FINAL REPORT

TITLE: Evaluation of Anti-Germ Dome Antimicrobial Activity Against Nosocomial Pathogens on Door Handles

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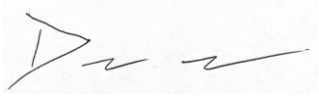

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INTRODUCTION

Germ Dome has designed a UV-C LED light device that bathes door handles in bactericidal UV light. With rising rates of multi-drug resistant (MDR) bacterial infections caused by hospital-acquired infections (1), many medical facilities are implementing more rigorous infection protocols to limit transmission of dangerous pathogens. According to the Centers for Disease Control (CDC), 1 in 31 hospitalized patients contracts at least one healthcare-associated infection (2).

The Anti-Germ Dome was conceived to sanitize door handles within these facilities to aid in the prevention of these life-threatening infections. In order to evaluate the antimicrobial activity of the Anti-Germ Dome, we inoculated stainless steel coupons with 5 different MDR pathogens and secured the coupons to a door handle with the Anti-Germ Dome device mounted in the position intended for use. Evaluated organisms consisted of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), extended-spectrum beta-lactamase producing *Escherichia coli* (ESBL-EC), metallo-beta-lactamase (MBL) producing *Pseudomonas aeruginosa*, and spores of a toxin-producing *Clostridioides difficile*. Counts of viable bacteria post-treatment and the % killing by the Anti-Germ Dome were determined at 4 different door handle locations and at two different sanitation cycle lengths.

MATERIALS AND METHODS

Organisms

The test organisms evaluated in this study consisted of reference isolates from the American Type Culture Collection (ATCC; Manassas, VA), the National Collection of Type Cultures (NCTC; Salisbury, UK), and the Centers for Disease Control (CDC; Atlanta, GA) Antibiotic Resistance Isolate Bank. Upon initial receipt at Micromyx, the organisms were sub-cultured onto an appropriate agar medium. Following incubation for 18 - 24 h at 35°C in ambient atmosphere for aerobic organisms, and incubation for 48 hours at 35°C anaerobically for *C. difficile*, colonies were harvested from these plates and cell suspensions prepared and frozen at -80ºC with a cryoprotectant. Prior to testing, aerobic isolates were streaked from frozen vials onto Trypticase Soy Agar (TSA) with 5% sheep blood (Cat. No. 221261; Lot No. 0022632, 0051888, 0080299, 0094764 BD; Sparks, MD), and were incubated at 35°C overnight.

C. Difficile endospore preparation

A 2.5 mL aliquot of a 0.5 McFarland standard of *C. difficile* ATCC BAA-1870 (approx. 1-2 x 10^7 CFU/mL) was used to inoculate 500 mL of autoclaved sporulation medium (45 g Trypticase peptone, 2.5g of proteose peptone no. 3, 0.5g ammonium sulfate, 0.75g Tris, pH to 7.4) prior to incubation anaerobically at 35°C for 14 days. Cells were harvested by centrifugation (5005 rcf for 45 min), resuspended in 300 mL 50% ethanol, and incubated at room temperature for 1 hr to kill remaining vegetative cells. Spores were harvested by centrifugation (5005 rcf for 15 min), washed 2X by 150 mL sterile phosphate buffered saline (PBS), and resuspended in 30 mL sterile PBS in a 50 mL conical tube containing sterile glass beads. Conical tubes were vortexed for 2 min. A 4 mL aliquot of spore suspension was then layered on top of a 10 mL bed of 50% (w/v) sucrose in water in 15 mL tubes. Tubes were centrifuged (3200 rcf for 20 min), sucrose and

debris were removed, and pellets were combined. Pellets were washed 4 times in ice-cold sterile phosphate-buffered saline (PBS), resuspended in 5 mL PBS, and filtered on 5 micron PTFE filters. Spores were enumerated by serial dilution and plating on Brucella agar containing 5% laked sheep blood and 0.1% sodium taurocholate followed by anaerobic incubation at 35°C for 48 hr prior to counting the resulting CFU.

Inoculation of carriers

Stainless steel coupons (1/2" x 3" x 1/16") purchased from Alabama Specialty Products Inc. were sterilized and prepared by washing in 70% ethanol, 3 washes in deionized water, autoclaving for 20 minutes, and followed by a sterile drying and cooling period. Using growth of well isolated colonies of aerobic isolates grown on TSA with 5% sheep blood, a suspension equivalent to a 0.5 McFarland was made in sterile saline. A 60 µL aliquot of previously prepared *C. difficile* spores or 0.5 McFarland standard of aerobically grown isolates were spread as thinly as possible over the surface of the stainless steel coupons by a pipette tip. Coupons were placed in sterile petri dishes in a Biological Safety Cabinet at room temperature until dry (20-35 min).

