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Environmental Services
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Can a Robot Process a Hospital Room as Completely as a Human?

By George Clarke, BS, and John Scherberger, BS, CHESP, REH



Photo: Tom Fedor, The Gazette/Post Community Media, LLC.

TECHNOLOGY



Several years ago, a renowned academic and author on business management said: "...to fix health care, we have to ask the right questions."

In *Harvard Business Review*¹ Henry Mintzberg also wrote: "The health care system could benefit... by adopting successful practices that are already in use—practices that are informed by good management."

Among those practices that Mintzberg said were worth considering included the notion that hospital administrators "look to the people on the ground... for ideas for real improvements" (vs. only asking consultants for ways to cut costs); and "encourage greater collaboration" (vs. competition, which can pit individuals against one another, unproductively) to build genuine systems that promote health and treat illness.

Mintzberg's reasoning about health care brings to mind a similar thought—reducing the spread of health-care-associated infections (HAIs). Are we asking the right questions?

The 'Robot' vs. the Human

For example, consider this question: "Can a robot clean a hospital room just as well as a person?"

This was a question put forth recently in response to a university-produced article² announcing a new study³ from the Texas A&M Health Science Center College of Medicine that compared the effectiveness of UV systems for hospital room disinfection in the absence of manual disinfection. This single question caused a stir of sorts when someone belonging to an AHE Discussion Group on LinkedIn⁴ posted a comment that began with the same question—pitting *the robot against the person*.

As you might expect, comments in the discussion ran the gamut, from defending environmental services staff as the "first line of defense," to making the case for the costly UV systems because environmental services cleaning "simply isn't good enough by itself and never will be" due to human error.

In his 1973 novel, *Gravity's Rainbow*,⁵ author Thomas Pynchon writes, "If they can get you asking the wrong questions, they don't have to worry about answers." Is that what happened here? If we were one of Pynchon's famously paranoid characters, we might wonder if there weren't some hidden agenda behind the question about robots vs. humans—possibly to sidetrack the discussion away from the facts about both humans and UV light systems.

"Can a robot clean a hospital room just as well as a human?" Let's look at a few facts by dissecting the question and answering some questions of our own.

Q: Is an ultraviolet disinfection (UV) system a robot?

By definition (*Robot: a machine capable of carrying out a complex series of actions... that can do the work of a person and that works automatically or is controlled by a computer*), UV

1 "To Fix Health Care, Ask the Right Questions," By Henry Mintzberg, *Harvard Business Review*, October 2011. <https://hbr.org/2011/10/to-fix-health-care-ask-the-right-questions>.

2 "New method for cleaning hospital rooms could help stop the spread of 'superbugs,'" By Ellen Davis, Texas A&M Health Science Center, April 13, 2015. <https://news.tamhsc.edu/?post=new-method-for-cleaning-hospital-rooms-could-help-stop-the-spread-of-superbugs>.

3 "Can pulsed xenon ultraviolet light systems disinfect aerobic bacteria in the absence of manual disinfection?" *American Journal of Infection Control*, April 1, 2015. [www.ajicjournal.org/article/S0196-6553\(14\)01398-4/fulltext](http://www.ajicjournal.org/article/S0196-6553(14)01398-4/fulltext).

4 "UV Light to Clean Patient Rooms," AHE, LinkedIn, May 2015. www.linkedin.com/grp/post/4108998-5996349997342351363.

5 "Gravity's Rainbow," By Thomas Pynchon, 1973, several publishers. https://en.wikipedia.org/wiki/Gravity's_Rainbow.

light systems aren't robots. In fact, you need a trained, typically the environmental services staff, human to transport, set up, and initiate operation.

Q: Is a UV system capable of disinfecting an entire patient room?

No. UV systems are line-of-sight devices—that is, UV light-rays must fall on the surface if they are to be effective. Anything in shadows or, for instance, the folds of cubicle curtains or the “other side of the bed,” is unaffected. Furthermore, to do the patient room bathroom requires the trained human to return, move the UV device into the bathroom and reinitiate.

Q: Does a UV system clean a patient room?

