



## ZOONO ANTIMICROBIAL PROTECTION: NHS CASE STUDY

### Introduction

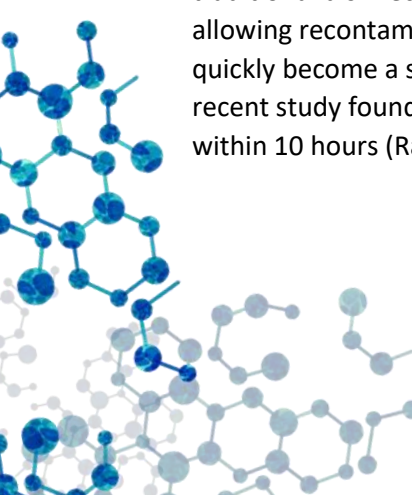
Zoono is an innovative technology that aims to improve health and well-being by providing pioneering, durable germ protection. Zoono Group Ltd is a Global Biotechnology company that develops, manufactures a suite of long-lasting, scientifically validated antimicrobial solutions. As a company, Zoono not 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 healthcare environments 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.

## Case Studies: Surface Testing

### Test Set Up

The purpose of this test was to evaluate the effect the application of ZOONO Z-71 Microbe Shield had on a range of high-touch point areas within a NHS Hospital. Initially the plan was to conduct trials to decide if the hospital would engage with ZOONO to complement the existing hygiene regime at the hospital. This includes:

- Regular systematic cleaning throughout the hospital by an 'in-house team'
- UV cleaning

Following several meetings with the Medical Director and his team, it was decided that the hospital would implement Z71 across the 77,000 m<sup>2</sup> (approx) and carry out testing as the Z71 was deployed. The testing would be using ATP initially in a controlled area alongside data being collected throughout the hospital including COVID -19 wards.

The trial was overseen by the Senior Microbiological Consultant to ensure 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 Swabbing

All initial testing was conducted on 06/05/2020. There were three main sections to the testing that was conducted across the hospital:



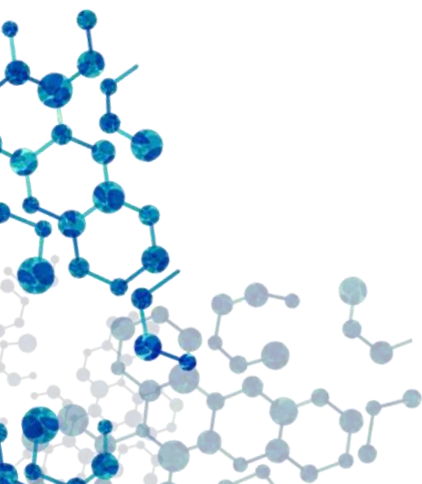
- Testing A – Initial readings were taken in these locations prior to any application of ZOONO and again 1 hour after the initial application of ZOONO on the same day. Subsequent testing was then carried out again at days 14 & 21
- Testing B – Initial readings were taken prior to the application of ZOONO then subsequent testing was taken again on days 14 & 21
- Testing C – Initial readings taken were after the initial application of ZOONO and subsequent testing was again carried out on days 14 & 21

Within each area, ATP testing locations were determined based on high touch point areas. Test locations were sampled, and the specific area recorded and photographed to ensure accurate measurement of the same area in the follow-up swab testing.

ATP is a measure of a molecule called Adenosine Triphosphate which is present in all living organisms and is measured in Relative Light Units (RLU). Whilst ATP is a measure of all living matter, it is widely accepted within the food and healthcare industries as a quick, useful measure of environmental contamination.

#### *Contact Plates*

Contact plates were taken pre-fogging with ZOONO, 1 hour post-fogging with ZOONO and again at days 7, 14 and 21 in the same locations. Within each area, contact plate testing locations were determined based on high touch point areas. Test locations were sampled, and the specific area recorded and photographed to ensure accurate measurement of the same area in the follow-up testing.