Placement of coupons

A total of three independent evaluations were conducted for each organism. In each evaluation, four coupons were attached to the door handle at four different locations, as directed by the sponsor (front, rear, top, and bottom) (**Figure 1**). Coupons were fastened to the door handle with a sterilized twist tie. An additional inoculated coupon was used as an untreated control to determine % killing by the Anti-Germ Dome. Finally, each organism had an uninoculated control coupon as a negative control.

Enumeration of bacteria/spores from coupons

Coupons fastened to door handles were treated with UV-C light from the Anti-Germ Dome for either 60 or 90 seconds. UV-treated, untreated, and uninoculated coupons were removed and immersed in a sterile 50 mL conical tube containing 10 mL of PBS along with sterile glass beads. After collection of the 16 coupons for each organism from 3 separate disinfection cycles, conical tubes were vortexed for 1 min followed by 10 min of gentle rocking. Cells in conical tubes were then vortexed for an additional minute, serial diluted 10-fold in PBS and plated on an appropriate agar (TSA for bacteria and Brucella sporulation agar containing 5% laked sheep blood and 0.1% sodium taurocholate for *C. difficile* spores) in duplicate. Plates for aerobic bacteria were incubated in ambient atmosphere for 16-20 hours at 35°C, whereas *C. difficile* spores were incubated anaerobically at 35°C for 48 hours prior to enumeration of CFU. The average of duplicate counts were used to determine CFU/mL for each biological replicate. The % kill was determined by subtracting the % surviving bacteria ([bacteria recovered from treated coupon/bacteria recovered from untreated coupon]*100) from 100.

RESULTS AND DISCUSSION

The Anti-Germ Dome was initially evaluated for 60 second treatment cycles against *E. coli* NCTC 13353 (ESBL), *E. faecium* CDC 2205 (VRE), *P. aeruginosa* CDC 0439 (metallo-β-lactamase producer), *S. aureus* ATCC 43300 (MRSA), and spores of *C. difficile* ATCC BAA-1870 (hypervirulent *C.* difficile; **Appendix 1**). The Anti-Germ Dome decreased average CFU/mL at all 4 coupon locations for all 5 bacterial isolates (**Figures 2-6**). All tested isolates had statistically significant reduction in CFU/mL at 60 second treatment ($p<0.05$ student's two-tailed unpaired t-test), except for *P. aeruginosa* where recovered CFU on the untreated coupons were too low to reach significance (**Figure 5**). By comparing treated coupons to the untreated coupons within each trial, the % killing by the Anti-Germ Dome was calculated (**Appendix 2**).

The Anti-Germ Dome consistently killed all 5 organisms at all four coupon locations (**Table 1**). Killing of bacteria on the rear face of the door handle was highest compared to the other 3 locations (**Table 1**), as *E. coli* NCTC 13353, *S. aureus* ATCC 43300, and *P. aeruginosa* CDC 0439 all had greater than 99% killing at this location while *E. faecium* CDC 2205 still had greater than 95% killing. As expected, spores of *C. difficile* ATCC BAA-1870 were the most difficult to kill, with killing at different locations ranging from 76.3% to 89.8% (**Table 1**). The killing of aerobic bacteria at various locations ranged from 84.5% for *E. faecium* CDC 2205 on the front face of the handle to no detectable surviving bacteria found for *P. aeruginosa* CDC 0439 on the rear face of the handle.

To evaluate whether increased sanitation cycle length resulted in increased killing, *E. coli* NCTC 13353 and *S. aureus* ATCC 43300 were challenged with a 60 and 90 second sanitation cycle lengths (**Appendix 3 and Appendix 4**). Overall, there was no discernible changes in killing between the 60 and 90 second sanitation cycle lengths (**Table 2**). Altering sanitation cycle length did not statistically change the % killing by the Anti-Germ Dome ($p>0.05$ by student's unpaired t-test).

In summary, the Anti-Germ Dome consistently displayed bactericidal capabilities after a single short duration cycle against 5 resistant pathogens that spread in the healthcare setting. Evaluated organisms consisted of methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), extended-spectrum beta-lactamase producing *Escherichia coli* (ESBL-EC), metallo-beta-lactamase (MBL) producing *Pseudomonas aeruginosa*, and spores of a toxin-producing *Clostridioides difficile*. All five organisms at all four locations on the door handle had reduction in CFU after Anti-Germ Dome sanitation. The Anti-Germ Dome % killing ranged from 84.5%-99.9% for aerobic bacteria and 76.3%-89.8% for *C. difficile* spores after only 60 seconds of treatment.

Of note, this study-design demonstrates a worst-case scenario. *C. difficile* spores are able to survive in the hospital environment for months to years and are highly resistant to heat, desiccation, antibiotics, and many disinfectants (including alcohol-based sanitizers) (3). Thus, testing the Anti-Germ Dome against *C. difficile* spores represents a great challenge. Also, in order to provide sufficient numbers for the recovery and enumeration of bacteria to enable

evaluation of the Anti-Germ Dome, the bacterial densities inoculated on door handles in this study were much greater than what would be encountered in real-world scenarios.