UV light systems are not capable of cleaning anything. In fact, UV system operating instructions state (as with any disinfectant) to thoroughly clean all surfaces prior to use.

Q: What is meant by “clean” in the commonly seen marketing of UV systems?

This gets down to the real issue: Manufacturers and marketers are using words to describe UV systems that can vary considerably from the studies quoted, thus getting people to argue, debate, and thus “fog” (no pun intended) the inaccuracies.

For example, under the headline, “New method for *cleaning hospital rooms* [italics ours] could help to stop the spread of ‘superbugs’” we see:

“...[Chetan] 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 xenon UV light system cut the amount bacteria in the room by about 70 percent*—roughly the same level of effectiveness as manual disinfection.”

However, in the actual study,⁶ the researcher quoted wrote:

“Five high-touch surfaces within each room were sampled before and after PX-UV disinfection. The surfaces included three in the patient room (i.e., call button, bedrail, and tray table) and two in the bathroom (i.e., the handrail and toilet).”

⁶ “Can pulsed xenon ultraviolet light systems disinfect aerobic bacteria in the absence of manual disinfection?” *American Journal of Infection Control*, April 1, 2015.

The point here is that the number of surfaces actually exposed to direct, line-of-sight UV system disinfection in the study represents a minor amount of space in relation to the entirety⁷ of a patient room. The marketing broad-brushes this fact, is misleading and ultimately, if it’s relied upon, could have an impact on patient safety.

Q: Is a UV disinfection system a tool in the fight to reduce HAIs?

Yes. Like any other tool, the UV system can add value providing its limitations are understood and it is used properly.

Q: Can a UV system disinfect a patient room without a human?

No.

Q: Can a human disinfect a patient room without a UV system?

Yes.

What is of greatest concern is that UV systems are now being heralded as “single-solution” tools for cleaning and disinfection, much like hand hygiene has been promoted as the be-all-to-end-all solution for preventing HAIs—all at the expense of the environmental services department, ignoring the inherent risk of environmental surfaces and the invaluable humans that are the first line of defense in a multimodal intervention HAI program.

The Case for Multimodal Intervention

The lead researcher in the study on UV light systems is Chetan Jinadatha, MD, MPH, assistant professor at the Texas A&M College of Medicine. Jinadatha has stressed 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.

In the battle to stop the spread of and reduce HAIs when the right questions are asked, we come up with common-sense solutions such as a multimodal intervention, a comprehensive approach to infection prevention in hospitals. Clearly, in today’s challenging pay-for-performance environment, the incentives for a multimodal approach are multiple. The increasing threat posed by the spread of antibiotic-resistant superbugs

⁷ “Further Thoughts About Surface Sampling,” By Dr. Harriet Burge, EMLab P&K, February 2010, Indoor Environment Connections.

affects not only the lives of patients, but also a facility’s reputation and its financial health.

Enterprise-wide multimodal intervention initiatives must be supported and heralded from the hospital C-suite down to the basement and throughout the facility. Researchers have published studies proving that the environment plays a key role, as do people’s hands, in the transfer of pathogens responsible for HAIs. Numerous studies over the past couple of decades prove that humans make the difference in reducing infection rates by anywhere from 30 percent to 70 percent and beyond.

All departments need to adopt up-to-date best practices supported by best-in-class products that can get the job done. This includes everyone—from those in food service to the ER, from nursing to environmental services, and from all the other clinical departments. UV disinfection systems are but one of the many tools that can be deployed when necessary and under the appropriate circumstances.

Best practices may include the use of UV machines in some environments. But in our efforts to stop the spread of HAIs, let’s be more collaborative instead of pitting these machines against humans. As Dr. Jinadatha, MD has said, “There is no one thing that will take away the problem of hospital-acquired infections.” ●



George Clarke, BS, has been an aggressive and tireless advocate of environmental hygiene and raising standards in the battle to reduce HAIs for more than a decade. He is founder and CEO of UMF Corporation and his PerfectCLEAN® Environmental Hygiene System includes high-performance textile products and specialty training in infection prevention.



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