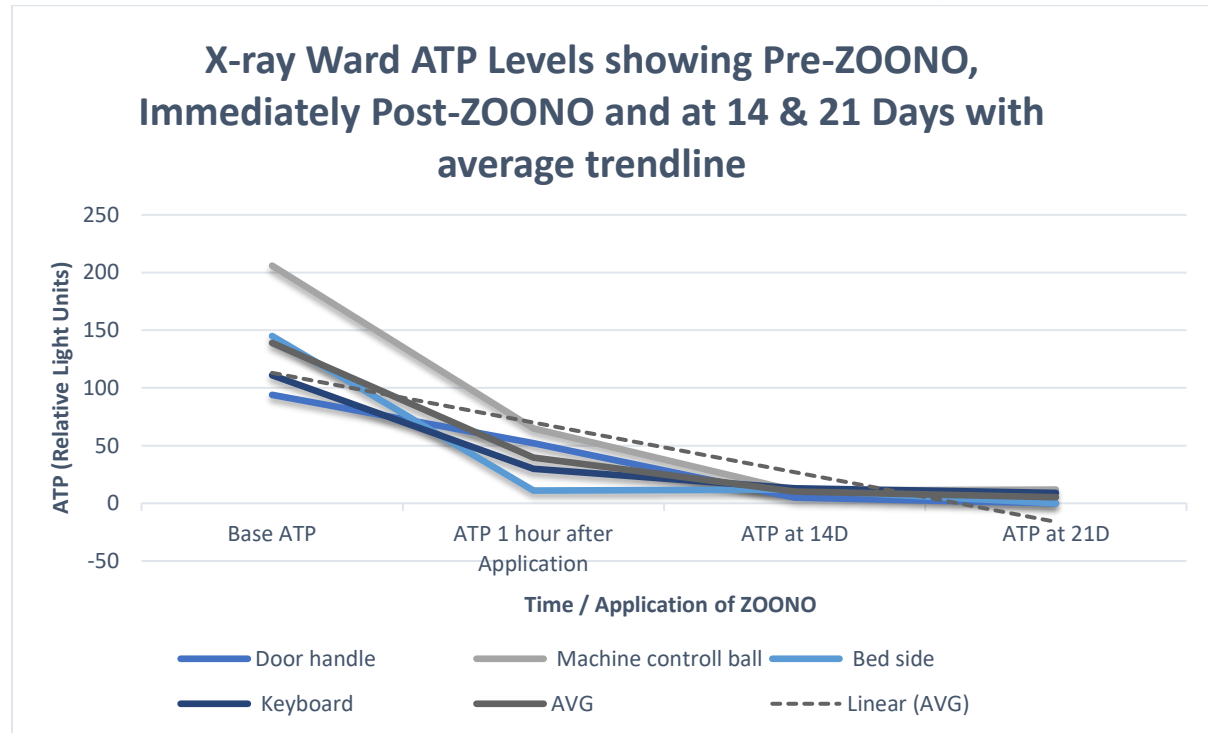


## The Data

### ATP Results

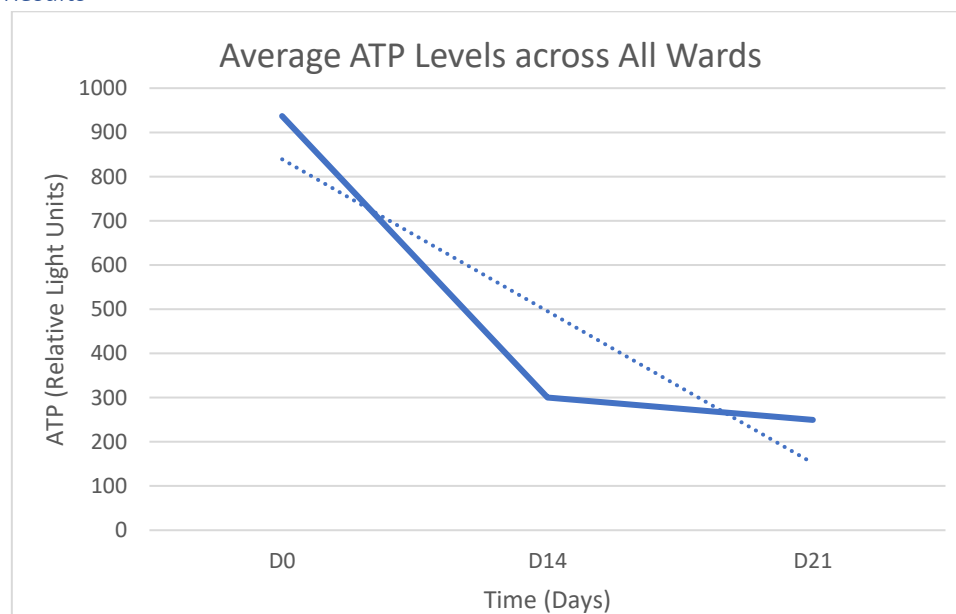
The graphs below indicate the average levels of ATP found within the Hospital. The results used in the data analysis are the readings provided from the 21 day testing period from the chosen locations.