REFERENCES

1.) O'Neill J. 2016. Review on Antimicrobial Resistance. Tackling drug-resistant infections globally. **https://amr-review.org/Publications.html**

2.) Magill S.S. et al. 2018. Changes in Prevalence of Health Care-Associated Infections in U.S. Hospitals. NEJM 379 (18):1732-1744

3.) Crobach M.J. et al. 2018. Understanding *Clostridium difficile* Colonization. Clin Microbiol Rev. 31 (2) e0021-17

Table 1. Summary of Average Killing by Anti-Germ Dome at Varying Coupon Locations

Isolate	% Killing at Each Coupon Location			
	Front	Rear	Top	Bottom
E. coli NCTC 13353	89.0% +/- 4.8%	99.0% +/- 1.4%	95.2% +/- 1.3%	85.6% +/- 20.1%
S. aureus ATCC 43300	96.6% +/- 1.8%	99.7% +/- 0.4%	97.0% +/- 0.8%	90.8% +/- 10.5%
E. faecium CDC 2205	84.5% +/- 9.2%	95.6% +/- 1.2%	96.2% +/- 2.1%	94.7% +/- 3.3%
P. aeruginosa CDC 0439	97.3% +/- 3.0%	99.9%* +/- 0.2%	94.5% +/- 5.3%	99.1% +/- 0.9%
C. difficile ATCC BAA-1870	82.3% +/- 8.6%	89.8% +/- 4.2%	76.3% +/-2.8%	80.5% +/- 9.4%

Numbers are the average % killing of the three trials (100- ((Treated coupon/untreated coupon)*100)). +/- is the calculated standard deviation of the % killing across the 3 trials.*-No detectable CFU found, number is based off the limit of detection of the assay.

Table 2. Comparison of Killing by Anti-Germ Dome at Varying Sanitation Cycle Lengths

Isolate (Sanitation Cycle Time (s))	% Killing at Each Coupon Location			
	Front	Rear	Top	Bottom
E. coli NCTC 13353 (60)	90.3% +/- 5.3%	97.3% +/- 3.1%	91.4% +/- 8.3%	98.8% +/- 0.6%
E. coli NCTC 13353 (90)	81.6% +/- 11.4%	98.6% +/- 0.9%	95.3% +/- 2.4%	98.8% +/- 1.5%
S. aureus ATCC 43300 (60)	92.9% +/- 4.9%	98.5% +/-0.2%	96.9% +/- 1.8%	98.0% +/- 1.1%
S. aureus ATCC 43300 (90)	93.8% +/- 3.7%	94.2% +/- 4.1%	94.6% +/- 1.6%	94.3% +/-3.0%

Numbers are the average % killing of the three trials (100- ((Treated coupon/untreated coupon)*100)). +/- is the calculated standard deviation of the % killing across the 3 trials.

