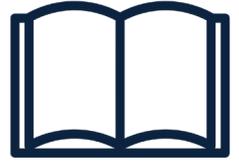


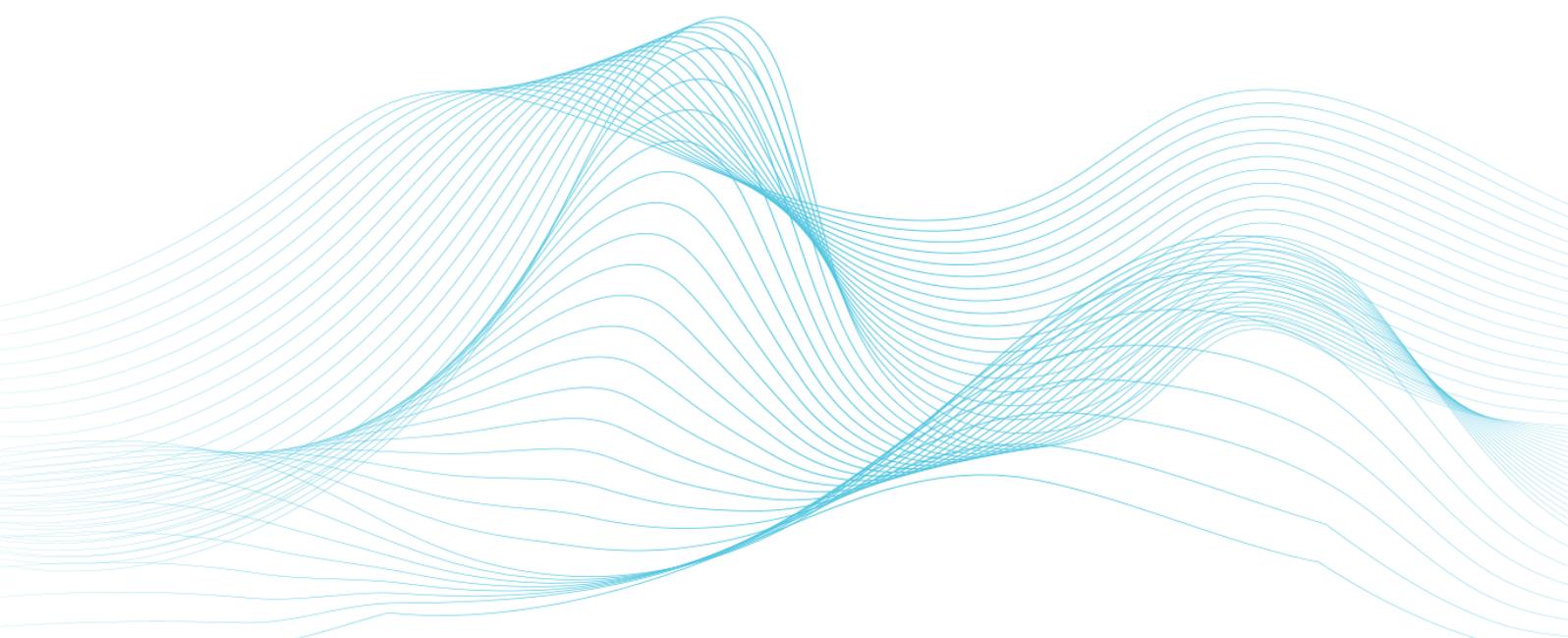
ZOONO ANTIMICROBIAL PROTECTION: EDUCATION SPACE CASE STUDY



Introduction

Zoono is an innovative technology that aims to improve health and well-being by providing pioneering, durable germ protection. Zoono Group Ltd is a Global Biotechnology company that develops, manufactures a suite of long-lasting, scientifically validated antimicrobial solutions. As a company, Zoono not only believes in its technology being able to provide enhanced antimicrobial protection within industry, healthcare, transport, and household settings, but regularly carries out in-field trials to prove it. It is important to note the limitations of traditional disinfection products using active ingredients such as bleach or ammonia. These products are only effective whilst wet and recontamination of surfaces and skin can occur once the product has dried. Misconception about how long alcohol-based hand sanitisers remain effective for has come to light in various studies published online, with some members of the public not realising these products are only effective for around two minutes.

Testing is carried out within public transportation to assess the performance of Zoono Z-71 Surface Sanitiser when utilized in conjunction with the normal cleaning routine. It is widely accepted that germs spread quickly in areas where there are high volumes of people, through close contact and via environmental surface contamination. The high levels of footfall in busy buildings makes the opportunity for germs to spread very easy. The trials are designed to assess the benefit of applying Zoono by taking ATP measurements pre-application and at several time points post-application, as a method of assessing product efficacy and its ability to reduce levels of surface contamination over time.



The Zoono Technology

Zoono is a non-leaching, colourless and alcohol-free surface sanitiser that will modify the way the surface interacts with microbes. Zoono Microbe Shield is scientifically proven to be a longer-lasting water-based protectant that has a similar toxicity level to Vitamin C. Zoono provides an invisible protective barrier that covalently bonds to a range of surfaces to provide long-lasting protection against numerous pathogens including bacteria, fungi, and viruses. A positively charged layer of microscopic pins attract and lyse negatively charged pathogens. This invisible layer of pins causes the cell wall to rupture resulting in the pathogen breaking up with lethal effect.

It is well documented that bacteria and viruses can last for long periods of time on hands and surfaces (Hirose et al., 2020; Rawlinson, Ciric and Cloutman-Green, 2020). It is also evident that traditional disinfection has limited disruptive effect, as they are only active when in their wet phase, allowing recontamination to occur once the surface has dried. Surfaces that look and smell clean can quickly become a source of numerous pathogens, enabling the spread and transmission of disease. A recent study found COVID-19 present on a hospital bed was able to spread to 18 other surfaces within 10 hours (Rawlinson, Ciric and Cloutman-Green, 2020). This is where Zoono products come into play. Zoono bridges the gap between routine cleaning processes, modifying the surface to be disruptive to bacteria and viruses between routine cleaning. Zoono works as part of the greater solution for Infection Prevention and Control (IPC), posing as a new and important tool for the enhancement of IPC in the future.

Benefits of Zoono Microbe Shield include:

- Longer-lasting, effective for up to 30 days
- Ready to Use formulation
- Water based (does not contain alcohol)
- Does not promote microbial mutation (superbugs)
- Shelf-stable for 3 years
- Non-damaging to surfaces
- Not flammable
- Non-staining
- Odourless

Zoono has quantitative data supporting its efficacy from many internationally recognised laboratories. Zoono also enjoys registrations and approvals in numerous major countries, including Europe, America and Australasia.



Test Set Up

Testing A

The purpose of this trial was to assess the performance of Zoono Z-71 Surface Sanitiser within an Education Facility. It is widely accepted that germs spread quickly amongst children, and having numerous children mixing daily within the same site make it even easier for bugs to spread. A trial was conducted at a School in New Zealand between 10th August – 4th September 2019. There were no alterations made to the existing housekeeping protocols during the trial period. Therefore, the difference between the Control room (2) and the Zoono treated room (1) can be attributed to the addition of Zoono Z-71 and the additional layer of defence it provides.

In Room 1, Zoono product was applied topically to the identified surfaces within the school and routine cleaning regime was continued after Zoono was thoroughly left to dry. In Room 2, no Zoono was applied as this was the control room. In the control area the normal cleaning regime & protocol was continued.