### Testing A Results

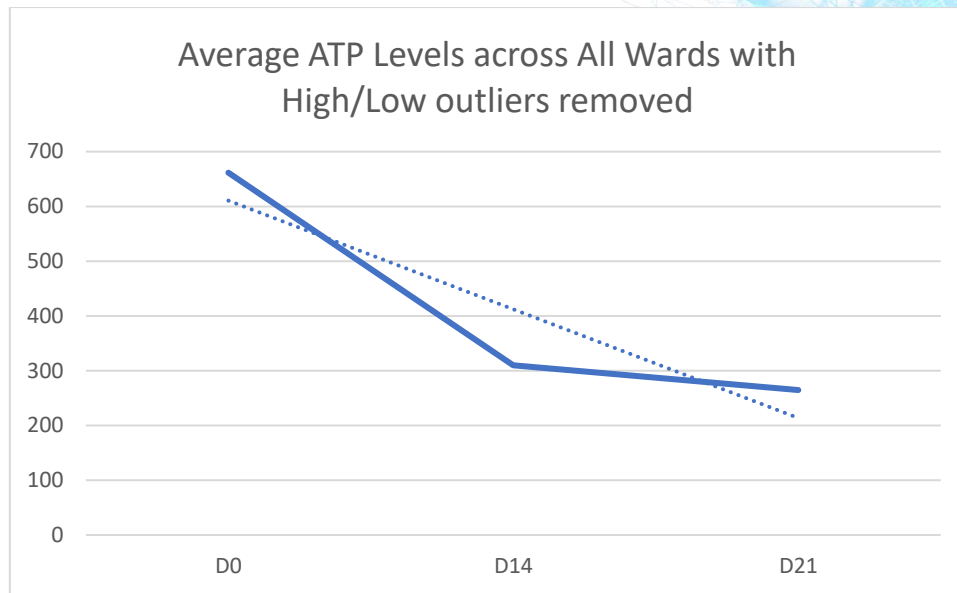


Graph 1

### Testing B Results

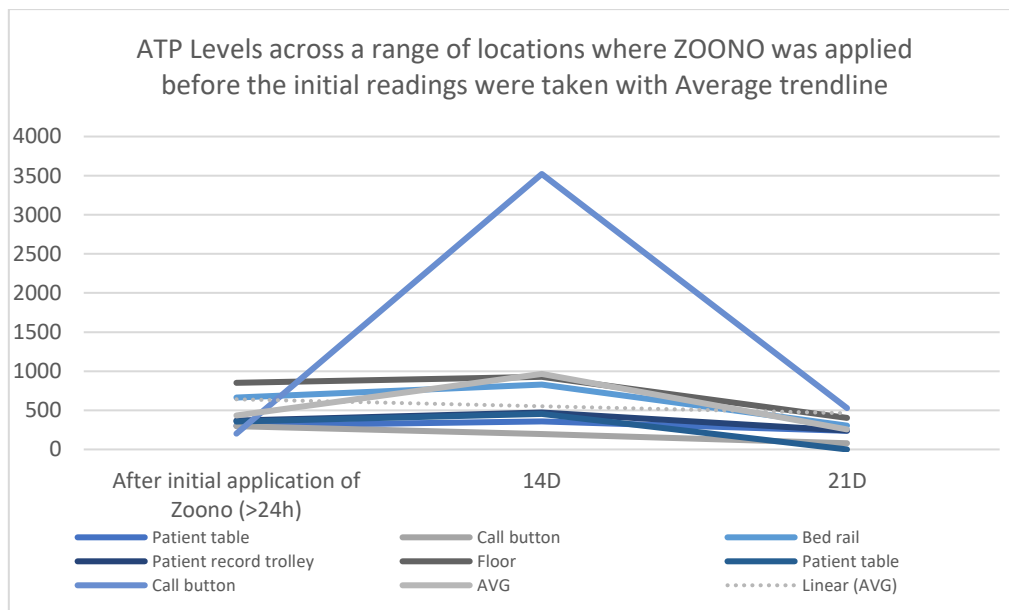


Graph 2



Graph 3

### Testing C Results

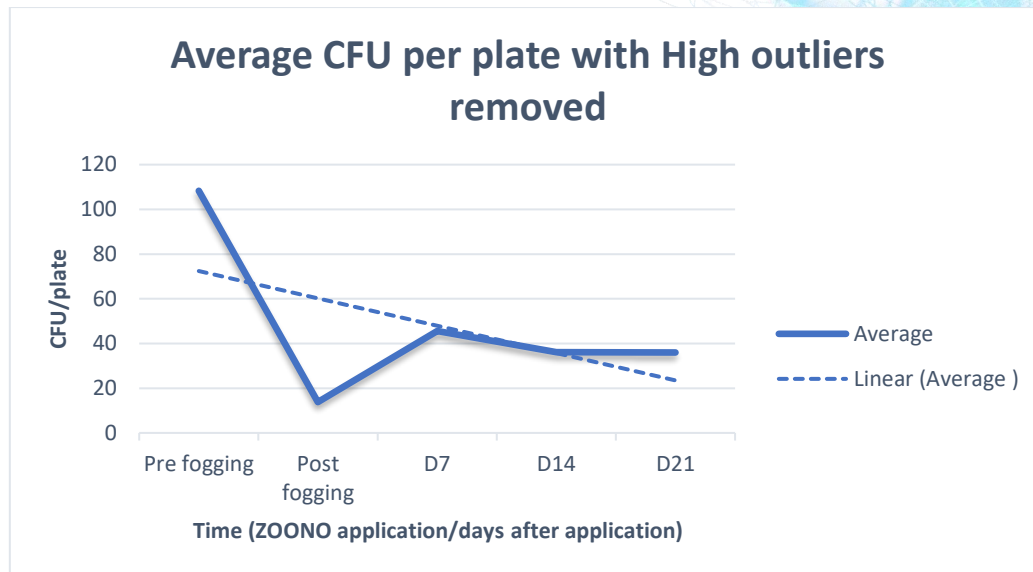


Graph 4

### Contact Plate Results

Graph 5 shows the average CFU (Colony Forming Units) count per contact plate throughout the locations tested from pre-fogging through to 21 days after the initial application.





Graph 5

## Data Discussion

### ATP Swabbing

#### Testing A

The X-ray ward was the only ward we were able to successfully monitor from pre-application through to 21 days after treatment. From Graph 1 it is evident the positive effect that ZOONO had on the microbial levels throughout the ward as detected using an ATP monitor. It is evident that despite the ward being part of a busy hospital there is a substantial and continued decline in microbial levels.

#### Testing B

The downward trend in results is obvious from both above charts. The overall average showed a 64.6% reduction in bio-load from day 0 to day 21. With outliers removed, there is a bio-load reduction of 54.0%. Therefore, this shows there was a significant reduction in bio-load across all tested location when ZOONO Z-71 Microbe Shield was used in addition to the normal cleaning routine.

#### Testing C

As can be seen the majority of the locations tested show a continual low level of ATP readings over the 21 day period. As the ZOONO had been applied initially more than 24 hours before the initial readings were taken, the subsequent readings at 14 & 21 days were not at 14 & 21 days of the original ZOONO application. The spike seen with the call button at 14 days has been addressed and call buttons have been an area identified by the hospital that need enhanced cleaning protocol due to the nature of the object, the frequency of touching and the likely abrasion the objects surface.

