UV Light Helps Combat Superbugs

New research out of the Texas A&M Health Science Center College of Medicine indicates that a germ-zapping robot to clean hospital rooms could hold the key to preventing the spread of superbugs.

Can a robot clean a hospital room just as well as a person? According to new research out of the Texas A&M Health Science Center College of Medicine, that is indeed the case. Chetan Jinadatha, MD, MPH, assistant professor at the Texas A&M College of Medicine and chief of infectious diseases at the Central Texas Veterans Health Care System in Temple, is studying the effectiveness of a germ-zapping robot to clean hospital rooms, which could hold the key to preventing the spread of superbugs.

Keeping hospital rooms clean is important to prevent the spread of infections from one patient to another. Surfaces in hospital rooms such as tray tables, bedrails, call buttons and grab bars can be reservoirs for bacteria such as methicillin-resistant Staphylococcus aureus (MRSA), which can be difficult to treat, and in some cases, fatal.

"A typical 100-bed hospital sees about 10-20 hospital-acquired infections a year," Jinadatha says. "Our goal is to get to zero infections."

In addition to the human toll, hospitals now have a financial reason to reduce hospital-acquired infections: beginning in 2017, the federal government will dramatically reduce Medicare payments to hospitals that exceed incidences of certain conditions, such as hospital-acquired infections.

Surfaces in hospital rooms such as tray tables, bedrails, call buttons and grab bars can be reservoirs for bacteria. A UV light method for cleaning hospital rooms could help stop the spread of dangerous bacteria, and in turn, save lives. Photo courtesy of Texas A&M Health Science Center.

Since the current method of cleaning hospital rooms relies heavily on housekeeping staff, who often have a high turnover rate, Jinadatha has focused his research on using technology to prevent hospital-acquired infections. In particular, he is studying the effectiveness of a pulsed xenon ultraviolet (UV) light system that was developed in Texas. Jinadatha has been among the first to study the system since it was introduced in 2011.

The device has a large saucer-shaped head on top of a column that rises up to reveal a bulb filled with xenon gas. When the system is switched on, high-voltage electricity passes through the bulb and releases a spectrum of UV light that binds to the DNA of organisms and kills them.
Last year, Jinadatha published a study that compared the effectiveness of manual disinfection alone to manual disinfection plus the use of UV light. This study found that manual cleaning plus UV light killed more than 90 percent of the bacteria, compared to 70 percent with manual cleaning alone. Of particular note was the fact that manual disinfection plus UV light killed 99 percent of the bacteria that cause MRSA.

In a 2014 study, Jindatha and colleagues examined rooms vacated by patients that had a MRSA-positive polymerase chain reaction or culture during the current hospitalization and at least a two-day stay. 20 rooms were then treated according to one of two protocols: standard manual cleaning or PPX-UV. This study evaluated the reduction of MRSA and HPC taken from five high-touch surfaces in rooms vacated by MRSA-positive patients, as a function of cleaning by standard manual methods vs a PPX-UV area disinfection device.

Colony counts in 20 rooms (10 per arm) prior to cleaning varied by cleaning protocol: for HPC, manual (mean=255, median=278, q1-q3 132-304) vs PPX-UV (mean=449, median=365, q1-q3 332-530), and for MRSA, manual (mean=127; median=28.5; q1-q3 8-143) vs PPX-UV (mean=108; median=123; q1-q3 14-183). PPX-UV was superior to manual cleaning for MRSA (adjusted incident rate ratio [IRR]=7; 95% CI <1-41) and for HPC (IRR=13; 95% CI 4-48).

The researchers concluded that PPX-UV technology appears to be superior to manual cleaning alone for MRSA and HPC. They add that incorporating 15 minutes of PPX-UV exposure time to current hospital room cleaning practice can improve the overall cleanliness of patient rooms with respect to selected micro-organisms.

Reference: Jinadatha C, Quezada R, Huber TW, Williams JB, Zeber JE, Copeland LA. Evaluation of a pulsed-xenon ultraviolet room disinfection device for impact on contamination levels of methicillin-resistant Staphylococcus aureus. BMC Infect Dis. 2014 Apr 7;14:187.

Jinadatha's latest study, which was published earlier this year in the *American Journal of Infection Control*, looked at the effectiveness of UV light disinfection by itself. This study found that in just 12 minutes, the UV light system cut the amount bacteria in the room by about 70 percent --roughly the same level of effectiveness as manual disinfection.

Jinadatha stresses that he would never recommend that a hospital use the UV light system by itself, but he believes it does have value as a "safety net" to kill bacteria that traditional cleaning may miss. Currently the system is being used in 40 VA hospitals across the country and about 200 private hospitals. He predicts it will eventually become standard equipment at all hospitals.
"There is no one thing that will take away the problem of hospital-acquired infections, but we are slowly chipping away at it," he says.