Testing B

The purpose of this trial was to assess the performance of Zoono Z-71 Surface Sanitiser within an Education Facility. As germs spread quickly amongst children, and even more so when there are numerous children mixing within the same area daily. A trial was conducted at a set of 10 nurseries at 10 set locations within each facility.

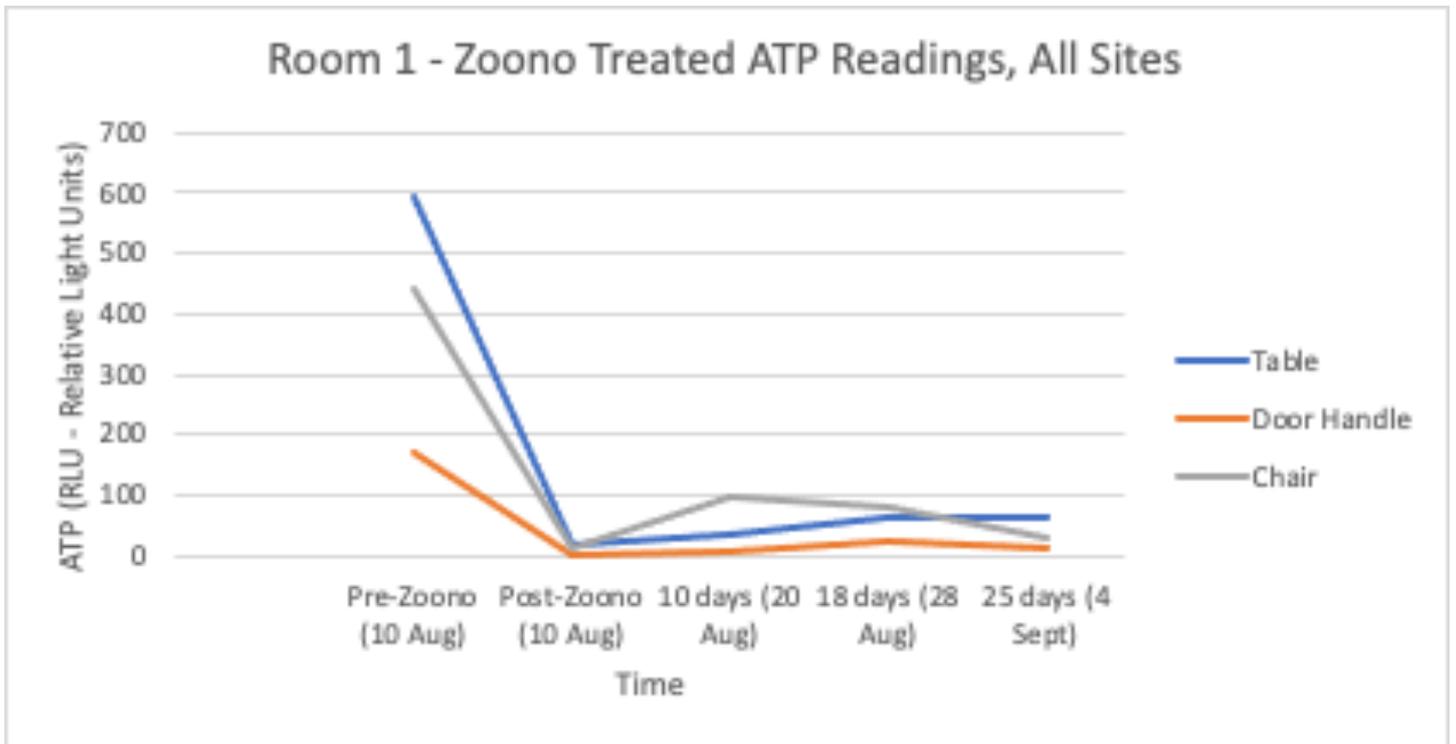
Each individual nursery trial was conducted in conjunction with a representative from the nursery group to oversee that the testing was conducted fairly. During the test period, there were no alterations to the routine cleaning and housekeeping protocols. This was specifically designed so the addition Zoono to the cleaning routine was the only factor being changed/assessed. This means the difference between the Post-Zoono application results and the Baseline results can be attributed solely to the addition of Zoono Z-71 and the enhanced, long lasting protection against germs it provides.

ATP Readings were taken prior to the application of Zoono, and this was used as a baseline reading that was taken to be representative of the normal levels of surface contamination when utilising normal cleaning protocols. Zoono Z-71 was then applied topically. A secondary reading was then taken to assess surface contamination levels immediately post-application of Zoono. Further readings were taken at 15-days and 30-days post-application of Zoono. Accurate records and photographic evidence of locations were recorded in order to ensure the same areas were tested at each reading.