### Contact Plate

As can be seen in Graph 5 there is an overall trendline showing decreasing CFU counts on the contact plates. The most notable dip in CFU is after the initial ZOONO application, showing a 87.26% reduction. The slight increase at Day 7 could possibly be attributed to the re-contamination of very high-touch point areas such as the patient call buttons again due nature of the object, the frequency of touching and the likely abrasion the objects surface. Despite this, the bacterial counts are still



significantly reduced at days 7, 14 & 21, highlighting the beneficial impact of using ZOONO in conjunction with routine cleaning protocols.

## Observations

- There is significant reduction shown in Testing A across all locations in the X-ray ward. A substantial and consistent downward trend line can evidently be seen showing the positive effect of ZOONO application in correlation with regular cleaning protocols has on reducing the bio-load. This scenario is most similar to what would be deployed in a real-life infection control and prevention protocol
- In Testing B there is significant reduction in ATP levels from day 0 to day 21 with a 64.6% reduction across all wards tested in testing style B. The continued downward trend of ATP levels with the use of ZOONO puts the high touch point areas on track to achieving clean status with regular use of ZOONO in conjunction to regular cleaning protocols
- In Testing C a continued low level of bio-load is achieved given that ZOONO was applied more than 24 hours before the initial readings were taken, therefore the entire data represents the maintained low level of bio-load achieved when ZOONO has been applied
- Initial reduction of 87.26% when tested was conducted using contact plates
- There would be benefit from employing the use of ZOONO within the Hospital, especially in high touch point areas where cross contamination is a common source of infection



