

# Spectra 1000 UV Light Surface and Air Room Disinfection Device



Effectiveness of UV disinfection device to inactivate common pathogens in the healthcare setting

## Efficacy summary

### Introduction

Healthcare-associated infections (HAIs) are a significant concern in healthcare settings due to the risk of exposure to various pathogens that may lead to serious illness for both patients and healthcare staff. Environmental disinfection practices are critical to reducing HAI risk in healthcare settings. The use of UV light disinfection for air and surface disinfection purposes, in particular, has received growing interest in healthcare due to its efficacy in inactivating microorganisms in the air and on surfaces.<sup>1,2</sup> UV disinfection inactivates microorganisms through the targeted destruction of nucleic acids. UV light can be used to disinfect a variety of surfaces in common healthcare settings, such as surfaces in patient rooms, operating room (OR) and intensive care unit (ICU) settings and even ambulances.

The Centers for Disease Control and Prevention (CDC) endorsed the use of UV disinfection as a supplemental disinfection technique for air and water sanitization; the CDC further endorsed the use of UV disinfection for healthcare surfaces in 2019.<sup>2</sup> UV disinfection should ideally be used as a disinfection technique that is supplemental to conventional chemical disinfection of healthcare settings.

Medline's Spectra 1000 UV Disinfection device is designed to provide effective air and surface disinfection in healthcare settings. A series of studies were conducted through a third party laboratory to evaluate the efficacy of Spectra 1000 UV in deactivating various pathogens commonly present in the healthcare space.



### Methods

Spectra 1000 UV was tested for air disinfection against pathogens, MS2 Bacteriophage<sup>3</sup>, *Staphylococcus aureus* (*S. aureus*)<sup>3</sup>, *Escherichia coli* (*E. coli*)<sup>3</sup> and *Cladosporium cladosporioides*<sup>4</sup>. It was also tested for surface disinfection against Human Enterovirus<sup>6</sup>, Human Coronavirus (HCoV)<sup>8</sup>, Ebola surrogate<sup>9</sup> and tested for surface sanitization against *Clostridium difficile* (*C. diff*)<sup>5</sup>, Methicillin-Resistant *S. aureus* (MRSA)<sup>5</sup>, *Listeria monocytogenes*<sup>7</sup> and *Candida auris*.<sup>10</sup>

After each microorganism was appropriately grown and treated with Spectra UV 1000, percent reduction and log<sub>10</sub> reduction of each microorganism was reported. Statistical analysis of the study data results was additionally conducted by Medline.\*<sup>11</sup>

\* Shapiro-Wilk tests were conducted for the respective pathogens. Wilcoxon Rank Sum Tests were performed to evaluate the significance. Mean, Median, Average Percent Reduction and Average Log<sub>10</sub> Reduction were all calculated for every data table, with reduction calculations looking at total average results vs control sample.

# Results

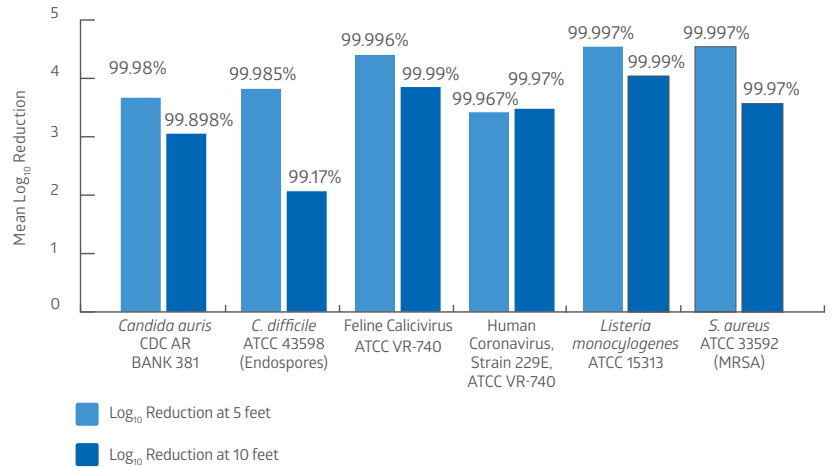
## Surface Efficacy

Spectra 1000 UV was highly effective at eliminating pathogens on surfaces when used at distances of 5 feet and 10 feet for a duration of 5 minutes. The *Candida auris* results were also highly effective at distance of 5 and 10 feet. Across tested pathogens, there was an average 99.9% reduction in microorganism count after treatment with Spectra 1000 UV.

