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## Pilot Study Shows Effectiveness Of New, Low-cost Method For Monitoring Hand Hygiene Compliance

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"We know that a range of pathogens are spread from healthcare workers to patients by direct touch and that the current rates of hand hygiene compliance are suboptimal," said Philip Polgreen, MD, University of Iowa Health Care. "Our new low-cost method of monitoring could potentially reduce cost while increasing compliance rates." The failure of healthcare workers to perform appropriate hand hygiene is one of the leading preventable causes of healthcare-associated infections.

This new technology marks a major shift from the current method of monitoring hand hygiene compliance that involves direct human observation, which is both costly and labor intensive. With human observation there is also the potential for a "Hawthorne Effect," which means workers will only clean their hands when being actively observed. Older automated monitoring technology, called radio-frequency identification (RFID) infrastructure, is available, but can be prohibitively costly and consumes far more power than Polgreen's method.

The pilot study uses "Zigbee" technology which is part of a new generation of wireless devices that require less power. Workers wear small, pager-sized badges to monitor their use of hand hygiene dispenser stations prior to entering patient rooms. The technology behind the study was developed in collaboration with computer scientists at Iowa. Ted Herman, the lead computer scientist on the project, designed badge construction and placement of small beacons inside patient rooms and other designated locations. "A novel part of our method is how data are recorded," Herman said, "data are recorded and processed in the badges rather than relying on a network." Each use of the dispenser station is automatically reported by the user's badge, which logs the time and length of use, date and dispenser ID number. The data from the badges can be automatically off-loaded multiple times, which means results are recorded and aggregated without any manual data entry. The automated monitoring system correctly identified more than 90 percent of study subjects entering and exiting patient rooms when they remained in the room for 30 seconds. When the time in the room is increased to 60 seconds, the monitoring system approaches 100 percent identification of subjects entering and exiting patient rooms.

The study findings suggest that there is potential for this new technology to change the behavior of healthcare workers and increase compliance. Polgreen points out that more testing in a variety of hospital settings is necessary, but that the technology offers hospitals a cost-effective option to implement automated monitoring of hand hygiene compliance in accordance with CDC guidelines.

"This new technology is a novel and practical method to determine hygiene compliance that does not rely on the installation of expensive infrastructure and can be installed and removed within minutes," added Polgreen.

The development of the technology was funded by an award to Dr. Herman from the National Science Foundation. Additional funding was provided by an NIH career grant awarded to Dr. Polgreen as well as a grant from the University of Iowa.

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