UV light disinfection robots help to overpower pathogens

Disinfection robots are first on the ECRI Institute’s 2015 Top 10 Hospital C-Suite Watch List, which includes new and emerging technologies healthcare providers should know about. Hospital-acquired infections (HAIs) are a persistent problem, and a recent study supports the efficacy of disinfection robots. However, the technology is expensive, and experts caution that robots should not be considered a replacement for other infection control strategies.

“People are looking for an extra sense of protection,” says James Davis, MSN, RN, CCN, CIC, HEM, senior infection prevention analyst at the ECRI Institute in Plymouth Meeting, Pennsylvania. The ECRI Institute’s list includes hydrogen peroxide vapor (HPV) robots in addition to ultraviolet-C (UV-C) robots.

One reason for including disinfection robots on the list has been the rise of Ebola, Davis says. “In the last quarter [of 2014] with the Ebola outbreak, we saw a twofold increase in purchasing of these types of machines,” he says. “Hospitals are looking at these machines to do terminal cleaning because with something like Ebola, where risk is high and the public is acutely aware, the robots give an extra sense of security that you got all the nooks and crannies.”

Reducing infections

Multi-drug-resistant organisms such as Clostridium difficile (C diff), methicillin-resistant Staphylococcus aureus (MRSA), and vancomycin-resistant Enterococci (VRE) are other pathogens that are difficult to eradicate in hospital settings. According to a recent study in Infection Control & Hospital Epidemiology, robots using UV-C light exposure reduce these pathogens.

The pulsed-xenon UV disinfection robot (Xenex, San Antonio, Texas) contains a non-mercury xenon gas flash bulb and emits a broad spectrum of radiation that penetrates pathogens’ cell walls and renders them unable to reproduce. In addition to the flash bulb, the portable unit has a UV feedback sensor, a control panel, and a door sensor (photo).

Researchers who tested the device found that, when used for 10 minutes, it reduced recovery of C diff, MRSA, and VRE on frequently touched surfaces in hospital rooms.

One section of the study showed the pulsed-xenon system significantly reduced the presence of pathogens where there was no manual cleaning, indicating that the reduction was solely due to the UV disinfection.

Cleaning more thoroughly

Adding this level of cleanliness to terminal cleaning was the goal when the Texas Health Southwest surgery department in Fort Worth purchased a pulsed-xenon system 3 years ago. “We were looking to get our MRSA and drug-resistant organism rates down,” says infection preventionist Katherine Rhodes, BSN, RN, CIC, COHN-S, CHSP. They used the system as an adjunct to their terminal cleaning and periodically...
after cases with higher contamination levels, such as a C diff case or after draining a wound.

“We started seeing some pretty significant decreases of surgical site infections,” she says. “Since we bought the system, our MRSA rates decreased by 50% in 2013 and then another 50% last year.”

Texas Health Southwest received a national award for surgical site infection decreases, and, according to Rhodes, the disinfection robot was a factor in their success. “We did quite a few other initiatives on practice and AORN guidelines, so it’s difficult to say if there was one driver, but I think it did contribute,” she says. The facility has since purchased another pulsed-xenon system and has put a dedicated staff member in charge of the robot on the patient floors.

Rhodes says the system’s 10-minute cycle time is critical. “It’s a pulsed-UV light, so it works much faster than the other UV devices,” she says. “We’ve got a tremendous patient growth volume, so we were really looking for what we could implement that wouldn’t affect our throughput.” The pulsed-xenon system is also easy to move and has no exposed bulbs or tubes, unlike some other UV disinfection systems, she adds.

Though Davis recognizes the value of disinfection robots, he stresses that they should be used as an added layer to complement infection control protocols already in place. “UV light and hydrogen peroxide vapor don’t actually penetrate bioburden. We want people to look at and evaluate this technology as an adjunct to cleaning,” he says.

Rhodes also views the pulsed-xenon system as an extra step to their cleaning routine. “I think sometimes when you read the literature from various UV device manufacturers, you almost get the impression that it’s going to save you time because you’re using it instead of manual cleaning,” she says. “I certainly would not recommend that.”

Making purchasing decisions
Hospital leaders must consider several angles when deciding whether or not to buy a disinfection robot. “Make sure you’re purchasing the type of equipment that has the right level of support that you need and the staff to support it,” says Davis.

The pulsed-xenon UV disinfection system costs around $80,000, and—according to Davis—there are not many unbiased publications that currently prove their worth. “As it becomes more popular, we’re hoping to see more double-blind, controlled studies between technologies,” he says. “We know it’s scientifically effective, but how effective is it in an environment outside of the manufacturer’s literature?”

One such study is being planned by the ECRI Institute later in 2015, according to Laurie Menyo, director of public relations and marketing communications. Their independent medical device testing unit plans to conduct a device evaluation between different UV disinfection units to help hospitals make the best procurement decisions based on cost, effectiveness, and usability, she says.

The type of environment in which the device will be used is another important factor to consider, Davis says. The HPV devices tend to cost around $30,000 less than UV devices, but their room turnaround time tends to be longer. Additionally, hospital leaders should think about which types of equipment are in the ORs they plan to use the robots in and how effectively each robot would disinfect that environment.

“You need to do a lot of evaluation and due diligence to make a decision that is not only right for your pocketbook, but right for the environment you’re using it in,” says Davis.
For Rhodes, the opportunity to reach the buttons and crevices of complex OR machines such as their anesthesia machines is a benefit worthy of the added cost, time, and labor. “You’re disinfecting areas that you probably, even in a good manual cleaning, are really not getting to,” she says. “It eliminates the human error.”

But anyone considering whether to add the disinfection robot should evaluate the facility’s entire manual cleaning process, Davis notes. “They need to evaluate all the technologies out there, whether it be UV light, HPV, or even looking at their regular cleaning,” he says.

Keep in mind the probable expectations of adding a disinfection robot to cleaning routines, Davis advises. “This technology by itself likely will not make your infection rates magically go down. The literature to support those claims just doesn’t exist presently,” he says. “It will just help your regular cleaning process and give yourself, and maybe your patients, an added level of security.”

—Mai Hanoon

References