Figure 1. Location of Stainless Steel Coupons on Door Handle

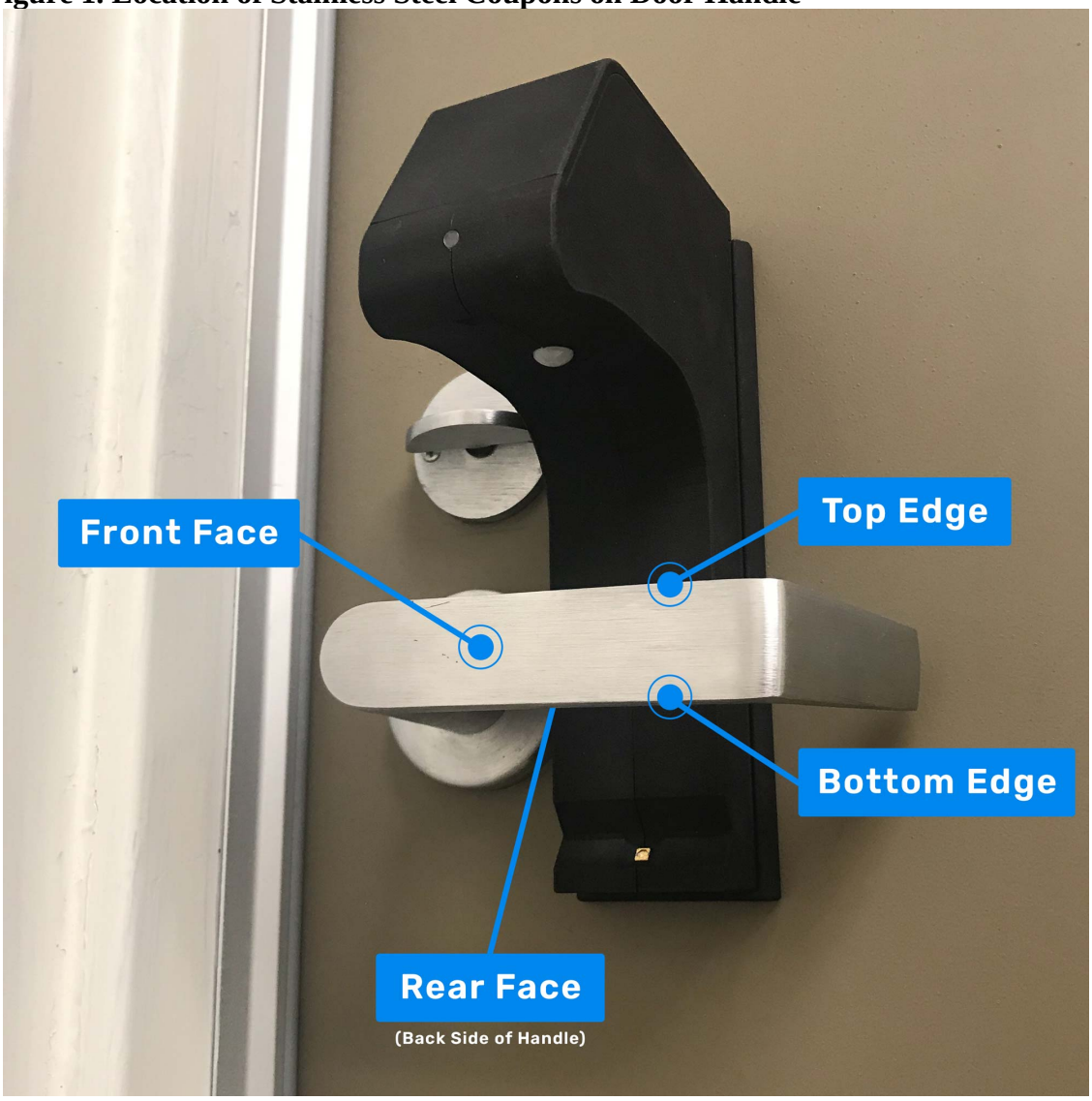
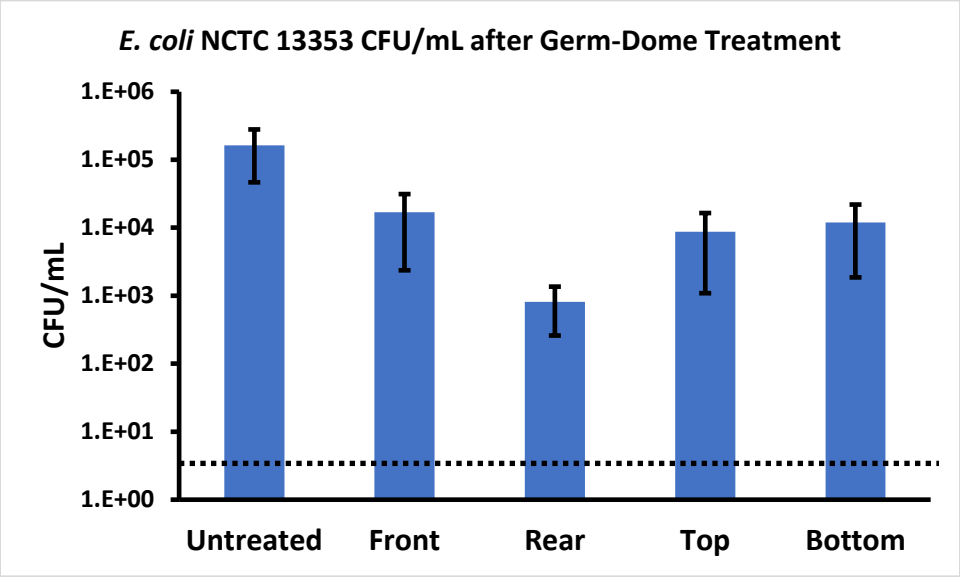
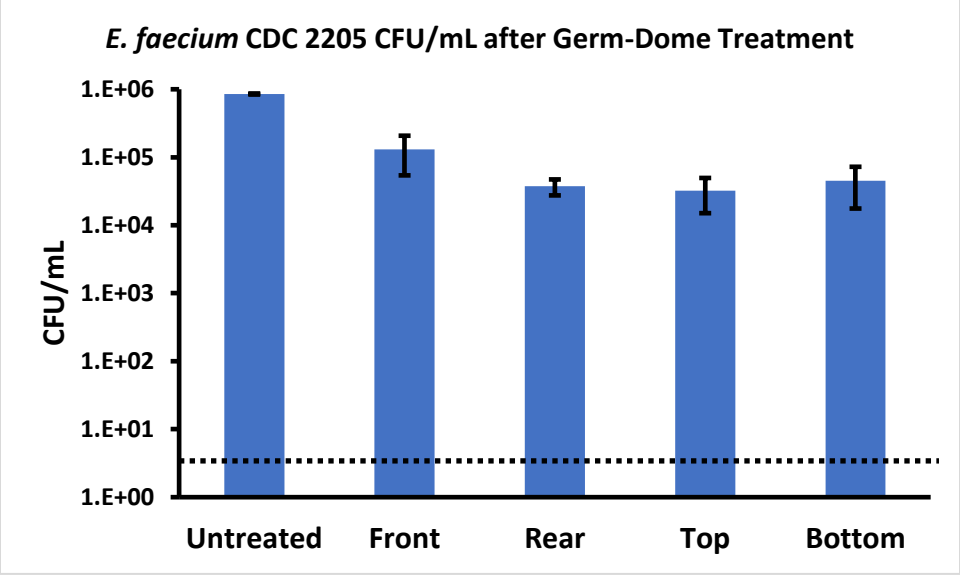


