CASPR Technology in Schools
Test Report

Test Period:

August 4-12, 2020

Date of the Report

August 12, 2020

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Background and Rationale

The recent COVID-19 pandemic has underscored the necessity of reducing pathogens in air and on surfaces of publicly occupied rooms. While forced air exchange rates of heating, ventilation, and air conditioning (HVAC) systems dilute pathogen concentrations, and highly effective filters reduce bio burden, new systems for pathogen reduction are needed; CASPR technology provides a solution.

CASPR stands for "continuous air and surface pathogen reduction" and is an almost maintenance free catalytic converter that uses photocatalytic processes to generate powerful oxidizers, including gaseous hydrogen peroxide, H_2O_2 from molecular oxygen and humidity of the ambient air and disburses low concentrations of such oxidizers into the room environment. The oxidizing molecules decompose pathogens in the air and on surfaces. The concentrations of those oxidizers are highly effective to reduce the bio burden, yet safe for homes and public environments.

Picture 1: CASPR Mobile

Microbiology testing of air and surfaces was performed comparatively between rooms with and without operating a CASPR Mobile stand-alone unit (Picture 1), to evidence the efficacy of the CASPR technology under real-world conditions.

Methodology

The testing took place at a private high school in Dallas, TX, where two rear second floor bathrooms were selected for comparative evaluation. The approximately 156 square foot woman’s bathroom was designated as the “control” bathroom and was not given a CASPR unit (No CASPR). The approximately 182 square foot men’s bathroom was designated as the “treated” bathroom, where a CASPR Mobile unit was installed on August 4, 2020 (CASPR). The unit was running continuously on medium setting. The bathrooms were publicly available and used during the testing period. After 8 days, on August 12, 2020 surface and air testing were performed. Surface testing was performed on various surfaces. The swabs (UltraSnap Surface ATP Test, Hygiena, Camarillo, CA) were evaluated with respect to the amount of accumulated adenosine triphosphate (ATP). ATP is abundantly found in living organisms and as such, gives a direct measure of biological concentration of actively growing microorganisms. ATP is quantified by measuring the light produced, after a catalytic reaction with a solution which lyses bacteria that binds the ATP, forming excitable fluorescent compounds which can be detected using a hand-held ATP luminometer (SystemSURE Plus, Hygiena, Camarillo, CA). The amount of light produced is directly proportional to the amount of biological energy present in the sample. Active air monitoring was performed using a microbial air sampler (SAS Super 100, International pbi Spa, Milan, Italy) that forces a predefined volume of air onto a plate containing culture media (Tryptic Soy Agar (TSA), USP, 15x100mm plates, Eurofins Microbiology Labs, De Soto, Texas), for aerobic bacterial counts. The incubation and the CFU counting of the plates from the active air sampling was performed by an independent accredited microbiology laboratory (Eurofins Microbiology Labs, De Soto, Texas).

Results

Active Air Sampling

At day 8 (eight), air sampling was performed 5 (five) times, and after incubation, the counts of bacterial colony forming units (CFUs) were normalized as a function of CFUs per liter (CFU/L) of air sampled and averaged. The sampling in the women's bathroom, i.e. the "control" site with No CASPR treatment, showed an average count of 0.1034 CFUs/L, while the sampling in the men's bathroom, i.e. the CASPR "treatment" site, showed an average count of 0.0308 CFUs/L, yielding a 70.2% (seventy percent) reduction in aerobic bacterial burden (Figure 1). One-way analysis of variance (ANOVA) was performed yielding a p-value of 0.0315, demonstrating a statistically significant decrease in the measured results.

