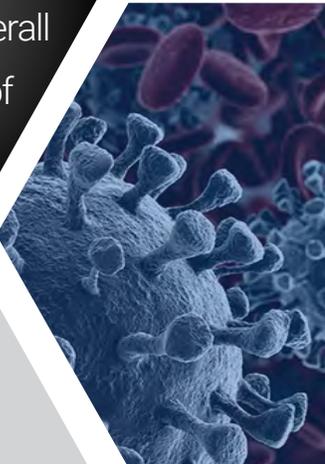
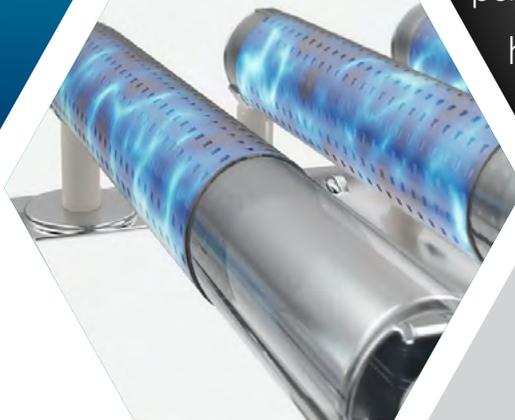


# AIR DISINFECTION: UNINTENDED CONSEQUENCES



Making schools safer also improves indoor air quality, human performance, and the overall health and well being of staff and students.



## A White Paper



The school systems (Pre-K through Higher Ed) that we are engaged with have done a phenomenal job with the primary problem:

## *Managing the transmission of COVID-19.*

*But sometimes when you improve processes in one area of an environment it can have Unintended Consequences in other areas.*

Better protect immune compromised staff and students.



Significantly improve indoor air quality and reduce asthma triggers.

## Unintended Consequences

What if the quest to better control infectious diseases in the wake of a pandemic drove changes in other areas? What would these impacts look like? This is referred to within the discipline of Systems Thinking as “Unintended Consequences”. The definition of Unintended Consequences is: Results of an action that are not considered or foreseen.

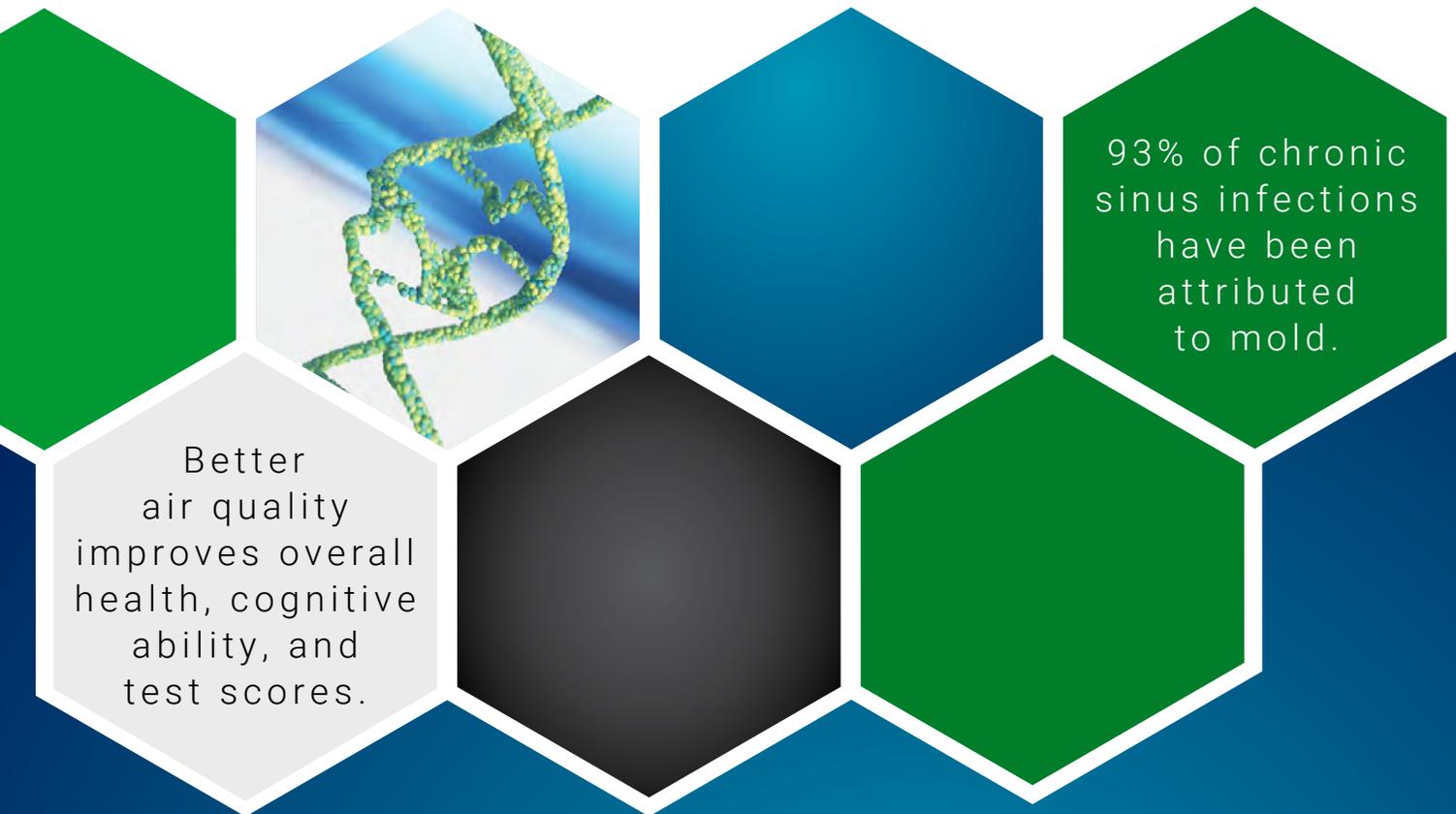
Most of the time unintended consequences are not good.