Figure 2. CFU/mL of *E. coli* NCTC 13353 Recovered from Coupons after 60 second Anti-Germ Dome Treatment



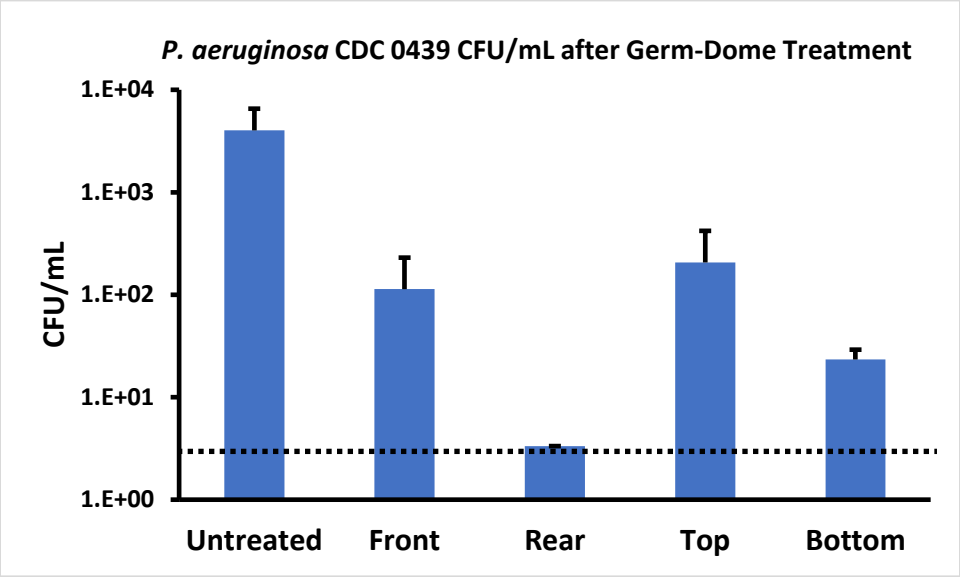
Data graphed on a logarithmic scale (1.E+05 represents 1x 10^5 or 100000). Error bars represent standard deviation of biological replicates. Dotted line on the graph represents the assay's limit of detection.

Figure 3. CFU/mL of *E. faecium* CDC 2205 Recovered from Coupons after 60 second Anti-Germ Dome Treatment



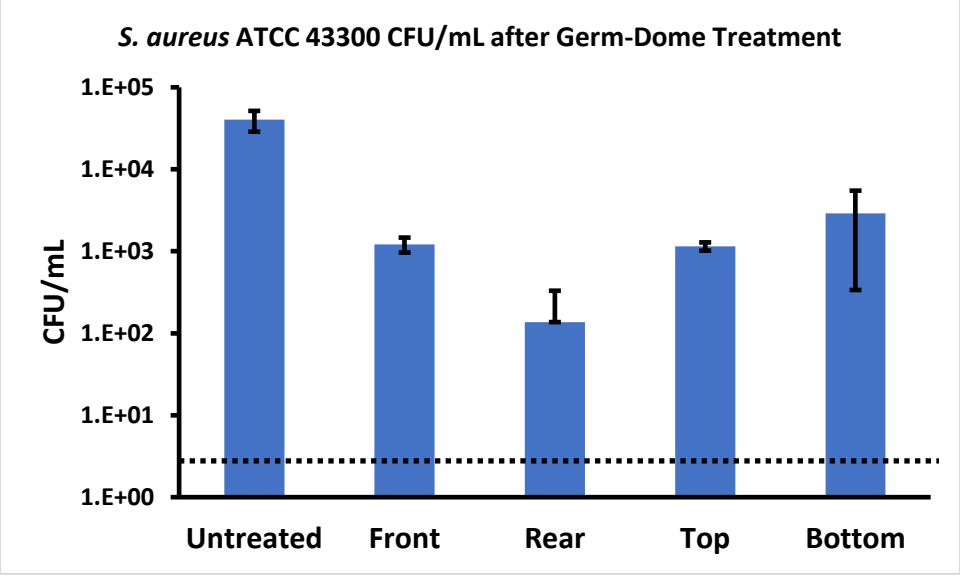
Data graphed on a logarithmic scale (1.E+05 represents 1x 10^5 or 100000). Error bars represent standard deviation of biological replicates. Dotted line on the graph represents the assay's limit of detection.

