**Touchless Ultraviolet Disinfectant Systems and Hospital-Acquired Infections**

Author: Brittany N. Helzer   
Major: Cell and Molecular Biology  
Department of Microbiology and Molecular Genetics, Oklahoma State University, Stillwater, OK 74078, USA

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**The Reduction of hospital-acquired infections has long been a challenging issue, yet not one that has been pushed aside. In recent years, with the help of the growing technological field in reference to healthcare, touchless UV light disinfectant systems have started to push their way to the top. Hospitals have often been the subjects of scrutinization for hospital-acquired infections. However, with the innovation and integration of touchless UV light disinfectant systems, hospitals may see a decrease in this problem area.**

**Introduction**

According to the Center of Disease Control and prevention an estimated 722,000 hospital-acquired infections occurred all within acute care hospitals in 2011 [3]. This leads to a staggering 4% of all admitted patients that will contract at least 1 hospital-acquired infection [3]. By taking a look at these figures, it leads hospitals to look at the flaws of manual cleaning and also at possible contamination of hospital surfaces, especially those within patient care areas. These patient care areas include but are not limited to Emergency Department facilities, patient hospital rooms, patient restrooms, and hospital-waiting areas. There is also evidence to suggest that not only are these surfaces infected with hospital-acquired infections, but that these areas are regularly contaminated with multi-drug resistant organisms [3]. The correlation between these figures and manual cleaning is that not all areas are cleaned in a consistent fashion. This demonstrates that not all surfaces are being reached nor is staff taking the proper pre-cautions for such infections.

“The reduction of microbial contamination in the hospital environment is an important component of an infection prevention strategy” [1]. This statement rings true in an era where hospitals are being highly scrutinized on hospital-acquired infections as well as multi-drug resistant organisms. These hospital-acquired infections (HAIs) include but are not limited to the following: methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE), Acinetobacter, and Clostridium difficile (C. diff) [5], all of which are feared by healthcare communities, big and small. When it comes to the aforementioned hospital-acquired infections, it has been found that these infections occurred where flaws in traditional cleaning methods are used. These flaws in traditional cleaning methods can stem from inconsistent cleaning methods, missed surface areas, or lack of knowledge on how to properly clean a recently infected patient room.

How can a hospital cover hospital-acquired infections and the multi-drug resistant organisms? One way to overcome this problem area would be by integrating touchless UV disinfectant systems. At the forefront of the UV systems, hospitals have two options. These options include the hydrogen peroxide vapor (HPV) and the continuous UV (UV-C) disinfectant systems. Most studies that have been done on this topic, have utilized the UV-C versus the HPV. The HPV system disburses vaporized hydrogen peroxide in a room that has been dehumidified, in which the hydrogen peroxide is then circulated into the area. The hydrogen peroxide is eventually circulated back into the system, in which the hydrogen peroxide gets broken down in hydrogen and water, causing this process to be “residue free” and non-toxic to humans. The UV-C system when activated, measures the reflected UV-C emissions with a sensor that automatically delivers a lethal UV dose for HAIs. The UV-C system utilizes a continuous wave band of UVC light for a high continuous wave band of UVC light that targets the DNA of pathogens. In most studies done, both systems have been used, however, it appears that most have taken to prefer the UV-C system versus the HPV. In a recent study published in the publication, “Infection Control Today” the UV-C system was said to take less disinfectant time and to be more user friendly. Both systems appear to have great attributes for health care communities as well as great potential to decrease hospital-acquired infections. However, there have been few studies that have directly compared the effectiveness of the “no touch” systems [11].

**Recent Progress**

The recent progress of the integration of touch less UV disinfectant systems within hospital communities have been done, however, all studies seem to be lacking in quality of data. In addition to the lack of data, one has to figure in the lack of studies that have been done on the effectiveness of one system versus the other.

However, in a study done by Passaretti *et* *al*. [8], Passaretti *et al.* performed a 30-month study that used concurrent controls. What this means is that the study was done using a HPV device on six high-risk units in a 994-bed hospital facility. The patients that were admitted to rooms disinfected using the HPV system were 64% less likely to acquire any multi-drug resistant pathogen and 80% less likely to acquire VRE. In addition to these results, the risk of acquiring C. diff and MRSA was also reduced, but not significantly [9]. In another study done by Anderson *et al*., this study was the first clinical trial to assess a touchless disinfection system for terminal room disinfection situations [9]. This specific study did a trial in nine hospitals that used three different strategies for an enhancement of terminal room disinfections: a standard quaternary ammonium compound plus UV-C, bleach on its own, as well as bleach plus UV-C [11]. Overall the study showed that the enhanced room disinfection strategies (i.e., bleach and/or UV-C disinfection) decreased the HAIs by about 10 to 30% [9].

**Discussion**

Due to lack of recent studies done on this specific topic more specifically, lack of studies done to compare the HPV and UV-C systems, it was hard to decide if these results are valid. However, the studies that were found to use either system, had results with lower percentages in HAIs. These results ranged from a lower percentage in the specific HAIs mentioned or a combination of two or more HAIs. What these studies fail to mention or touch base on is the lack of hand hygiene in comparison to the use of touchless disinfection systems as well as in conjunction with traditional cleaning supplies.

What healthcare communities need to be aware of is that there happens to be a plethora of touchless systems available. For example, systems may vary in the likes of bulb size, UV wavelength, energy output, and cost [11]. Touchless systems have been demonstrated to decrease HAIs, in all clinical trials found, however, to be more accurate in in these findings, more studies need to be done, especially comparing the HPV and the UV-C systems. If healthcare communities integrated touchless UV systems, a decrease in the confusion in cleaning roles between nursing and environmental services staff members could be seen. By the possible addition of touchless UV disinfectant systems, these flaws would be immediately irrelevant, leading to the possibility of more studies being done on this subject. Even if healthcare communities were to integrate either of the disinfectant systems, a few questions remain still remain. These questions include: Are these systems cost effective? Are these systems better qualified to suit bigger regional hospitals or can all health care communities benefit from such technology?

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