

Patient-Safety Center Tests RFID-enabled Hand Sanitizers

The system, designed to decrease the number of patient infections, warns health-care providers if they fail to properly wash up before treating a patient.

Aug. 17, 2009—The University of Miami-Jackson Health System (UM-JMH) Center for Patient Safety is piloting an RFID-based system intended to track the hand-washing compliance of hospital employees, thereby combating an age-old problem of infection transmission that occurs in medical facilities. The system tracks who washed their hands, and when. If a doctor or nurse visits a patient's bed without first washing his or her hands, an audible alarm offers a reminder. The Center for Patient Safety hopes to increase the rate of staff hand-washing, thus decreasing the number of patient infections.

The system, which includes Versus Technology's hybrid infrared-RFID tags, as well as interrogators installed by RTLS health-care systems integrator [Dynamic Computer Corp.](#) (DCC), is the latest effort, this time a technological one, to address the problem of hospital-acquired infections, often occurring in intensive care or emergency units.

"We have found that the largest factor in reducing these infections is tight control of hand hygiene," says David J. Birnbach, a medical doctor and the director of the UM-JMH Center for Patient Safety. All health-care providers are advised to wash their hands immediately before and after visiting every patient. However, Birnbach says, this procedure is missed between 10 and 60 percent of the time in the United States.

"Study after study suggests that physicians and nurses are not complying," Birnbach says. Reasons for that failure include rushing or simply forgetting. While the U.S. Centers for Disease Control (CDC) has tried to address the problem for years, he notes, non-technology solutions have been insufficient. Encouraging patients to remind doctors to wash their hands, for instance, creates an adversarial relationship between the doctor and patient, and encouraging nurses to report physicians who don't wash their hands creates similar problems. Many hospitals employ a monitor to walk the floors and watch the hand-washing activity of doctors, but these employees don't enter patient rooms, and thus can't know what is happening at all times.

According to Birnbach, showing videos and Web-based instruction to health-care workers regarding the risks of infection from failure to wash hands may be effective, but there is no way to measure that effectiveness. For these reasons, he began turning to technology to solve the problem.

"They contacted us looking for an automated solution for hand washing," says Farida Ali, DCC's president and CEO. The company investigated the Versus system, and determined that its technology would offer an accurate solution. With the Versus system, personnel are issued ID badges containing a tag that can transmit infrared and RFID signals

encoded with a unique ID number. A Versus sensor, installed above a hospital bed or a hand sanitizer, contains an IR interrogator that reads the badge ID number. The sensor also contains an active RFID tag to transmit the data from the sensor to a reader.

The pilot, which launched on July 29, is taking place at the UM-JMH facility, where health-care workers receive safety training. To test the DCC-Versus solution, several health-care providers are wearing a battery-powered tag, either on a wrist or hung around the neck. The tag has two chips—one for RFID, the other for infrared transmissions—and both can transmit the tag's unique ID number, which is linked to the staff member's name in the back-end system. In this case, however, the badges transmit only IR signals, to make sure a sensor reads only the tag within its vision. By having the badge tags transmit IR signals instead of RF, explains Henry Tenarvitz, Versus' chief IP officer, a Versus sensor is less likely to pick up stray reads from other tags in the vicinity—such as those worn by personnel standing near the dispenser but not using it.

When a staff member presses the hand-sanitizing dispenser containing soap or a waterless disinfectant such as Purell, a Versus sensor installed in the dispenser activates, scans for an IR signal and then captures the tag's unique ID number. The sensor's built-in RFID tag then transmits the badge's ID number—along with the date, time and sensor tag's ID number and location—to a reader wired to a PC. There, Versus software interprets that data, links it to an employee and confirms that the individual washed his or her hands.

The system software measures the passage of time between the moment when a care provider finishes the hand-sanitizing process and that person's arrival at a patient's bed—typically, less than 20 seconds later. For the pilot, Tenarvitz says, DCC installed a Versus sensor above one patient bed, which captures the ID number on the employee's badge, then transmits that information to the reader via 433 MHz RFID. Versus software determines whether the badge owner washed his or her hands, as well as how long ago that occurred, and saves all of that data on the server. If too much time has elapsed (more than 20 seconds, for example), or if the badge owner has not washed his or her hands at all, a computer-generated voice warns the physician or nurse, by name, to go back to the sink or Purell dispenser for proper hand hygiene.

The pilot will continue for several more weeks before DCC and Jackson Memorial Hospital consider installing it in a 30-bed unit to be tested in a real health-care setting. "This is the cleanest, easiest solution available," Ali says, noting that it does not require any additional procedures by the health-care providers who use it, and that it is easy to install onto soap and Purell dispensers.

"So far, it's working fantastically," Birnbach reports, though he is still conferring with DCC and Versus on details, such as whether an audible warning would be the best alert system, or if it should use flashing lights. He says he has requested that the sensors read the IR tags at a range of 12 inches from the bed, in order to catch the problem before

a physician touches a patient or the bed, by sending an alert as soon as the physician or nurse comes within close range of the bed.

"If the system works" Birnbach says, "it will be a very appropriate paradigm for changing the culture in the U.S. to washing hands appropriately" before meeting with a patient, and afterward.