Figure 4. CFU/mL of *P. aeruginosa* CDC 0439 Recovered from Coupons after 60 second Anti-Germ Dome Treatment



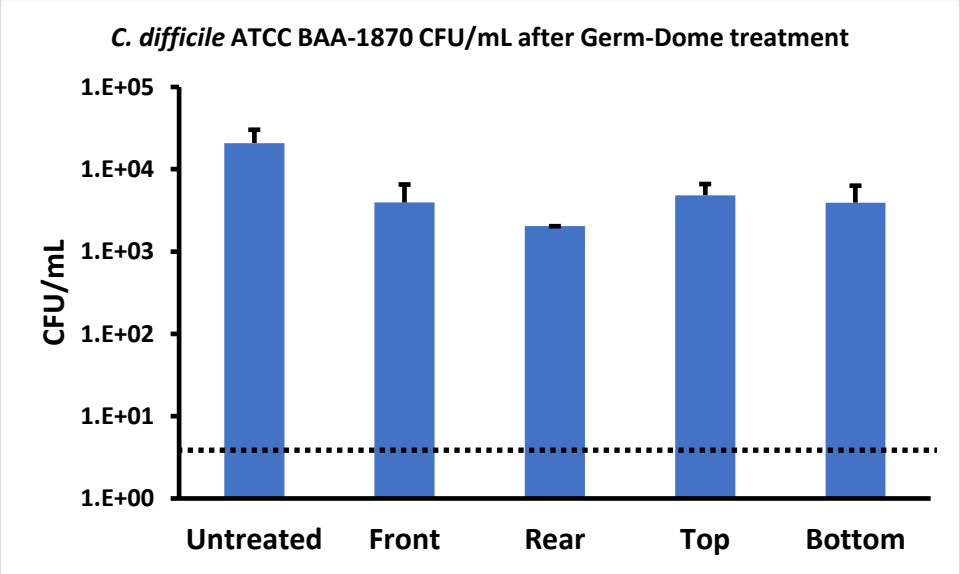
Data graphed on a logarithmic scale (1.E+05 represents 1x 10^5 or 100000). Error bars represent standard deviation of biological replicates. Dotted line on the graph represents the assay's limit of detection.

Figure 5. CFU/mL of *S. aureus* ATCC 43300 Recovered from Coupons after 60 second Anti-Germ Dome Treatment



Data graphed on a logarithmic scale (1.E+05 represents 1x 10^5 or 100000). Error bars represent standard deviation of biological replicates. Dotted line on the graph represents the assay's limit of detection.

Figure 6. CFU/mL of *C. difficile* ATCC BAA-1870 Spores Recovered from Coupons after 60 second Anti-Germ Dome Treatment



Data graphed on a logarithmic scale (1.E+05 represents 1x 10^5 or 100000). Error bars represent standard deviation of biological replicates. Dotted line on the graph represents the assay's limit of detection.

Appendix 1. CFU/mL Recovered after 60 second Anti-Germ Dome Cycle

Isolate	Coupon Location	Trial	CFU/mL Recovered from Coupons		
			Replicate 1	Replicate 2	Average
E. coli NCTC 13353 (ESBL-EC)	Front	1	36000	31000	33500
		2	7000	9400	8200
		3	8400	9100	8750
	Rear	1	740	700	720
		2	1500	1300	1400
		3	420	200	310
	Top	1	17000	17000	17000
		2	1700	1900	1800
		3	7100	7900	7500
	Bottom	1	11000	19000	15000
		2	25000	15000	20000
		3	650	700	675
	Untreated	1	350000	220000	285000
		2	51000	56000	53500
		3	140000	160000	150000
E. faecium CDC 2205 (VanA VRE)	Front	1	190000	150000	170000
		2	170000	190000	180000
		3	47000	38000	42500
	Rear	1	28000	24000	26000
		2	39000	49000	44000
		3	41000	43000	42000
	Top	1	13000	14000	13500
		2	51000	44000	47500
		3	31000	41000	36000
	Bottom	1	42000	32000	37000
		2	90000	61000	75500
		3	21000	24000	22500
	Untreated	1	900000	810000	855000
		2	860000	810000	835000
		3	820000	910000	865000