## Case Studies: Absenteeism

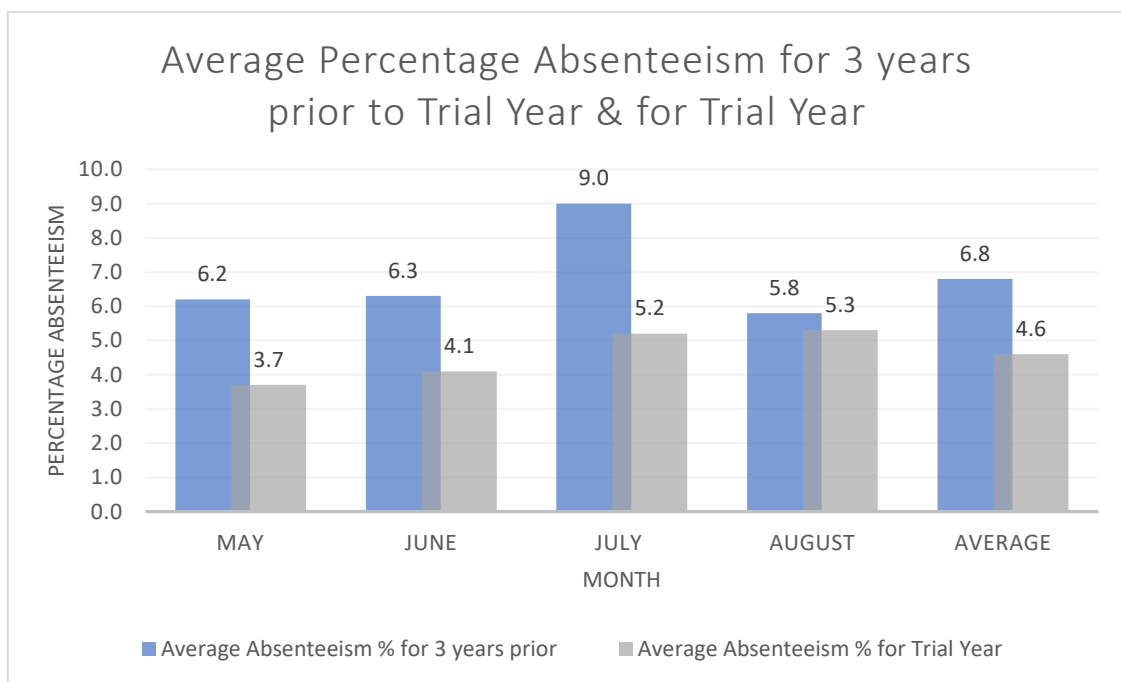
### Test Set Up

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

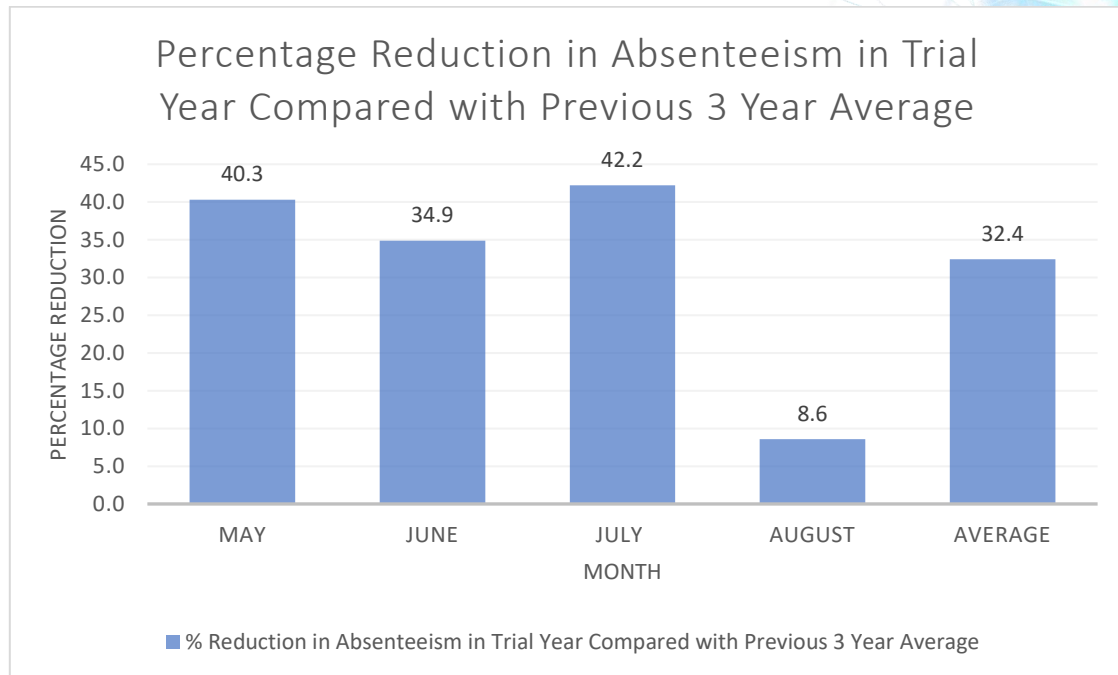
Graph 6 – The Average Percentage Absenteeism for the 3 years prior (2012, 2013, 2014) to the trial year (2015) in blue and the Percentage Absenteeism for the Trial year where the workplace was treated with Zoono Surface Sanitiser & the staff given Zoono Hand Sanitiser







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.

When additionally considering the potential rate of return that could be obtained from the decreased amount of sick pay / temporary cover

## Conclusions

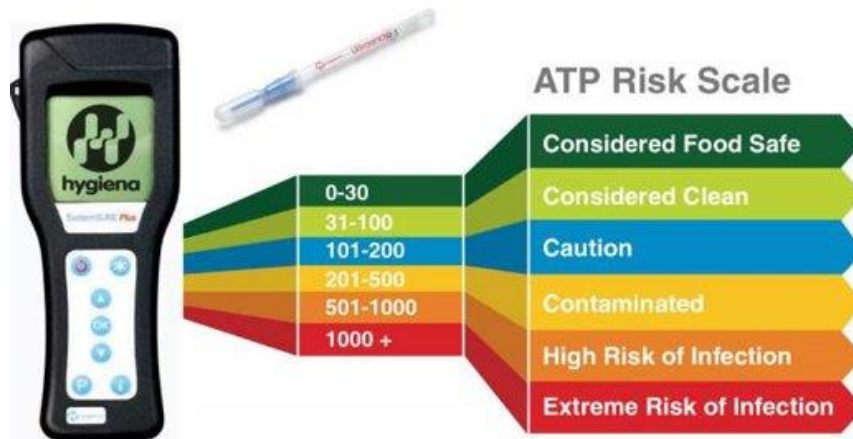
Revolutionising the way surfaces are protected with Zoono's antimicrobial technology can help prevent the spread of potentially harmful germs within the hospital environment. Given that health, disinfection and personal protection has been catapulted to the forefront of the media over the last year, 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 patients and visitors 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

### 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.