

PP-L Biosafety - February 2021

Case Study: Air Disinfection Solutions in a Sensitive Educational Support & Care Setting.

Rainbow Stars - 2021



Introduction

Rainbow Stars, Lincolnshire, is a specialist educational group that focuses on supporting the needs of children with Autism, ADHD, Asperger's Syndrome, and other behavioural issues. During the COVID-19 pandemic the registered charity could only welcome a reduced number of children but with such important work, staff and volunteers continued supporting the learning and wellbeing of their most vulnerable children.

With the safety of their volunteers and children being the number one priority, at the breakout of the COVID-19 pandemic within the UK, the staff took measures to ensure that everybody entering their space was temperature checked upon arrival, hygiene emphasis was significantly increased, and COVID-Secure Guidance followed to the letter.

Nevertheless, Rainbow Stars contacted PP-L in early 2020, not long after the pandemic began impacting the UK, to explore options of reducing the risk of COVID-19 transmission and ensure maximum safety of those in their care and workplace environment. The Rainbow Stars hub has no mechanical ventilation and only one external wall with small windows. PP-L's diverse team of Chartered Engineers, Scientists and Medics were early in providing defences for clients in the war against Covid-19 when it emerged in the UK in early 2020, knowing that coronaviruses are primarily an airborne pathogenic hazard, their experience from the interventions in SARS 2003 with their products and also other ARI's, the team



worked on the same basis, that this coronavirus, which causes COVID-19, SARS-CoV-2 was also primarily airborne. Hygiene solutions would be important and easy to implement, so PP-L Biosafety prioritised the infection prevention solution proportionally – 80:20 rule of air purification : surface cleaning effort.

The ventilation in the classrooms was typical of many such older buildings (ventilation limited to small openable windows, no mechanical ventilation) and so, given that back in early 2020, the lack of suitable, non-VOC emitting and validated portable HEPA Filters (which are proven in lab tests (ref.5) at 93% effectiveness against SARS-CoV-2 compared to UVC with 100% of the virus undetectable after exposure to the device.), the best course of infection

control, to protect occupants was to use germicidal UVC upper room sanitisers on both sides of the hub to ensure that the air in the rooms could be treated to be safe and reduce the risk of COVID transmission.

These Upper Room UVC devices have been used for decades against pathogens and ARI's and PPL-Biosafety deemed them perfect for this educational setting. Whilst the amount of data available on their successful application in higher risk clinical and laboratory settings is inordinate, the UK Government is currently comparing them in a study consisting of 30 Bradford Schools. 10 of which use UVC air sterilisation to control COVID transmission. The other 20 schools consist of 10 controls and 10 use HEPA air filtration devices. "This will provide more valuable data on the best measures of COVID infection control within schools and hopefully guide policy to make recommendations for the best technology. Based on all of the above, UVC is likely to prove effective"

Then, a COVID Case...

All through the pandemic of 2020, with Rainbow Star's high levels of Covid-secure compliance and more, with the upper room UVC air disinfection filters, the support work at the school continued safely, normally and without incident for the whole of 2020.

At the start of 2021, however, COVID-19 risk was unwittingly brought into the hub by a member of staff who did not have any symptoms, signed-in as feeling healthy & normal, and passed the temperature test to access. What happened next?

COVID is transmitted by people breathing. The exhaled emissions from any individual can result in a major concentration of tiny invisible particles in those breaths (droplets, micro-droplets, aerosol as referred to by the scientists) and within 30-60 minutes in a small confined and poorly ventilated environment, one person who is infected with COVID can infect other occupants who inhale the infected particles, if thorough infection control isn't in place (Source)¹.

The pre-symptomatic volunteer spent the entire day at the Rainbow Stars Hub on 2 February 2021 along with 5 other staff/volunteers, sharing and breathing that same indoors air for most of the day. It was a cold day and the windows were closed. None of the other

occupants had at that time been vaccinated, nor had COVID or COVID symptoms previously and so, no disease immunity could reasonably be assumed.

That one staff member felt ill on the next day and tested positive for COVID-19. Upon learning of the positive case, all other individuals who shared the room for the day previous, were instructed to isolate and test for COVID..

All five of these other individuals received negative test results for COVID-19, despite the significant risk from spending a whole day in a room with an infectious colleague, which save for the UVC mitigation, would be otherwise, be classified as a poorly ventilated room.

“Receiving five negative tests after close exposure in such a high-risk situation is an amazing feat. It supports the infection protection measures that we put in place and just goes to show the power of how Engineering & Technology solutions can control COVID risks”, said Jane Peck, the Charity’s CEO.

The use of upper room UVC Filters has been scientifically proven as an effective method for combating COVID-19. [\(Source\)](#)² . As well as this real life incident (averted), recently an independent laboratory tested the efficiency of one of PPL’s solutions against a COVID-19 substitute in a sealed test room which is the average office size. After 7 minutes, the room air containing a surrogate virus to SARS-CoV-2 was disinfected; after 45 minutes:- an 8-LOG (99.999999%) reduction of all the virus in the air was recorded; and after 60 minutes there were no recoverable viable viral particles.

This is sterilisation of the air equivalent to a level equivalent to x10,000 better than most sanitiser hand gels. Clearly in real life settings where a variety of microbes will be present, sterilisation of air is unlikely but if specified correctly, the air can be continuously disinfected with upper room based UVC devices.

What is GUV UVGI?

UV-C light is also known as germicidal light as it renders the DNA and RNA of microbes inactive by breaking bonds between the Thymine and Adenine pair and “glues” two adjacent Thymine nucleotides together. This process is irreversible and stops the microbes from undergoing mitosis, inactivating them.



Germicidal UV air disinfection has proven efficacy against the transmission of measles, probably one of the most infectious diseases known to mankind, as well as Tuberculosis, SARS-CoV, SARS-CoV-2 (Covid-19), MERS-CoV,

Influenza A, and “Bird Flu”, as well as many other bacteria and viruses. These have all been successfully inactivated by UV Air Treatment solutions in HVAC and via Upper Room Emitters, both in the labs, and in practical applications over decades. (see our supplementary references document.)

Coronaviruses, are easily inactivated by calculated UVC exposure. (Source)³ The data from 2004 and 2020, shows how easily Coronavirus is inactivated by UV-C technology. “The survival ability of SARS coronavirus in human specimens and environments seems to be relatively strong. Ventilation and UV irradiation can efficiently eliminate the viral infectivity” (Source)⁴

Bibliography

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