Isolate	Coupon Location	Trial	CFU/mL Recovered from Coupons		
			Replicate 1	Replicate 2	Average
P. aeruginosa CDC 0439 (metallo-β-lactamase)	Front	1	10	10	10
		2	90	90	90
		3	240	240	240
	Rear	1	10	0	5*
		2	10	0	5*
		3	10	0	5*
	Top	1	50	50	50
		2	120	120	120
		3	450	450	450
	Bottom	1	30	30	30
		2	20	20	20
		3	20	20	20
	Untreated	1	1800	1300	1550
		2	6400	6800	6600
		3	3600	4200	3900
S. aureus ATCC 43300 (MRSA)	Front	1	1700	1200	1450
		2	800	1100	950
		3	1500	1000	1250
	Rear	1	30	30	30
		2	360	360	360
		3	20	20	20
	Top	1	1200	900	1050
		2	1700	900	1300
		3	900	1300	1100
	Bottom	1	6700	4700	5700
		2	2500	2300	2400
		3	630	630	630
	Untreated	1	33000	21000	27000
		2	47000	46000	46500
		3	44000	50000	47000

***-Numbers altered for limit of detection**

Isolate	Coupon Location	Trial	CFU/mL Recovered from Coupons		
			Replicate 1	Replicate 2	Average
C. difficile spores ATCC BAA-1870	Front	1	4700	4900	4800
		2	4700	7300	6000
		3	1200	900	1050
	Rear	1	2700	3000	2850
		2	2300	2000	2150
		3	800	1400	1100
	Top	1	5400	4700	5050
		2	6800	6200	6500
		3	3300	2600	2950
	Bottom	1	1500	2100	1800
		2	5400	7600	6500
		3	3500	3500	3500
	Untreated	1	21000	17000	19000
		2	31000	31000	31000
		3	12000	13000	12500

Appendix 2. % Killing of Bacteria on Door Handle by 60 Second Anti-Germ Dome Cycle

Isolate	Coupon Location	Trial	% Killing		
			Replicate 1	Replicate 2	Average
E. coli NCTC 13353 (ESBL-EC)	Front	1	87.37	89.12	88.25
		2	86.92	82.43	84.67
		3	94.40	93.93	94.17
	Rear	1	99.74	99.75	99.75
		2	97.20	97.57	97.38
		3	99.72	99.87	99.79
	Top	1	94.04	94.04	94.04
		2	96.82	96.45	96.64
		3	95.27	94.73	95.00
	Bottom	1	96.14	93.33	94.74
		2	53.27	71.96	62.62
		3	99.57	99.53	99.55
E. faecium CDC 2205 (VanA VRE)	Front	1	77.78	82.46	80.12
		2	79.64	77.25	78.44
		3	94.57	95.61	95.09
	Rear	1	96.73	97.19	96.96
		2	95.33	94.13	94.73
		3	95.26	95.03	95.14
	Top	1	98.48	98.36	98.42
		2	93.89	94.73	94.31
		3	96.42	95.26	95.84
	Bottom	1	95.09	96.26	95.67
		2	89.22	92.69	90.96
		3	97.57	97.23	97.40

Isolate	Coupon Location	Trial	% Killing		
			Replicate 1	Replicate 2	Average
P. aeruginosa CDC 0439 (metallo-β-lactamase) *-Numbers altered for limit of detection	Front	1	99.35	99.35	99.35
		2	98.64	98.64	98.64
		3	93.85	93.85	93.85
	Rear	1	100.00	100.00	99.68*
		2	100.00	100.00	99.92*
		3	100.00	100.00	99.87*
	Top	1	96.77	96.77	96.77
		2	98.18	98.18	98.18
		3	88.46	88.46	88.46
	Bottom	1	98.06	98.06	98.06
		2	99.70	99.70	99.70
		3	99.49	99.49	99.49
S. aureus ATCC 43300 (MRSA)	Front	1	93.70	95.56	94.63
		2	98.28	97.63	97.96
		3	96.81	97.87	97.34
	Rear	1	99.89	99.89	99.89
		2	99.23	99.23	99.23
		3	99.96	99.96	99.96
	Top	1	95.56	96.67	96.11
		2	96.34	98.06	97.20
		3	98.09	97.23	97.66
	Bottom	1	75.19	82.59	78.89
		2	94.62	95.05	94.84
		3	98.66	98.66	98.66
C. difficile spores ATCC BAA-1870	Front	1	75.26	74.21	74.74
		2	84.84	76.45	80.65
		3	90.40	92.80	91.60
	Rear	1	85.79	84.21	85.00
		2	92.58	93.55	93.06
		3	93.60	88.80	91.20
	Top	1	71.58	75.26	73.42
		2	78.06	80.00	79.03
		3	73.60	79.20	76.40
	Bottom	1	92.11	88.95	90.53
		2	82.58	75.48	79.03
		3	72.00	72.00	72.00

***Numbers altered for limit of detection**

Appendix 3. CFU/mL Recovered after Varying Sanitation Cycle Lengths by the Anti-Germ Dome