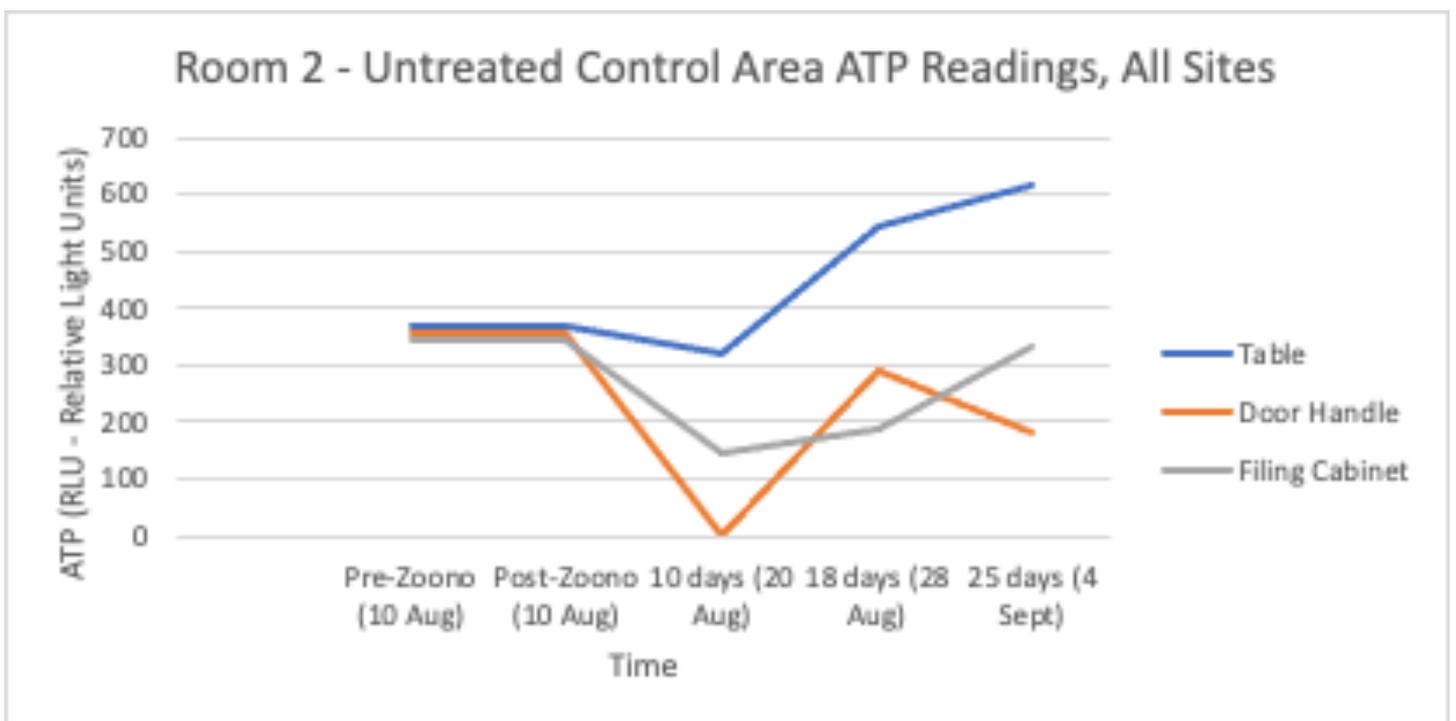
The Data

Testing A

Graph 1 – ATP readings of Zoono treated areas, all sites

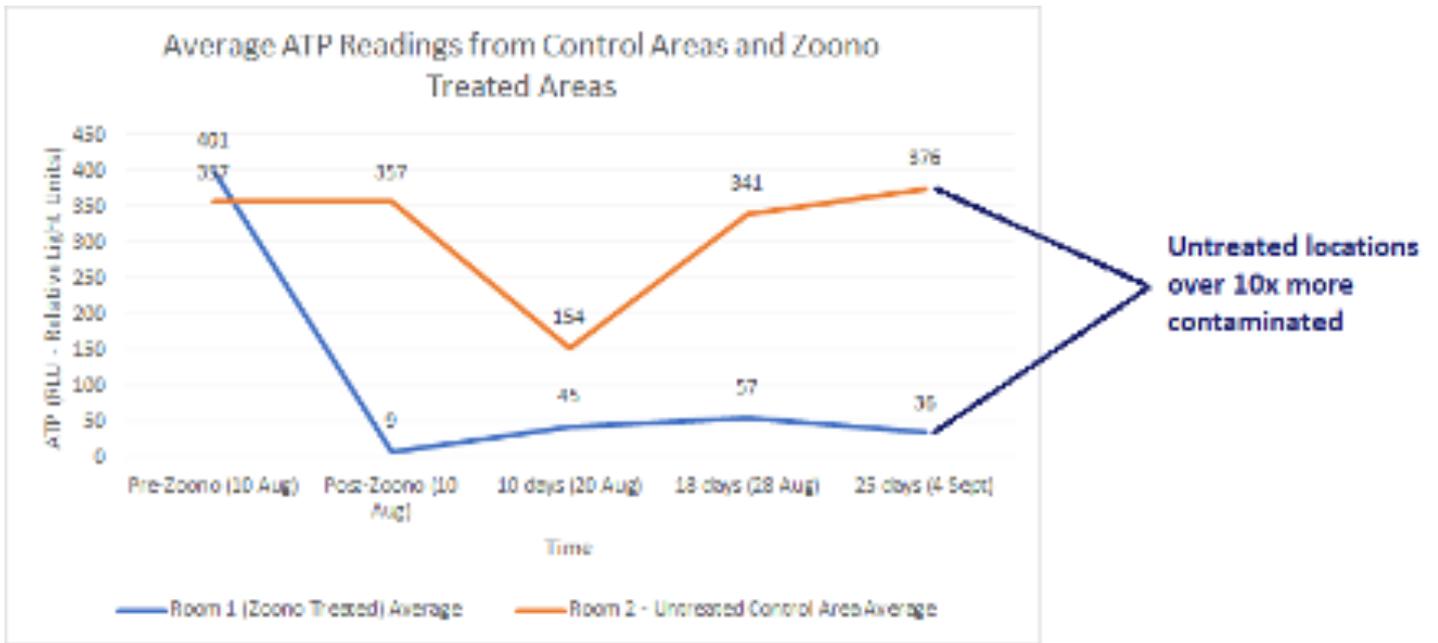


Graph 2- ATP readings for the Control Area, all sites



The Data

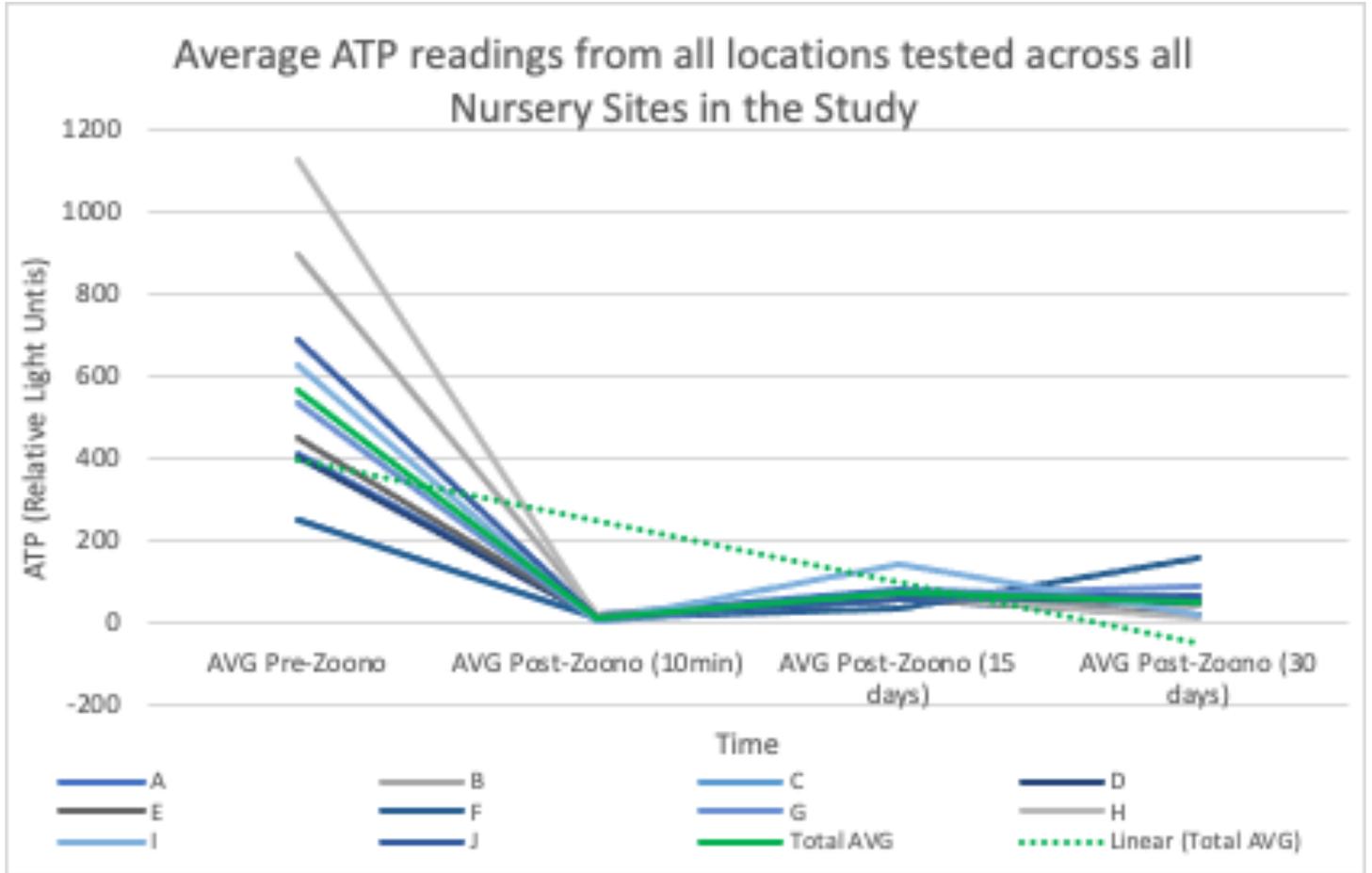
Graph 3 – Average ATP readings taken from the Zoono treated area compared with the control area



