tags for their functionality in the hospital’s linen-washing environment. They chose Monza R6 tags with passive UHF readers from [Alien Technology](#) and Impinj, which were provided by ABG Systems. The deployment began with a pilot in one operating room department, in which the team installed a White Box Distributor cabinet with a capacity for 720 items, which included a total of six locked doors—three in a master cabinet and three others in a slave cabinet—that could be accessed only with an authorized ID badge or PIN code. What’s more, they installed a single White Box Collector station in the locker room.

The system provided OR personnel with 24-hour-a-day access to uniforms in the sizes they sought. Each user first scanned his or her contactless ID badge at the access-control unit in the cabinet. If an individual was authorized to access the uniforms, the door would unlock and that worker could peruse the shelved items and select those required. The RFID reader and antenna built inside the cabinet captured the RFID tags on every item taken, which were linked to data about those garments.

Once the door closed again, the reader captured another inventory count, then the software determined what had been removed and linked those items to the user who’d accessed the cabinet. Each user can be assigned a specific number of garments in the software, so that if she or he attempts to acquire garments without returning enough soiled scrubs, that employee will not have access to the clean inventory.

Another RFID-enabled cabinet, the White Box Collector, was used for the return of goods and came with a built-in reader and antennas. A user would insert returned scrubs through a flap door, and a sensor would trigger the reading process only after the flap door was subsequently closed and engaged by a magnet. The machine was completely shielded, thereby avoiding the risk of any stray reads of tags outside the container. An external LED light illuminated to let users know their scrubs were properly received. In the meantime, the software removed each item from the individual's record.

In the laundry area, the hospital installed a tabletop reader where linens are sorted, folded and stacked. The tabletop antenna is used to scan new scrubs in the laundry before they begin the distribution process. Tags are also read when uniforms are prepared to be returned to the distribution box. This process ensures that the tags still operate properly, while also enabling the medical facility to identify and tag any uniforms not yet in the system. The antenna's read range was set at a low level to ensure it didn't capture stray reads within the laundry environment.

The OR staff was trained to use the system, Bendavid says, adding that the technology worked intuitively. Each user is provided with a fixed number of credited items, and as long as he or she brings back any used uniforms, that worker will have access to new ones. If an employee fails to bring the items back, she or he will not be allowed to take new ones.

During the first year of the technology's use, Bendavid says, Jewish General Hospital found that it did not need to order any new uniforms, which saved the facility approximately \$10,000. "We completed the project [and] took the time to do it properly," he states. "The plan was to [gradually] expand."

When COVID-19 descended on Montreal and the rest of the world, the system's requirements changed within a day. ER activity

dropped due to the reluctance of some people to seek emergency care for non-coronavirus-related injuries or illnesses. However, the use of uniforms rose precipitously, as did onsite laundering. Overnight, the hospital noticed a 500 percent increase in scrub use and returns. Since most surgeries have been postponed to allow for COVID-19 response, Diachidos says, the RFID scrubs-distribution system was moved to the emergency department. The White Box devices in the OR department were reinstalled in the ED, and the hospital ordered more cabinets to store and distribute the additional uniforms.

The hospital had to acquire more scrubs quickly—as many as 10,000 additional items—and at three times the original price at which the garments had cost pre-COVID-19. As such, Bendavid says, the loss of even a single uniform could be costlier to the hospital than in the past. Therefore, the proper management of inventory was critical. The hospital also acquired a new distributor and collector cabinet known as the White C, which is now installed at a strategic location for staff access. The White Box distributors come with rotating hutch units similar to a sandwich vending machine.

Each user provides his or her ID badge number to the machine's reading device. The individual selects the proper size, then the machine turns the shelves in such a way that the user's type and size are made available in the front of the machine. Each machine can accommodate 200 items and is typically restocked twice daily. The advantage of the newest cabinet model is that it does not allow users to come into contact with any scrubs they don't actually take, thereby reducing the risk of cross-contaminations. A similar distribution machine is expected to be added onsite shortly with a capacity for another 300 items. "COVID gave us many lessons about logistics distribution, controls and human behavior," Bendavid says. For the ED staff, he adds, the challenge was to quickly learn how to use the dispensing system to access scrubs.

“Fortunately, the software and machines are so user-friendly, they just had to follow instructions, and there was almost always another employee who could guide them through it,” Diachidos says. The system generates automatic replenishment orders, minimizing supply shortage and ensuring a more efficient stock management, he adds. After the machine operates for four weeks, the system automatically calculates the average usage and optimizes the inventory pattern accordingly. “We see very consistent logistic curves in terms of sizes,” he states, “but the software will make it automatic and that much more precise.”

Ultimately, the RFID solution enabled the hospital to more easily transition to additional scrubs (from 2,000 to about 20,000) in its emergency department. That has resulted in better service for patients who require emergency support. “Probably over the months or years,” Diachidos says, “we will continue to make improvements” to the technology use.

With the solution in place, the hospital is now equipped to serve a much larger number of employees with scrubs, “because we do not have to overstock numerous areas.” For example, Diachidos notes, “If you have 20 clinical areas and each one has to be over-stocked to guarantee everyone has the size they are looking for, you require many multiples of inventory to be able to accomplish that.”

If a few machines are placed at strategic locations, Diachidos says, only the scrubs that are actually being worn are in circulation, making the process leaner and enabling the hospital to meet the Quebec scrub-use mandate. Going forward, the machines and solution will continue to manage scrubs throughout the hospital. “Crisis or no crisis, this was where we were going,” he states.