**Table 1. Spectra 1000 UV Surface Efficacy**

Pathogen	Average Per Carrier	Average Percent Reduction from Control		Mean Log <sub>10</sub> Reduction from Control	
		5 feet	10 feet	5 feet	10 feet
<i>Candida auris</i> CDC AR BANK 381	4.50E+02	99.98%	99.898%	3.62	2.99
<i>C. difficile</i> ATCC 43598 (Endospores)	8.52E+04	99.985%	99.17%	3.83	2.08
Feline Calicivirus ATCC VR-740	7.31E+02	99.996%	99.99%	4.41	3.86
Human Coronavirus, Strain 229E, ATCC VR-740	9.55E+01	99.967%	99.97%	3.49	3.49
<i>Listeria monocytogenes</i> ATCC 15313	4.96E+02	99.997%	99.99%	4.55	4.04
<i>S. aureus</i> ATCC 33592 (MRSA)	8.13E+02	99.997%	99.97%	4.54	3.57

**Figure 1. Mean Log<sub>10</sub> Reduction of Surface Pathogens After Spectra 1000 UV Exposure by Distance from Device in Feet**



## Air Efficacy

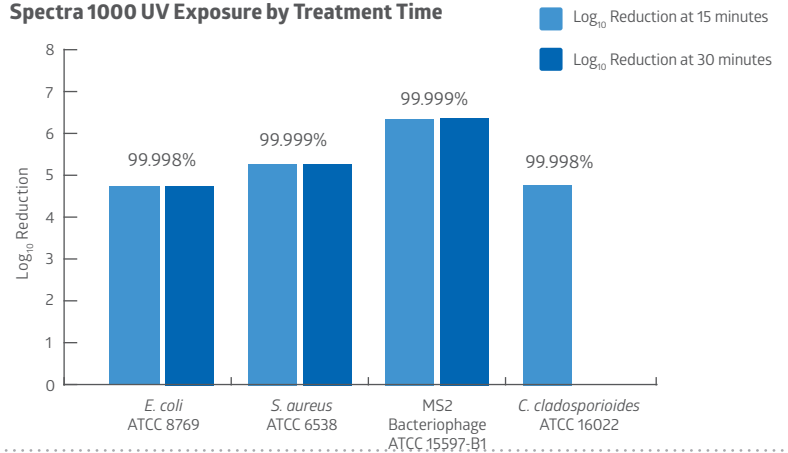
Across tested pathogens in air disinfection studies, treatment with Spectra 1000 UV at 15 minutes was highly effective in reducing colonies for each respective microorganism. Treatment with Spectra 1000 UV demonstrated an average 4 log reduction of air pathogen colonies.

**Table 2. Spectra 1000 UV Air Efficacy**

Treatment Time Point	Percent Reduction		Log <sub>10</sub> Reduction		Average Recovery (Colony Forming unit/m <sup>3</sup> )
	15 Min	30 Min	15 Min	30 Min	
<i>E. coli</i> ATCC 8769	99.998%	99.998%	4.73	4.74	7.80E+01
<i>S. aureus</i> ATCC 6538	99.999%	99.999%	5.26	5.27	7.80E+01
MS2 Bacteriophage ATCC 15597-B1	99.999%	99.999%	6.34	6.35	7.80E+01
<i>C. cladosporioides</i> ATCC 16022 <sup>†</sup>	99.998%	-	4.77	-	7.76E+01

<sup>†</sup> Measurements were not collected for *C. cladosporioides* at 30 minutes.

**Figure 2. Log<sub>10</sub> Reduction of Air Pathogens after Spectra 1000 UV Exposure by Treatment Time**



## Conclusions

UV disinfection devices are effective supplemental air and surface disinfection tools for healthcare settings. The results of efficacy studies demonstrate that Spectra 1000 UV can effectively reduce various pathogens, including pathogens such as MRSA, *S. aureus*, *Candida auris*, *C. diff*, and SARS-CoV-2 that may potentially cause dangerous infections for exposed patients and healthcare staff in clinical environments. In both air and surface efficacy studies, the Spectra 1000 UV performed extremely well in reducing air pathogens at 15 minutes and 30 minutes, and in reducing surface pathogens at distances of 5 feet and 10 feet at 5 minutes (10 minutes for *Candida auris*).

**References:** 1. Scott R, Joshi LT, McGinn C. Hospital surface disinfection using ultraviolet germicidal irradiation technology: A review. *Healthcare Technology Letters*. 2022;9(3):25-33. doi:10.1049/htl2.12032. 2. Rutala, W.A., Weber, D.J.: Guideline for disinfection and sterilization in healthcare facilities. Centers for Disease Control and Prevention, 2008 (Updated 2019). <https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines-H.pdf>. 3. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG6090-I. 4. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG6090-II. 5. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG5138. 6. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG5702. 7. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG6152. 8. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG5314-A2. 9. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG5648. 10. Antimicrobial Test Laboratories. Study Report. Study Identification Number: NG21121. 11. Statistical Report on File.