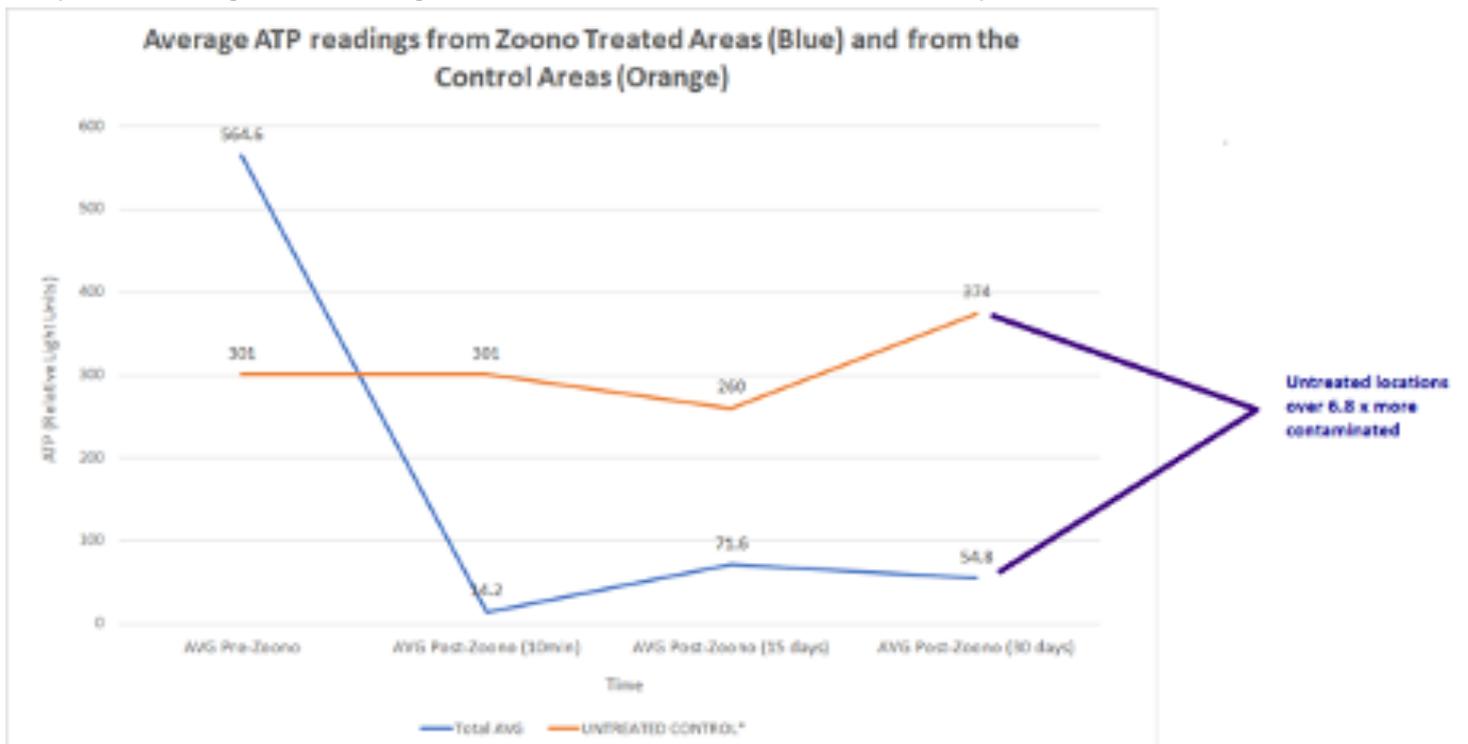
The Data

Testing B

Graph 4 – Average ATP readings taken across numerous locations within many nursery facilities



Graph 5 – Average ATP readings taken from the Zoono treated area compared with the control areas



*Please note, the untreated control line is an average of all industries, to increase the number of included data points and therefore increase the reliability of the data set. As our data set increases, this will become industry specific.

Data Discussion

Testing A

Graph 1 shows the reduction of bio-load over 3 different surfaces. A substantial initial decline can be seen, which then remains low over the duration of the testing. At the end of the trial period, all ATP results shown are <100, which is recognised as clean within the healthcare and food industries.

As can be seen from Graph 2, there is continual variance between results at all locations, depicting the uneven and higher levels of contamination that is found within the routine cleaning regime. Most results fall between the 100-500 range which can be considered as a caution needed /contaminated area.

Graph 3 shows that on average, a 91.1% reduction can be seen from the baseline results (taken prior to the application of Zoono) to 25-day post application. Immediately post application of Zoono (Post-Zoono – taken 1 hour after the application of Zoono had thoroughly dried) a reduction of 97.8% can be seen. The average ATP readings at 25 days post-Zoono application can be seen on the Graph as <50. As under 100 is considered clean and <30 considered food safe, this shows the excellent low-level of bio-load achieved across all surfaces. At 25 days, the average of ATP readings from the Control areas was 376 RLU and the average of ATP readings from the Zoono treated areas was 36 RLU. This shows that at 25 days post application of Zoono, the Control Area was greater than 10 times more contaminated than the Zoono treated area.

Testing B

Graph 4 shows the average reduction in ATP across all 10 locations tested in the 10 nurseries used within the trial (each line A-J represents one nursery, with each data set being an average of all samples taken at that location). A substantial initial decline can be seen, which then remains low over the duration of the testing. At the end of the trial period, all ATP results shown are <100 except one nursery. This result was caused by a single high result in one of the 10 locations tested at that nursery. ATP results being <100 is recognised as clean within the healthcare and food industries.

It can be seen on Graph 5 that the average reduction of 90.3% can be seen from the baseline results (taken prior to the application of Zoono) to 30-days post application. Immediately post application of Zoono (Post-Zoono – taken 10 mins after the application of Zoono had thoroughly dried) a reduction of 97.5% can be seen. The average ATP readings at 30-days post-Zoono application can be seen on the Graph as <55. As under 100 is considered clean and <30 considered food safe, this shows the excellent low-level of bio-load achieved across all surfaces. At 30-days post application, the average of ATP readings from the Control areas was 374 RLU and the average of ATP readings from the Zoono treated areas was 54.8 RLU. This shows that at 30-days post application of Zoono, the Control Area was greater than 6.8 times more contaminated than the Zoono treated area.

Observations

Testing A

- An initial bio-load reduction of 97.8% was seen following the application of Zoono
- At 25 days post-application, a reduction of 91.1% can be seen when compared with the initial readings taken
- At 25 days post-application the Control area was greater than 10 times more contaminated than the Zoono treated area

Testing B

- Average reduction in ATP across all locations and all sites at 30 days post application of Zoono is 90.3%
- Immediate average ATP reduction across all nursery sites after the application of Zoono was 97.5%
- All ATP readings were <55 RLU at the 30-day point, measuring as clean based on the food and healthcare industry standards