For example, early in the pandemic utilization of cleaners, disinfectants and sanitizers increased significantly. Nursing home administrators were complaining that the new cleaning and disinfection regimens were changing the color of wooden railings and trim. Use of these chemistries was typically up by 2-4X, despite the risks posed for future respiratory problems (COPD) and the symptoms they trigger with asthma and allergy sufferers.

Here is a relevant headline, and links to a few more meaningful studies related to the COPD risks:

**“Using national brand cleaners as little as once per week is as damaging to lung health as smoking 20 cigarettes per day.”**

[Learn More](#)



The 20-year study of 6,235 women and men with a beginning average age of 34 at 22 health centers in multiple countries. Over the next 20 years, participants were quizzed about their use of both spray and liquid home cleaning products and had their lung capacity tested regularly. <sup>(2)</sup>



COVID may be 'the reason this season' but other IAQ problems can be addressed concurrently.

*"Asthma problems and mold are closely linked – with about 40% of attacks being triggered by mold or other allergens"*

(Source: <https://realtimelab.com/mold-statistics/>)

## CAN **Unintended Consequences** BE POSITIVE?

*There are four types of Unintended Consequences —*

***Positive, Negative, Perverse, and Unforeseen***

**Can changing the process correct or improve unintended negative consequences?**

Absolutely. There are safer solutions, such [botanical antimicrobial cleaners](#) and sanitizers (all natural – safe for preschools, food wash, pets, bees, even toys) that are highly-effective. Another option is [hypochlorous acid](#), which sounds toxic (and it is to viruses and bacteria) but your body is making it right now to kill infectious diseases. It is 70X more effective than bleach at sanitizing and disinfecting surfaces. Changing or optimizing how cleaning chemistries that impact IAQ are used can significantly reduce VOCs (Volatile Organic Compounds) that cause breathing problems.

# POSITIVE CONSEQUENCES

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**The good news about unintended consequences:**

***Sometimes they are positive.***

Ensuring the health and well-being for students, staff, and visitors is clearly paramount. Improving the IDC ( Infectious Disease Control) capability does that. Air disinfection and purification is an effective tool for managing airborne pathogens. As it turns out, the right air purification solutions do have a positive unforeseen consequence in addition to making classrooms safer: They can significantly improve IAQ (Indoor Air Quality).

