

Elimination of viable airborne SARS-CoV-2 in COVID-19 hospital rooms by a novel-heated air disinfection system: a multi-center study.

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ABSTRACT

Airborne transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) via air conditioning systems poses a significant threat for the continued escalation of the current coronavirus disease (COVID-19) pandemic. Recent studies have shown elevated risk of transmission of COVID-19 through long-ranges through HVAC systems. Traditional high-efficient filters have been found not sufficient to capture the virus nor eliminate it. Recent virus test results of a novel-heated air disinfection system (patent pending, Integrated Viral Protection Solutions LLC, Houston, Texas, ivpair.com) revealed that aerosolized SARS-CoV-2 and anthrax spores can be destroyed in a single pass, instantaneously (<https://doi.org/10.1016/j.mtphys.2020.100249>).

To test clinical applications of the novel-heated air disinfection system, researchers collected air samples from the rooms of 28 COVID-19 patient rooms whom all had active respiratory infections confirmed with a nasopharyngeal swab positive for SARS-CoV-2 (within 72 hours), and none of whom had recently undergone aerosolized generating procedures in the room (within 72 hours).

To arrive at their findings, the team used air samplers that were subjected to RT-qPCR and virus culture, processed by a US third party, certified laboratory. Data probe sets and protocols were designed and provided by the Center for Disease Control and Prevention (CDC).

The findings of the test revealed that viable virus was isolated from 22 out of 28 baseline air samples, collected approximately 3 to 5 feet away from the patients. Results showed 82-percent of patients were found to have high levels ($Ct < 24$) of SARS-CoV-2.

After baseline levels were collected (3 hours) the novel-heated filter system was placed in the patient rooms and samples were taken from the intake and outtake of the mobile system. Results showed viable virus isolated from 21 out of 22 of the intake samples, and no viable virus was measured in the outtake probes of the novel-heated air disinfection system. Air samples were then repeated at the same location of those measured at baseline (3 hours later, without the system in place), and no viable virus was found in the air of any of those patient rooms.

DISCUSSION

Patients with respiratory manifestations of COVID-19 produce aerosols that can be measured at high levels in the circulating air and eliminated effectively within 3 hours when the novel-heated air disinfection system is used to condition the patient room.

The study findings shed light on:

1. the public health implications of airborne transmission of COVID-19
2. the current CDC guidelines including physical distancing of 6 feet (which would not be enough to help indoor spread in these patients)
3. the novel-heated air disinfection system can mitigate risk and potentially avert indoor spread in the clinical setting of COVID-19, and other biological species found to be airborne

More data is necessary to determine the effectiveness of this technology during aerosolized generating procedures. The novel-heated air disinfection system may play a significant role across all indoor spaces to lessen the spread of airborne SARS-CoV-2 (the virus causing COVID-19).

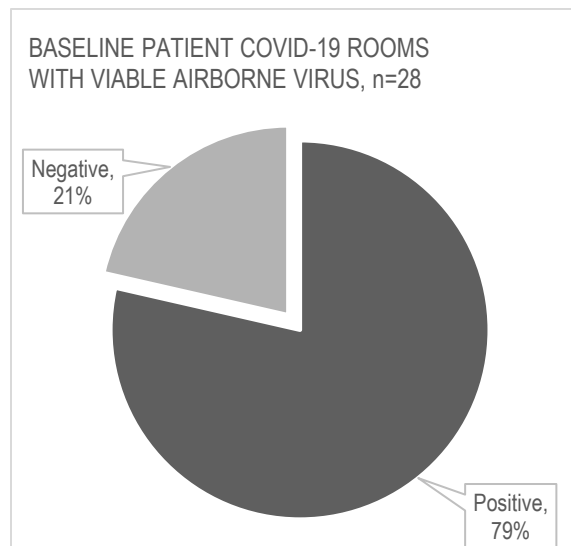
RESULTS

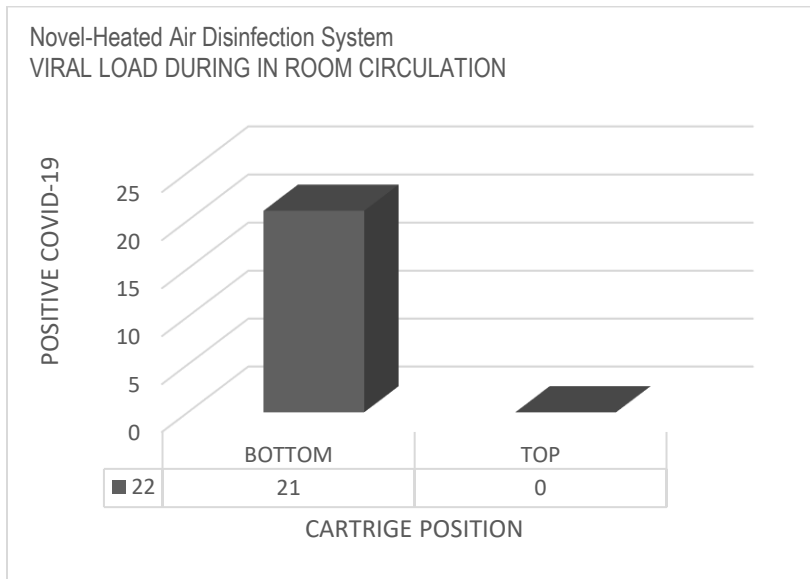


Aerosol Sampler Baseline and After



Novel-Heated Air Disinfection System





AIRBORNE COVID-19 LEVELS PATIENT ROOMS, n=22