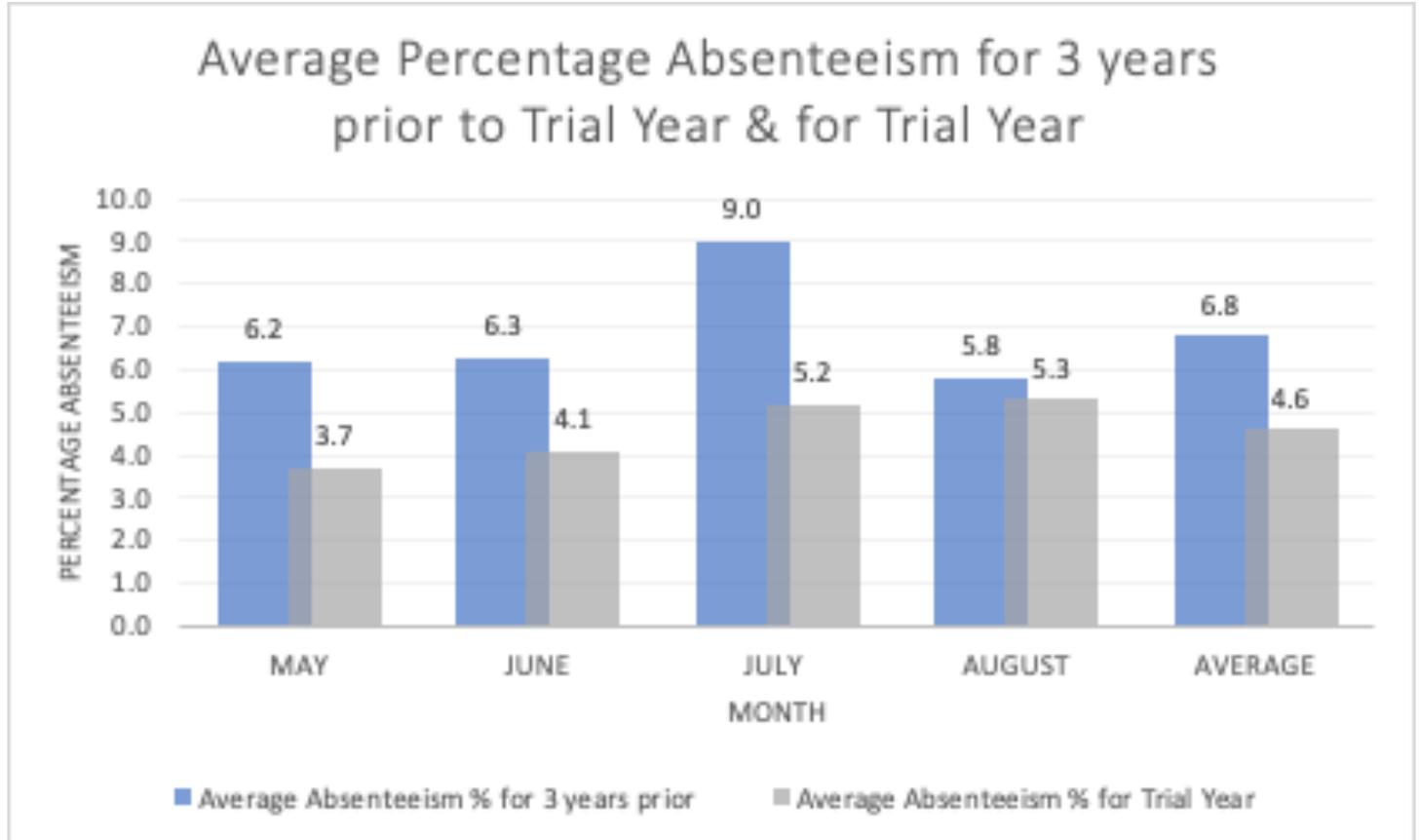
Case Studies: Absenteeism Test Set Up

During the winter months of 2015, a trial was completed for a major international insurance company in Auckland, New Zealand. The 100-seat call centre received wall mounted hand-sanitiser for application of Zoono Hand Sanitiser at the start of each working day. Also, all working areas were treated with Zoono Z-71 Surface Sanitiser via fogging at 20 microns, areas included workstations, staff equipment and communal areas.

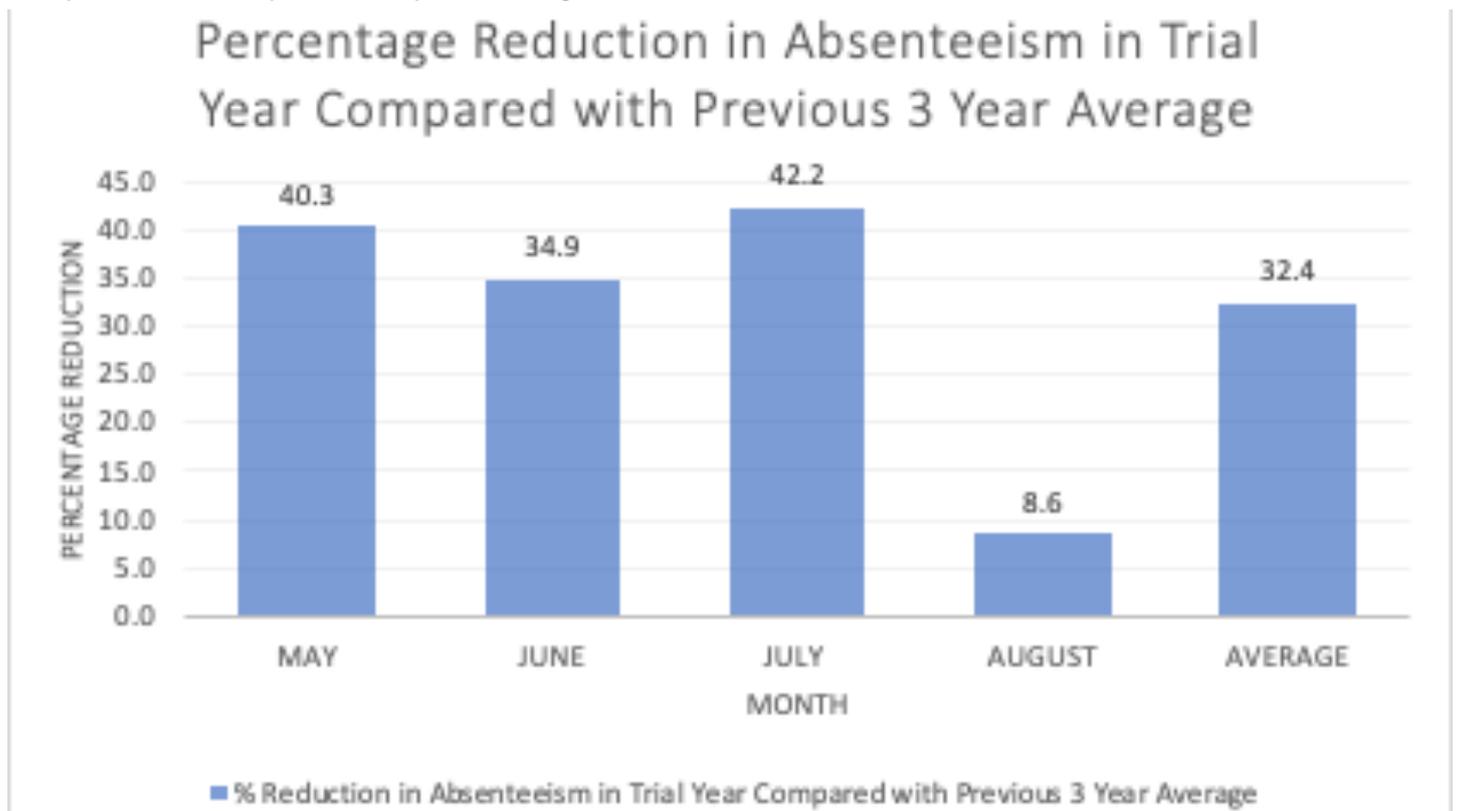
The success of the trial on the levels of absenteeism within the company were determined by comparing the absenteeism rate over the trial-winter with the absenteeism rates for winter from the previous three years (2012, 2013, 2014).