Isolate	Treatment Time (s)	Coupon Location	Trial	CFU/mL		
				Replicate 1	Replicate 2	Average
E. coli NCTC 13353 (ESBL-EC)	60	Front	1	4100	5200	4650
			2	11000	14000	12500
			3	3200	2600	2900
		Rear	1	320	320	320
			2	900	1000	950
			3	3600	4000	3800
		Top	1	9100	9600	9350
			2	3800	3100	3450
			3	2000	2300	2150
		Bottom	1	1200	700	950
			2	520	520	520
			3	710	710	710
		Untreated	1	52000	51000	51500
			2	77000	86000	81500
			3	60000	62000	61000
	90	Front	1	16000	25000	20500
			2	3600	5000	4300
			3	17000	16000	16500
		Rear	1	2100	2200	2150
			2	250	250	250
			3	600	1500	1050
		Top	1	8100	7000	7550
			2	3100	3200	3150
			3	1300	1200	1250
		Bottom	1	2800	3500	3150
			2	140	140	140
			3	280	280	280
		Untreated	1	105000	100000	102500
			2	60000	70000	65000
			3	51000	61000	56000

Isolate	Treatment Time (s)	Coupon Location	Trial	CFU/mL		
				Replicate 1	Replicate 2	Average
S. aureus ATCC 43300 (MRSA)	60	Front	1	12000	7000	9500
			2	14000	24000	19000
			3	43000	30000	36500
		Rear	1	4900	5200	5050
			2	4600	5700	5150
			3	4000	4800	4400
		Top	1	15000	16000	15500
			2	3200	2900	3050
			3	15000	8000	11500
		Bottom	1	8000	12000	10000
			2	2800	1700	2250
			3	7700	6600	7150
		Untreated	1	350000	360000	355000
			2	280000	320000	300000
			3	300000	290000	295000
	90	Front	1	6900	6300	6600
			2	13000	14000	13500
			3	26000	25000	25500
		Rear	1	4500	3900	4200
			2	14000	14000	14000
			3	26000	25000	25500
		Top	1	15000	10000	12500
			2	13000	11000	12000
			3	13000	13000	13000
		Bottom	1	12000	20000	16000
			2	11000	11000	11000
			3	10000	11000	10500
		Untreated	1	160000	190000	175000
			2	340000	280000	310000
			3	260000	230000	245000

Appendix 4. % Killing after Varying Sanitation Cycle Lengths by the Anti-Germ Dome

Isolate	Treatment Time (s)	Coupon Location	Trial	% Killing		
				Replicate 1	Replicate 2	Average
E. coli NCTC 13353 (ESBL-EC)	60	Front	1	92.04	89.90	90.97
			2	86.50	82.82	84.66
			3	94.75	95.74	95.25
		Rear	1	99.38	99.38	99.38
			2	98.90	98.77	98.83
			3	94.10	93.44	93.77
		Top	1	82.33	81.36	81.84
			2	95.34	96.20	95.77
			3	96.72	96.23	96.48
		Bottom	1	97.67	98.64	98.16
			2	99.36	99.36	99.36
			3	98.84	98.84	98.84
	90	Front	1	84.39	75.61	80.00
			2	94.46	92.31	93.38
			3	69.64	71.43	70.54
		Rear	1	97.95	97.85	97.90
			2	99.62	99.62	99.62
			3	98.93	97.32	98.13
		Top	1	92.10	93.17	92.63
			2	95.23	95.08	95.15
			3	97.68	97.86	97.77
		Bottom	1	92.10	93.17	92.63
			2	95.23	95.08	95.15
			3	97.68	97.86	97.77

Isolate	Treatment Time (s)	Coupon Location	Trial	% Killing		
				Replicate 1	Replicate 2	Average
S. aureus ATCC 43300 (MRSA)	60	Front	1	96.62	98.03	97.32
			2	95.33	92.00	93.67
			3	85.42	89.83	87.63
		Rear	1	98.62	98.54	98.58
			2	98.47	98.10	98.28
			3	98.64	98.37	98.51
		Top	1	95.77	95.49	95.63
			2	98.93	99.03	98.98
			3	94.92	97.29	96.10
		Bottom	1	97.75	96.62	97.18
			2	99.07	99.43	99.25
			3	97.39	97.76	97.58
	90	Front	1	96.06	96.40	96.23
			2	95.81	95.48	95.65
			3	89.39	89.80	89.59
		Rear	1	97.43	97.77	97.60
			2	95.48	95.48	95.48
			3	89.39	89.80	89.59
		Top	1	91.43	94.29	92.86
			2	95.81	96.45	96.13
			3	94.69	94.69	94.69
		Bottom	1	91.43	94.29	92.86
			2	95.81	96.45	96.13
			3	94.69	94.69	94.69