*“Researchers have found using portable air disinfection units to supplement a classroom’s HVAC system may result in up to five (5) times lower concentration of particles in the air. Improving air quality throughout the room, not just near the units.”*

*Good Morning America - July 21, 2021*



**But, there is a caveat: Do your homework.**

The last 18 months has seen a plethora of unproven and/or blatantly false claims related to efficacy. Some of these technologies and chemistries have even been deemed unsafe. [Class action suits are being filed](#) against manufacturers who made unsubstantiated claims, the [EPA is issuing SSURO's](#) (Stop Sale, Use or Removal Order), the FDA's "[Operation Quack Hack](#)" has issued 114 warning letters, filed 271 abuse complaints, and has list of over 1,000 unproven products. The [FTC is also cracking down](#), as are many state agencies.

The standard that we set is that every solution in our portfolio has to be proven in healthcare environments (and be compliant with all required regulatory bodies). Here is the qualifying question to ask vendors: ***Can you provide evidence of efficacy for the given applicaton in healthcare settings for the claims your product is making?*** If they cannot provide that information move on. And remember, lab data is collected in controlled environments. Schools are not “controlled environments”.

# THE VALUE OF CLEAN AIR

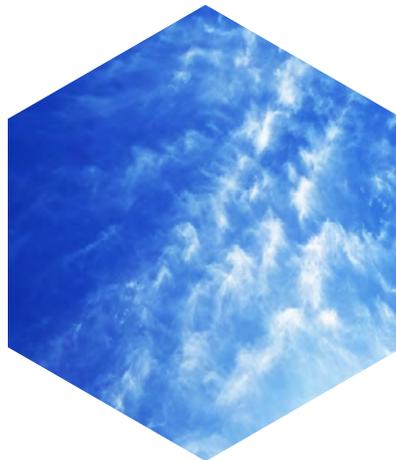
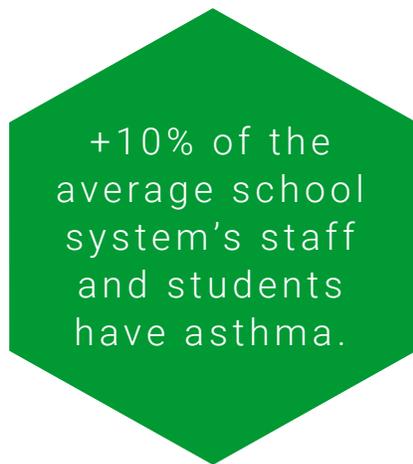
## Practical implications:

Poor indoor air quality in buildings can decrease productivity in addition to causing visitors to express dissatisfaction. The size of the effect on most aspects of office work performance appears to be as high as 6-9%, the higher value being obtained in field validation studies. It is more energy-efficient to eliminate sources of pollution than to increase outdoor air supply rates.

## IAQ and People: Human Performance Improved

Clean indoor air has been shown in multiple studies to improve human performance academically and athletically, with increases in cognitive ability, reading comprehension, and test scores as well as better overall health and well-being.

### [Athletes & Air - Download](#)



## Workplace well-being: returning to work

*"By surveying 3,000 employed adults across the US and Canada, we [Ambius] were able to discover how the mindset of the North American workforce, and the value it places on certain aspects of the workplace, have been altered since the onset of the pandemic. The survey asked those working in a range of environments, including factory and warehouse floors, hospitals, restaurants, schools, and general offices about their most important features of future workplaces."* <sup>(6)</sup>



The results indicated that 60% of respondents would take less money for better air and cleaner work environments.