The Data

Graph 6 – The Average Percentage Absenteeism for the 3 years prior (2012, 2013, 2014) to the trial year (2015) in blue and the Percentage Absenteeism for the Trial year where the workplace was treated with Zoono Surface Sanitiser & the staff given Zoono Hand Sanitiser



Graph 7 – The Percentage Reduction in Absenteeism in the Trial Year (when utilising Zoono products), compared with the previous 3 year average for absenteeism.



Data Discussion

Graph 6 shows the average percentage absenteeism for the 3-year average during winter prior to the trial winter (blue bars). This was accepted as the typical level of absenteeism during these months for the purpose of the trial. During the trial months, where Zoono was utilised (grey bars), the absenteeism percentage can be seen to be significantly lower than the average for the three years previously. The average level of absenteeism during the 3-year average is nearly 1.5x greater than the absenteeism during the trial winter.

Graph 7 shows the percentage reduction between the three years prior and the trial year. The overall average reduction in absenteeism through the winter months when using Zoono was 32.4% when compared with the previous 3-years. The highest reduction in absenteeism is 42.2% in the month of July. When comparing the reduction in absenteeism with just the previous July (2014) there was a reduction of 56.9% (12.13% absenteeism in 2014 compared with 5.23% absenteeism in 2015).

The use of Zoono products within the workplace does not negate for any false sick-days, where those members of the team off 'sick' are not genuinely unwell. If these factors could be accounted for, it is expected that the actual reduction in absenteeism as a result of genuinely illness would likely be greater.

Observations

- Average absenteeism reduction of 34.2% when using Zoono products, compared with average absenteeism from previous 3 years
- Reductions in absenteeism as high as 42.2% can be seen when using Zoono, compared with the previous 3 years
- When compared with the previous year's absenteeism, reductions of up to 56.9% can be seen, which has potential for a huge increase in productivity and subsequently be more cost efficient

Cost Efficiency

It is estimated that in the UK, workplace absence can cost businesses £29 billion/year. It has been established that employers investing in their workplace health and wellbeing can expect to receive increases performance and productivity from its workforce (Employee Benefits, 2018). Some employer consequences of absenteeism include decreased productivity, increased costs and higher resultant pressure on employees working without a full team. A study conducted within a multi-department site found cost reduction of approximately £9,500/month (across 6,000 sqm) when using Zoono. Another study conducted at a much larger site (approx. 93,000 sqm) found savings of 13% per month (£118,000) when compared with their previous cleaning routine.

Conclusions

Revolutionising the way surfaces are protected with Zoono's antimicrobial technology can help prevent the spread of potentially harmful germs within the home and workplace. Given health, disinfection and personal protection has been catapulted to the forefront of the media over the last year, there is no better time to invest in advancing both personal safety, and the safety of staff, students and visitors. Given the benefits associated with using Zoono within education facilities, adopting Z-71 into the cleaning routine would benefit overall levels of health and wellbeing, significantly reduce levels of surface contamination, increase safety of staff and students, increase staff productivity as well as reducing absence.

It would be of benefit to employ the use of Zoono Hand Sanitiser within the workplace for staff to use at the beginning of each shift, also making the product readily available for travellers to use upon entry. This would further help reduce the spread of germs via high touch point areas and skin-to-skin contact. Zoono Hand Sanitiser should be used in conjunction with good hand hygiene to remove large particles that can block the Zoono antimicrobial layer from being able to work.



Appendix 1

Raw Data: Surface Testing

Testing A

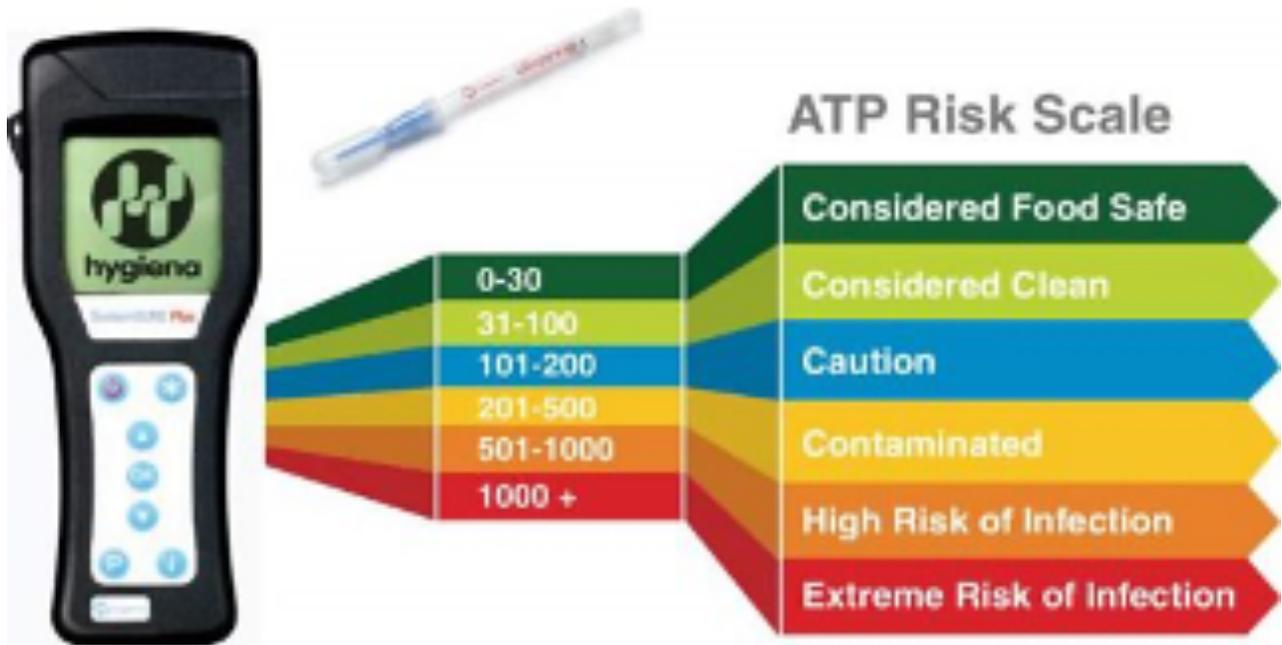
Room 1 (Zoono Treated)	Pre-Zoono (10 Aug)	Post-Zoono (10 Aug)	10 days (20 Aug)	18 days (28 Aug)	25 days (4 Sept)
Table	591	17	33	64	62
Door Handle	173	0	5	26	14
Chair	439	10	96	81	31
Average	401	9	44.66666667	57	35.66666667

Room 2 - Untreated Control Area	Pre-Zoono (10 Aug)	Post-Zoono (10 Aug)	10 days (20 Aug)	18 days (28 Aug)	25 days (4 Sept)
Table	368	368	318	545	617
Door Handle	358	358	0	292	179
Filing Cabinet	346	346	143	187	332
Average	357.33	357.33	153.67	341.33	376.00

Testing B

Location	AVG Pre-Zoono	AVG Post-Zoono (10min)	AVG Post-Zoono (15 days)	AVG Post-Zoono (30 days)
A	412	19	86	60
B	897	24	62	41
C	252	13	60	24
D	405	13	64	49
E	450	15	62	20
F	250	15	37	160
G	535	9	70	90
H	1130	16	69	15
I	628	6	143	20
J	687	12	63	69
Total AVG	564.6	14.2	71.6	54.8
UNTREATED CONTROL*	301	301	260	374

ATP Risk Scale



ATP testing was used to decipher the surface contamination levels. ATP is a commonly accepted method of testing surface contamination in many industries including Food Production & Healthcare. ATP detects the presence of Adenosine Triphosphate which is a molecule present in all living organisms in the measure of 'Relative Light Units'. The main drawbacks are the lack of specificity of the ATP reading (as it does not decipher between types of germs and cannot differentiate ATP from microorganisms, animals or plants). However, it is used widely and accepted as an estimation of surface contamination and is the only point-of-testing result that can be easily achieved & compared between industries at this time.

