Supplemental Materials

Impact of different toilet cleaning/disinfecting regimens on reducing the risk of exposure to toilet-borne pathogens in the American household restroom

Stephanie A. Boone, Nick D. Childress, Norma Patricia Silva-Beltran, Julie McKinney, M. Khalid Ijaz, Charles P. Gerba

Table S1. Heterotrophic Plate Count (HPC) Bacteria on restroom surfaces in colony-forming units (CFU) per 100 cm^2. A statistically significant difference was found on the third day, p = 0.009.

	Heterotrophic Plate Count Bacteria (CFU per 100 cm^2)							
	Phase 1/ (Single disinfectant)				**Phase 2/ (Multiple disinfectants)**			
	Days Between Cleaning				Days Between Cleaning			
Surface	1	2	3	7	1	2	3	7
Toilet Rim	6.90E+04	9.20E+05	7.86E+07	1.51E+06	7.30E+04	1.15E+05	2.76E+05	3.08E+04
Toilet Bowl Surface	1.31E+05	6.12E+05	1.96E+07	2.82E+05	2.46E+04	1.55E+04	3.54E+04	1.21E+05
Toilet Seat Bottom	1.15E+04	1.53E+05	1.31E+07	2.51E+05	4.09E+03	3.89E+02	8.52E+03	2.91E+03
Toilet Seat Top	2.29E+04	1.10E+04	1.02E+05	1.91E+04	2.92E+04	2.79E+04	3.06E+05	7.55E+03
Toilet Lid	2.71E+04	4.11E+03	2.03E+03	8.23E+03	2.63E+03	1.12E+03	2.58E+02	2.94E+03
Flush Handle	1.02E+04	1.78E+04	2.07E+05	4.52E+03	4.87E+03	9.63E+03	8.67E+03	1.16E+04
Toilet Floor	1.83E+05	9.12E+04	1.94E+07	3.01E+04	2.80E+04	7.23E+04	6.67E+05	1.63E+05
Vanity Top	6.11E+05	2.56E+05	7.98E+06	1.98E+05	4.25E+04	3.22E+05	7.26E+05	2.71E+05
Vanity sink faucet handle	6.11E+05	2.56E+05	7.98E+06	1.98E+05	3.96E+05	4.87E+05	1.68E+06	8.52E+05
Exit Doorknob	1.85E+04	1.71E+04	1.51E+05	1.63E+04	9.71E+03	1.56E+04	5.64E+03	8.45E+03
Total of all sites except Toilet bowl water	1.66E+06	1.88E+06	1.08E+08	1.76E+06	5.78E+05	1.01E+06	3.58E+06	1.46E+06

Table S2A. Phase 1 (single disinfectant use) in households after 3 days without cleaning. Coliform bacteria per 100 cm^2. Difference on the third day, $p = 0.10$ was statistically significant between 1st and 2nd Phase.

Phase 1 / Single Disinfectant					
Total coliform MPN per 100 cm^2 & log_{10} - 3 days between cleaning					
Restroom Surface	Household 1	Household 2	Household 3	Average	Standard Deviation
	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2
Toilet Bowl Water	0	4300	0	1433	2483
Toilet Rim	0	45972	9830	18601	24209
Toilet Seat Bottom	180	569	51	267	270
Toilet Seat Top	0	32777	0	10926	18924
Flush Handle	0	0	0	0	0
Toilet Lid	0	0	0	0	0
Restroom Floor	266	39923	178	13456	22922
Sink Faucet Handle	500	490020	0	163507	282769
Vanity Top	1134	20567	20567	14089	11219
Door Knob	0	6020	13000	6340	6506
Toilet Bowl	0	21776	6180	9319	11222

Table S2B. Phase 2 (multiple disinfectants) used during cleaning the restroom in households after 3 days without cleaning. Coliforms (MPN per 100 cm^2).

Phase 2 / Multiple Disinfectants					
Total coliform MPN per 100 cm^2 & log_{10} - 3 days between cleaning					
	Household 1	Household 2	Household 3	Average	Standard Deviation
Restroom Surface	**MPN per 100 cm^2**	**MPN per 100 cm^2**	**MPN per 100 cm^2**	**MPN per 100 cm^2**	**MPN per 100 cm^2**
Toilet Bowl Water	0	0	0	0	0
Toilet Rim	0	230	0	77	133
Toilet Seat Bottom	0	0	0	0	0
Toilet Seat Top	0	1252	0	417	723
Flush Handle	0	2050	0	683	1184
Toilet Lid	0	25	0	8	14
Restroom Floor	104	81680	180	27321	47076
Vanity Sink Faucet	1550	5500	0	2350	2836
Vanity Top	20567	20567	0	13711	11874
Door Knob	0	200	0	67	115
Toilet Bowl	0	51	0	17	29

Table S3A. Phase 1 (single disinfectant) (*E. coli* per 100 cm^2). – Statistically significant difference was found after 3 days without cleaning ($p = 0.13$) between Phase 1 and 2.

Phase 1 / Single Disinfectant					
Total *E. coli* MPN per 100 cm^2 & log_{10} - 3 days between cleaning					
Restroom Surface	Household 1	Household 2	Household 3	Average	Standard Deviation
	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2
Toilet Rim	0	45972	8761	18244	24409
Toilet Seat Bottom	0	142	0	47	82
Toilet Seat Top	0	17	0	6	10
Toilet Handle	0	0	0	0	0
Restroom Floor	0	0	0	0	0
Vanity Top	17680	264	85	6010	10107
Toilet Bowl	0	28	6180	2069	3560

Table S3B. Phase 2 (multiple disinfectants used) after 3 days without cleaning (*E. coli* per 100 cm^2).

Phase 2 / Multiple Disinfectants					
Total *E. coli* MPN per 100 cm^2 & log_{10} - 3 days between cleaning					
Surface	Household 1	Household 2	Household 3	Average	Standard Deviation
	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2	MPN per 100 cm^2
Toilet Rim	0	19	0	6	11
Toilet Seat Bottom	0	0	0	0	0
Toilet Seat Top	0	0	0	0	0
Toilet Handle	0	1000	0	333	0
Restroom Floor	104	39973	0	13359	23048
Vanity Top	0	0	0	0	0
Toilet Bowl	0	0	0	0	0