

The Issues

While medical facilities are thought of as centers for healing, both patients and healthcare workers are at risk of catching infectious diseases, whether by air<sup>1</sup> or insufficiently disinfected surfaces. Immuno-deficient or compromised individuals are more susceptible to these opportunistic pathogens.

Reception areas, inpatient wards, and administrative offices are all potential sources of infection. Your plumbing, heating, and air handling systems can harbor and spread pathogens. Exposed human tissue in the context of surgical procedures can be another source of bacteria, even in the air.

Antibiotics were once excellent hindrances to the infections borne by medical air and surfaces. However, because of their overuse, many contaminants have built up a resistance to these antibiotics.<sup>1</sup> Due to an increase of hospital infections from antibiotic-resistant pathogens since 2019, the CDC rightly issues a call to additional action, including implementing “effective infection prevention and control.”<sup>2</sup>



*Ultraviolet light technology ... has a place in health care settings. This technology can optimize environmental cleanliness, resulting in decreased pathogens that could potentially cause infection.*

*Northwell Health<sup>3</sup>*



How UV-C Works

UV light is made up of three wavelength ranges (UV-A, UV-B, and UV-C). UV-C lamps emit wavelengths at 254 nanometers (nm), which impact the DNA of harmful microorganisms and hinder their ability to multiply. Unwanted microbes eventually die off, making facilities safer, healthier, and even more efficient.

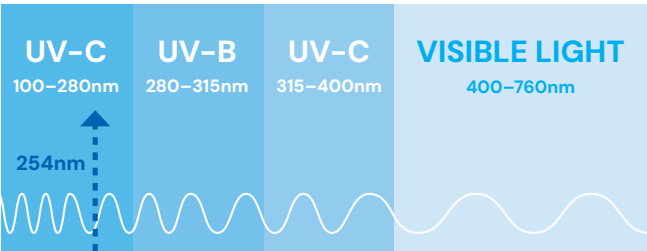


Figure 1: A Portion of the Electromagnetic Spectrum

Documented UV Success

While free-flowing air circulation is a good start in maintaining a clean and healthy environment, ultraviolet germicidal irradiation (UVGI) has shown to be effective at inactivating over 97% of pathogens, reducing airborne infections in healthcare patients and employees.<sup>4</sup> A nine-hospital study conducted by Duke University and funded by the CDC found that ultraviolet disinfection was effective in decreasing hospital-wide infections.<sup>5</sup>

The use of air filtration combined with UV can contribute to providing the near-sterile environment required by AIDS patients.<sup>6</sup> One hospital, after implementing a UV-C program for 12 months, reduced multidrug-resistant HAIs by 19% and saved over \$1.2 million.<sup>7</sup>

UV-C Doses

The UV-C doses below will inactivate many bacteria and viruses that are commonly found in medical facilities, in the air and on surfaces. Millijoules per square centimeter (mJ/cm<sup>2</sup>) measure energy produced by germicidal lamps over a certain amount of time.

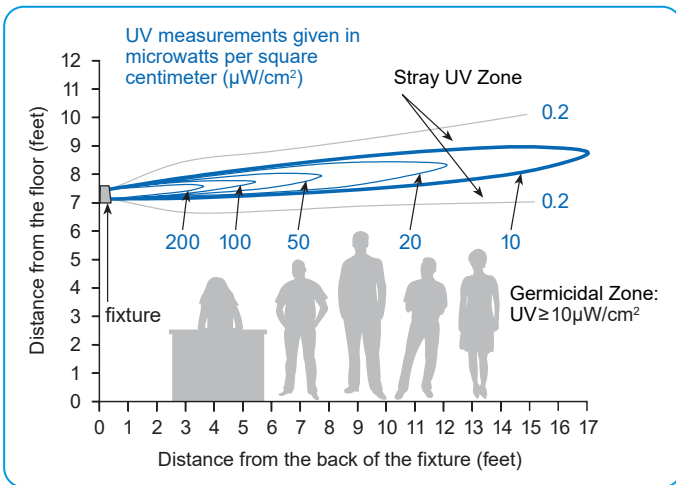
Microorganism	UV Dose (mJ/cm <sup>2</sup> )
<i>Staphylococcus aureus</i> (MRSA)	6.60
<i>Staphylococcus epidermidis</i>	5.80
<i>Candida auris</i>	32.0
SARS-CoV-2	7.80
<i>Klebsiella pneumoniae</i> (CRKP)	7.0
<i>Influenza</i>	1.20
<i>Clostridium difficile</i> (C. diff)	16.0
<i>Enterococcus faecalis</i>	8.60
<i>Pseudomonas aeruginosa</i>	3.90
<i>Serratia marcescens</i>	6.160
<i>Mycobacterium tuberculosis</i>	10.0
<i>Acinetobacter baumannii</i> (CRAB)	1.80

Table 1: UV-C Doses to Neutralize Various Microbes

## UV-C Solutions

### Upper Room UVGI

Our Hygeaire® models project long, uninterrupted ultraviolet rays across the upper room air, neutralizing bacteria and viruses carried by air circulation. These models mount seven feet or higher in occupied rooms such as laboratories, cafeterias, examination rooms, ERs, ORs, and waiting rooms. Wall mounted models must be installed on a plumb, vertical surface that is at least 7 feet from the floor and able to support 16 pounds.