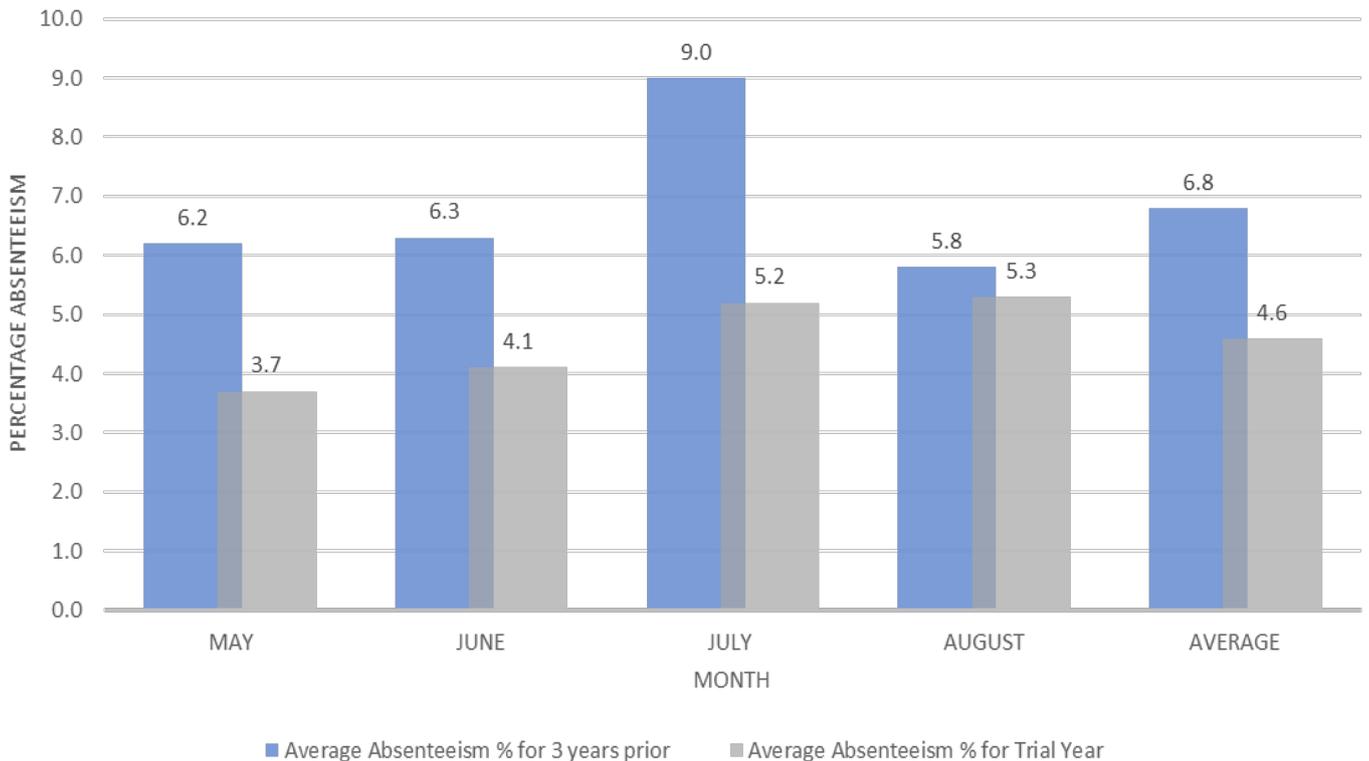
References

- Employee Benefits (2018) Reducing Absenteeism in the Workplace [Online]. Available from: Reducing absenteeism in the workplace - Employee Benefits
- Hirose, R., Ikegaya, H., Naito, Y., Watanabe, N., Yoshida, T., Bandou, R., Daidoji, T., Itoh, Y. and Nakaya, T. (2020) Survival of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and Influenza Virus on Human Skin: Importance of Hand Hygiene in Coronavirus Disease 2019 (COVID-19). *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, <https://doi.org/10.1093/cid/ciaa1517>.
- Rawlinson, S., Ciric, L. and Cloutman-Green, E. (2020) COVID-19 pandemic – let's not forget surfaces. *The Journal of Hospital Infection*. 105 (4), 790-791.

Education Space Case Study Summary

ABSENTEEISM CASE STUDY OVERVIEW

Average Percentage Absenteeism for 3 years prior to Trial Year & for Trial Year

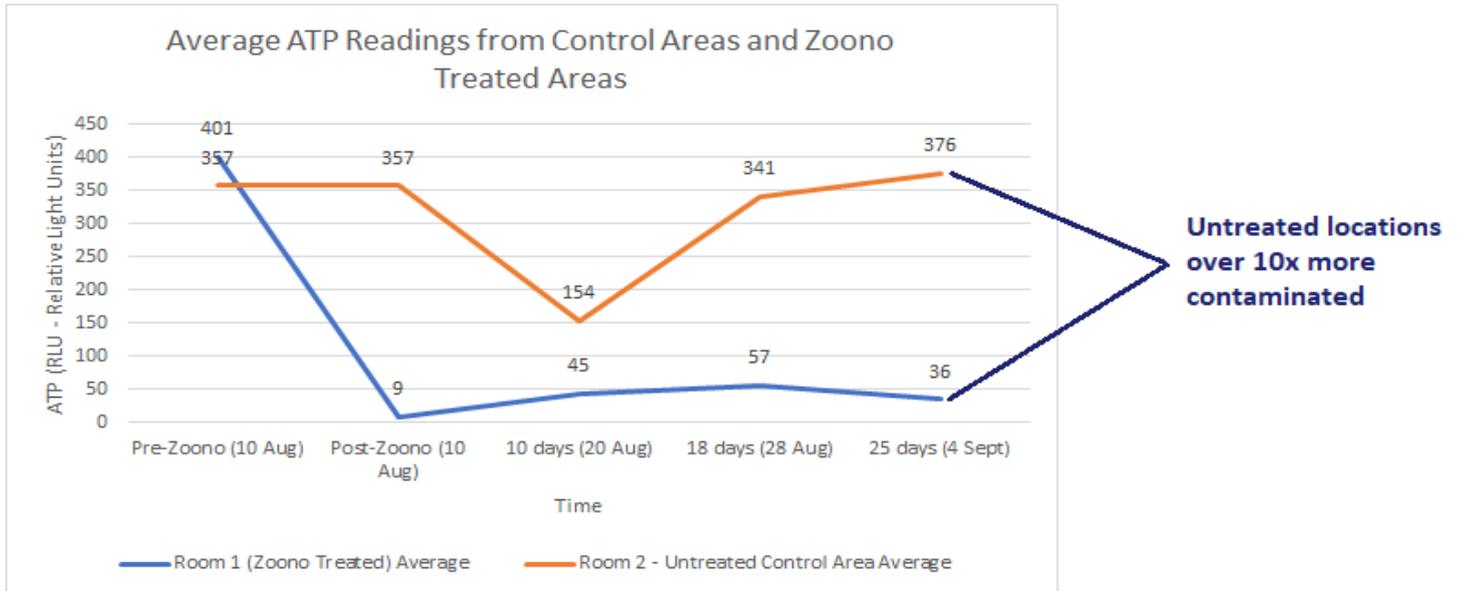


- The Graph shows the average percentage absenteeism for the 3-year average during winter prior to the trial winter (blue bars)
- When Zoono was utilised (grey bars), the absenteeism percentage can be seen to be significantly lower than the average for the three years previously
- An average reduction of 34.2% in absenteeism when using Zoono products within the company offices (fogging surfaces once/month and hand sanitiser available to all staff)
- Reductions in absenteeism as high as 42.2% can be seen when using Zoono
- Utilising Zoono products would benefit overall levels of health and wellbeing, significantly reduce levels of surface contamination, increase staff productivity as well as reducing absence

