

Evaluation of an Electrostatic Spray Disinfectant Technology

For rapid decontamination of portable equipment and large open areas in the era of SARS-CoV-2



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Study Overview

Dr. Curtis Donskey and his research group at the Louis Stokes Cleveland VA Medical Center, a 215-bed acute care facility, conducted a swab study to determine pathogen levels on portable equipment, wheelchairs, and waiting rooms, before and after applying a novel sporicidal disinfectant called Clorox Healthcare® Spore¹⁰ Defense™ Cleaner Disinfectant with the Clorox® Total 360® electrostatic sprayer. Pathogens examined include *C. difficile*, methicillin-resistant *Staphylococcus aureus* (MRSA), *enterococci*, Gram-negative bacilli and bacteriophage MS2 (a SARS-CoV-2 surrogate). Spore Defense™ efficacy was also confirmed in a laboratory test based on EPA methods. The authors noted that electrostatic spray technology provides a rapid and effective way to decontaminate portable equipment in large open areas, which can help meet elevated disinfection requirements brought on by the COVID-19 pandemic.



Key Findings

- ▶ A >6 log reduction was confirmed in a laboratory test against *C. difficile* and bacteriophage MS2 (a SARS-CoV-2 surrogate) with Spore Defense™ sprayed through the Clorox® Total 360® electrostatic sprayer.
- ▶ Electrostatic application of Spore Defense™ to wheelchairs was 4 times faster than manual wiping, but equally effective.
- ▶ Statistically significant reductions ($p \leq 0.01$) were achieved on all sites tested on portable equipment, wheelchairs and waiting room surfaces, with Spore Defense™ alone (no pre-clean or wiping except on a select few surfaces with visible soiling).
- ▶ Bacteriophage MS2 (SARS-CoV-2 surrogate) on wheelchairs was completely eliminated following application of Spore Defense™.
- ▶ Spore Defense™ applied through the Clorox® Total 360® electrostatic sprayer left minimal or no residue on surfaces.
- ▶ A standard waiting room with 15 to 20 chairs could be treated in just 5 minutes.
- ▶ 8 Environmental Services personnel all provided positive feedback after using the Clorox® Total 360® electrostatic sprayer on wheelchairs and in waiting rooms.

Methods

For the laboratory test, Spore Defense™ was sprayed through the Clorox® Total 360® electrostatic sprayer onto steel discs with the sprayer nozzle held 6 inches from the discs. A 5-minute contact time was used for *C. difficile* and a 2-minute contact time was used for bacteriophage MS2, per the EPA-approved master label. Experiments were performed in triplicate.

For the swab test on wheelchairs, portable equipment and waiting rooms, surfaces were swabbed, Spore Defense™ was sprayed through the Clorox® Total 360® electrostatic sprayer, surfaces were allowed to air dry, then surfaces were swabbed a second time. Cultures were collected and processed using standard microbiological techniques. A total of 30 wheelchairs, 40 portable devices and 30 waiting room chairs were included in the study. Both hard and soft surfaces were sprayed in the waiting areas. Portable equipment sprayed included bladder scanners, electrocardiogram machines, pulse oximeters, workstations on wheels and Doppler ultrasounds. No other disinfectants were used except in a select few cases where visible soiling was present (3 of 30, or 10% of wheelchairs; 2 of 40, or 5% of portable devices; and 0 of 30 waiting room chairs). A subset of wheelchairs were separately inoculated with bacteriophage MS2, a SARS-CoV-2 surrogate (12 sites total, 4 per wheelchair) and tested in the same manner.

Results

In the laboratory test, a >6 log reduction was confirmed against *C. difficile* and bacteriophage MS2 (a SARS-CoV-2 surrogate) when Spore Defense™ was sprayed through the Clorox® Total 360® electrostatic sprayer onto steel discs.

In the test on wheelchairs, portable equipment and waiting rooms, statistically significant reductions ($p \leq 0.01$) in the number of sites that tested positive for various pathogens were reported for all types of equipment tested (Table 1). Note that the authors did not report total organism counts, but rather only a binary measurement on whether a pathogen was present on the surface or not. This means that although the number of pathogens on some of these surfaces may have been greatly reduced after application of Spore Defense™, some sites still may have tested positive even after application. Because the exact log reductions against those pathogens were not measured, it is not possible to determine whether counts following application were low enough to be considered below the threshold for transmission. The bacteriophage MS2 applied to wheelchairs was completely eliminated following application of Spore Defense™.

Equipment/Area	Percent reduction in sites positive following application of Spore Defense™				
	All pathogens	<i>C. difficile</i>	MRSA	Gram-negative bacilli	<i>Enterococci</i>
Waiting Rooms	91%	75%	0%*	96%	95%
Wheelchairs	86%	75%	91%	75%	98%
Portable Equipment	92%	86%	0%*	88%	97%

*Sites tested had no contamination with this pathogen prior to application of Spore Defense™

Conclusions

This study demonstrated that wheelchairs, portable equipment and waiting room furniture can be frequently contaminated with disease-causing pathogens. Spore Defense™ applied through the Clorox® Total 360® electrostatic sprayer reduced the number of sites on these surfaces that tested positive for these pathogens, including the notoriously hard-to-kill *C. diff.*

A SARS-CoV-2 surrogate was completely eliminated from inoculated wheelchairs, suggesting that Spore Defense™ applied through the Clorox® Total 360® electrostatic sprayer may be an effective way to eliminate SARS-CoV-2 from complex surfaces.

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