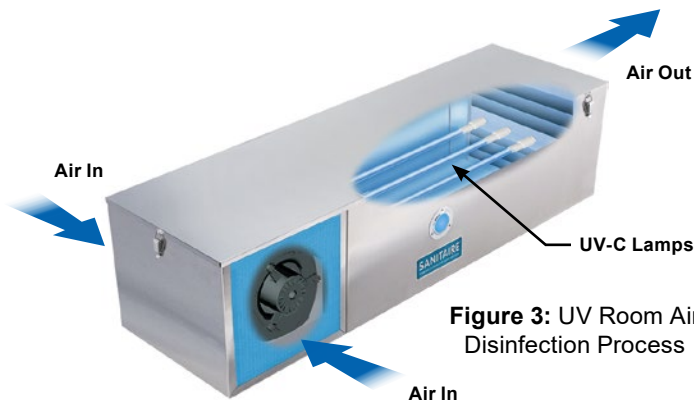


**Figure 2:** Distribution of UV rays from Hygeaire®

Field trials conducted in five hospitals concluded that upper room UV systems show an average reduction of infections by 70%. North Central Bronx Hospital was one of these locations, successfully controlling TB and nosocomial infections after installation.<sup>8</sup>

### Room Air Disinfection

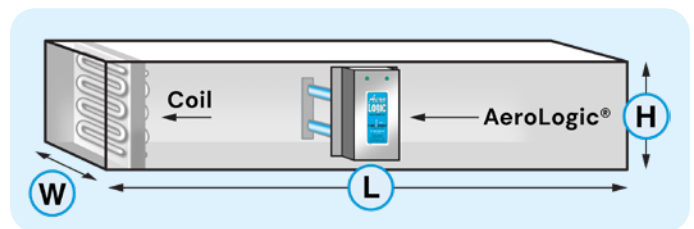
Sanitaire® models address airborne microbes in occupied rooms, especially those that are crowded or poorly ventilated. They accomplish room air changes by drawing in air through a filter, exposing it to UV-C rays, and returning it to the room with harmful microbes neutralized. For well-ventilated areas, we recommend a model that yields 3 room air changes per hour (ACH). For high-risk areas, choose a model yielding 6 ACH.



These models are safe for use in occupied areas such as waiting rooms, patient rooms, ORs, ICUs, recovery rooms, laboratories, cafeterias, examination rooms, and ERs. UV recirculation units are routinely used in TB isolation rooms.<sup>6</sup> Numerous Sanitaire® models are available: wall mounted, ceiling mounted, or mobile.

### HVAC System Disinfection

Our AeroLogic® UV disinfection models can be easily installed inside HVAC systems. For best results, mount perpendicular to airflow and direct at the condenser coil, where microbes tend to grow and thrive. In-duct systems are most efficient when installed in a long, straight run allowing at least 0.25 seconds of UV exposure.<sup>9</sup> We can recommend the model that best fits your duct or air handling unit size, air speed, and air temperature.



**Figure 4:** UV Disinfection Installed Horizontally in Air Duct

### Direct Air & Surface Disinfection

For use in unoccupied hospital rooms, our Sanidyne® portable UV sanitizers inactivate pathogens in the air and on surfaces. Supplied remote enables programming from a safe distance. Using wheels or handles, units can be conveniently moved from one location to another when the lamps have been disengaged. These models are ideal for locations where permanent sanitizers may not be an option, such as ORs, ICUs, laboratories, examination rooms, morgues, and ERs.

Our SaniRay® and SaniLight® direct UV models are stationary options for rooms that are either unoccupied or where workers are wearing protective gear, such as morgues, labs, and clean rooms. These fixtures can be ceiling mounted and custom-wired so that they turn off when anyone enters the area. Independent hospital operating room studies document the success of overhead UV systems at combating infection.<sup>10</sup>

### Instrument Disinfection

Our SaniUV-Cube™ is designed to disinfect surgical instruments and tools in between procedures. It has 4 high output UV-C lamps, removeable/washable quartz shelves, and a generously-sized stainless steel chamber. Simply set the desired time, engage the power, and safely watch disinfection behind the UV-blocking glass. Use in your labs, clean rooms, operating rooms, morgues, ERs, and pathology departments.

**Table 2:** Comparison of UV Air & Surface Disinfection Models

Model	Operation	Type of Space	Installation Location
Hygeaire®	Rays Projected to Upper Room	Occupied	Wall or Pendent Mounted
Sanitaire®	Air Drawn into Exposure Chamber	Occupied	Wall, Ceiling, or Portable
AeroLogic®	Direct Exposure within Air Ducts	Occupied	Duct or Air Handling Unit
Sanidyne®	Direct Exposure	Unoccupied	Portable
SaniLight®	Direct Exposure	Unoccupied	Wall or Ceiling
SaniRay®	Direct Exposure	Unoccupied	Wall, Ceiling, or Stand-off Mount
SaniUV-Cube™	Direct Exposure within Chamber	Occupied	Countertop (Pass-thru and custom models available)

## Sources

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