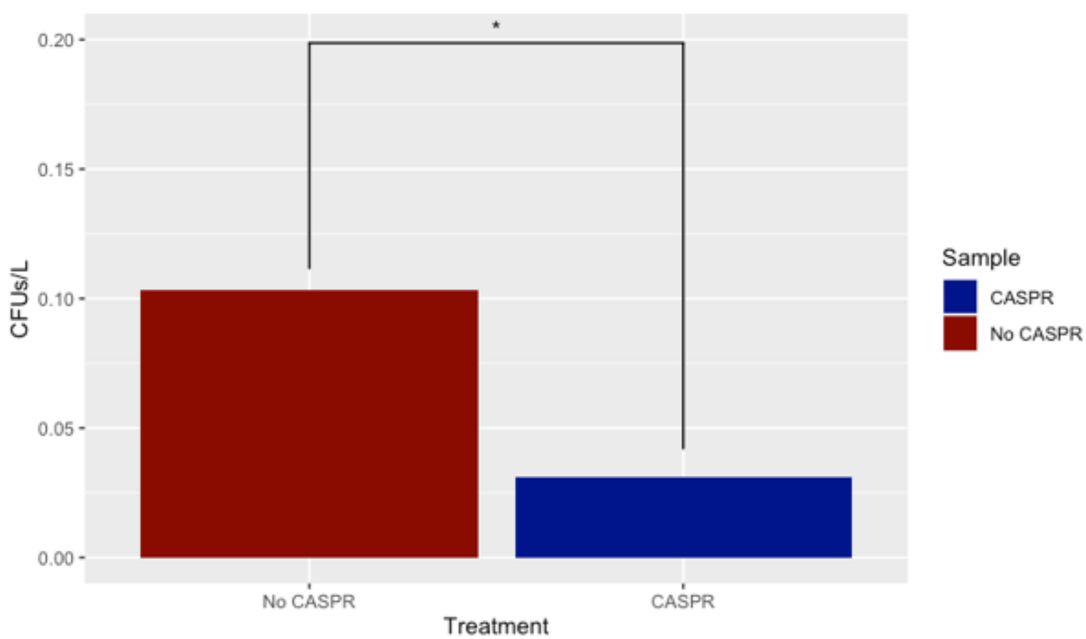

Figure 1: CFUs per liter in air at day 8, No CASPR "control" site, women's restroom vs. CASPR "treatment" site, men's restroom shows significant reduction of 70%

ATP Testing of Surfaces

At day 8 (eight), ATP testing was performed giving measurements of bacterial growth as a function of the relative light units (RLU). Surface swabbing samples were collected at the same three sites in the women's bathroom, i.e. the "control" site with No CASPR treatment, and in the men's bathroom, i.e. the CASPR "treatment" site, as shown in Table 1 and Figure 2. A control measurement was taken by disinfecting a surface with sterile disinfecting wipes and the RLUs were measured. Results yielded at least a 97% (ninety-seven percent) reduction in surface bacteria burden at all three sites.

Site	No CASPR	CASPR	% Reduction
Toilet Back	167	5	97
Inside Stall	594	4	99
Inside Door	525	6	99
Disinfected Control Surface		4	

Table 1: Relative light units (RLU) of ATP surface tests at day 8, No CASPR "control" site, women's restroom vs. CASPR "treatment" site, men's restroom

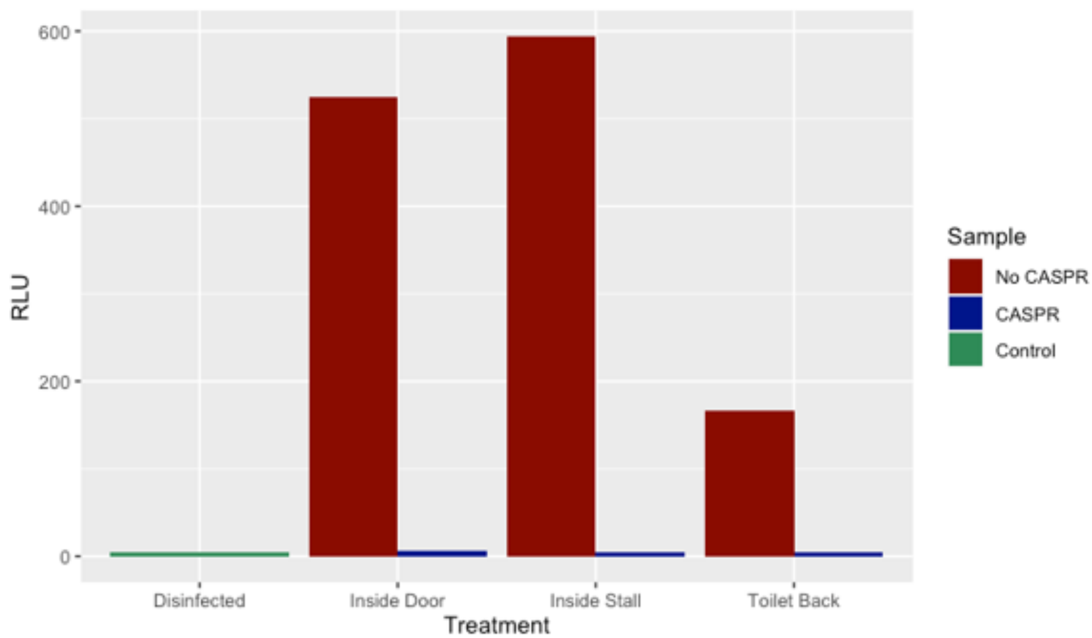

Figure 2: Relative light units (RLU) of ATP surface tests at day 8, No CASPR "control" site, women's restroom vs. CASPR "treatment" site, men's restroom

Conclusion

The continuous use of a CASPR Mobile unit in one of two publicly available and used bathrooms in a No CASPR "control" vs. a CASPR "treatment" site setting, showed a significant reduction in the bacterial bio burden in air of 70% and on surfaces of 97+%.