Education Space Case Study Summary

EDUCATION SPACE CASE STUDY

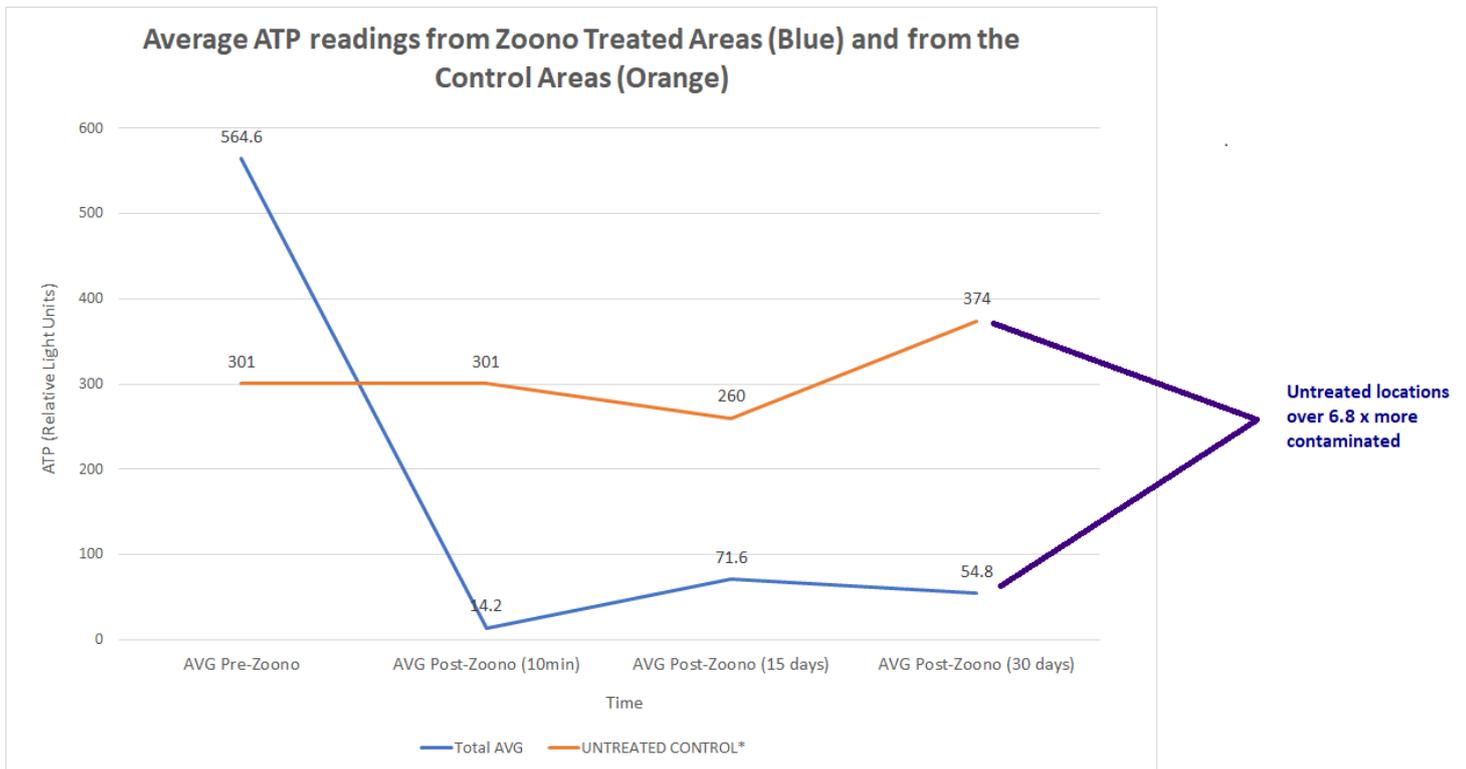
OVERVIEW



- The graph shows the average reduction from all locations and offices tested with the use of Zoono (blue line)
- The control readings (orange line) show the variable levels of cleanliness achieved when using the routine cleaning protocols
- From the starting point of the trials (Pre-Zoono application) to the end of the trials (25 days later) there was an overall reduction of 91% in surface contamination
- Average ATP readings for Zoono treated areas were <40 RLU at 25-days post-application of Zoono
- At the 25-day test point, there is more than 10 times greater surface contamination on the untreated control areas, compared with the Zoono treated areas
- Adopting Z-71 into the routine cleaning protocol can significantly reduce levels of surface contamination within educational facilities, in turn reducing spread of potentially nasty germs

Education Space Case Study Summary

EDUCATION SPACE CASE STUDY OVERVIEW



- The graph shows the average reduction from all locations and offices tested with the use of Zoono (blue line)
- The control readings (orange line) show the variable levels of cleanliness achieved when using the routine cleaning protocols
- From the starting point of the trials (Pre-Zoono application) to the end of the trials (30 days later) there was an overall reduction of 90.3% in surface contamination
- Average ATP readings for Zoono treated areas were <55 RLU at 30-days post-application of Zoono
- At the 30-day test point, there is more than 6.8 times greater surface contamination on the untreated control areas, compared with the Zoono treated areas
- Adopting Z-71 into the routine cleaning protocol can significantly reduce levels of surface contamination within education facilities, in turn reducing spread of potentially nasty germs and increasing overall productivity

Education Space Case Study Summary

EDUCATION SPACE CASE STUDY

OVERVIEW

- **Invest in your greatest asset:** Use Zoono and reduce sickness whilst increasing health & wellbeing of staff members. In return, staff members will feel valued and as a result be more likely to want to work harder for your company
- **Invest in the next generation: Protect students** and reduce the number of days off sick, increasing productivity and as a result improving performance, leading to better results for schools and more funding opportunities
- Zoono **protects against the potentially harmful germs** you cant see, working behind the scenes to prevent spread of illness in turn resulting in: fewer sick days (up to 34%), increased productivity, less pressure on well staff when other members of the team are off sick and **increased rate of return**
- Studies within education facilities have shown **a reduction of 90.3% in surface contamination** at 30-day post-application of Zoono surface sanitiser. If used in conjunction with Zoono Hand Sanitiser it is expected the achieved reduction would be further reduced as a result of **mitigating the spread of germs via hands.**
- **Reducing use of potentially damaging and toxic chemicals** such as bleach and ammonia can help **protect your company assets for longer** - invest in your company effects in the long term by using Zoono.

MICROBE SHIELD
30-day Protection
Surface Wipes

Zoono[®] Microbe Shield keeps killing
99.99% of germs for up to 30 days.

Zoono[®] forms an antimicrobial coating that
bonds to surfaces and protects against many
pathogens including H1N1, Norovirus, E coli,
MRSA, Salmonella, and mould, fungi and algae

ZOONO
MICROBE SHIELD
30-day Protection
Surface Wipes
Protects against 99.99% of germs for up to 30 Day Protection
Safe - Alcohol Free
Single Wipe