## HOW **Important** is CLEAN, SAFE AIR TO STAFF?

***What were the top two most important features of a workspace according to the survey?***

- Clean pure and healthy air – 62%
- Efficient air circulation – 54%

[See Survey](#)

**Many schools are short-staffed as some teachers are afraid to come back to the classroom.**

*What made respondents seem anxious?*

- Stale & stuffy work rooms – 47%
- Poorly lit work spaces – 43%
- Unpleasant odors – 42%
- Poor ventilation- 42%



# CLEAN AIR IS AN ASSET



To better understand how layering air disinfection and safer surface solutions might compound their effectiveness. Goals, Levers (the tools used to move metrics), and the Impact on IDC efficacy were listed in columns. The fourth column, IAQ Impact, was added after it was observed that the same levers used to achieve the IDC goals also significantly improved Indoor Air Quality.

Goals	Levers (Tools)	IDC Impacts	IAQ Impacts
<ul style="list-style-type: none"> <li>Optimize and Improve IDC capability</li> <li>Use solutions that do not aggravate respiratory issues</li> <li>Use only proven &amp; safe technologies</li> </ul>	<ul style="list-style-type: none"> <li>(Air) Air disinfection at the source of origin</li> <li>(Surfaces) Persistent healthcare proven surface treatments</li> <li>(Safe-Sol) Safer Solutions - disinfectants and cleaners</li> </ul>	<ul style="list-style-type: none"> <li>Air disinfection technology bursts pathogen cell in .002 seconds</li> <li>Kills Mold &amp; Fungal Spores</li> <li>No colonization or antimicrobial resistance potential</li> <li>Significant measurable impact on reduction of aerosolized pathogens</li> </ul> <p><i>(Note: Pathogen – a microbial that transmits an infectious disease)</i></p>	<ul style="list-style-type: none"> <li>Air disinfection also significantly improves IAQ</li> <li>Interim tools for sick building and moisture control applications</li> <li>Effective against odors</li> </ul>
<ul style="list-style-type: none"> <li>Mitigate COVID-19 transmission risks (+ all other pathogens)</li> </ul>	<ul style="list-style-type: none"> <li>Air</li> </ul>	<ul style="list-style-type: none"> <li>99.99% effective against SARS-CoV-2 surrogate (lab)</li> <li>Viruses, Bacteria, Mold Spores</li> </ul>	<ul style="list-style-type: none"> <li>Reduces mold,</li> <li>Effective against odors</li> </ul>
<ul style="list-style-type: none"> <li>Manage transmission via touch (antimicrobials + other pathogens)</li> </ul>	<ul style="list-style-type: none"> <li>Surfaces</li> <li>Safe-Sol</li> </ul>	<ul style="list-style-type: none"> <li>Average +80% reductions in surface bio loads</li> <li>No colonization or antimicrobial resistance potential</li> <li>Effective against mold</li> </ul>	<ul style="list-style-type: none"> <li>Measuring surface bio loads justified reduced frequency of application and volume of cleaners and disinfectants</li> </ul>
<ul style="list-style-type: none"> <li>No negative impact on IAQ technology</li> </ul>			<ul style="list-style-type: none"> <li>IAQ Improved</li> </ul>
<ul style="list-style-type: none"> <li>Best health impact profiles for chemistries</li> </ul>			<ul style="list-style-type: none"> <li>Asthma triggers and respiratory irritants reduced</li> </ul>

The capability to mitigate the risk of transmission of SARS-CoV-2 (et. al) with air disinfection nanotechnologies meets the current critical need, especially for those with respiratory issues or compromised immunity. But the resulting IAQ improvements have far reaching positive impact for everyone.

# PROVING

## ROI

### From the CFO's perspective:

- **Potential for significant ADA loss avoidances** (results from clinical studies in healthcare environments suggest 25-35% reductions in absences due to illness are possible)
- **Cost savings on substitute teacher pool** (+ less negative impact on student performance)
- **Risk mitigation**
  - Data to substantiate decisions on ESSER \$ spending (potential look back?)
  - Position for potential future litigation re. VOCs from cleaners, disinfectants, and sanitizers
- **Best positioned to stay open** (with the data needed to prove performance)
- **Increased staff productivity and safety** <sup>(12)</sup>
- **Value of IAQ as related to recruiting & retention** - 60% of employees surveyed valued clean air over higher salary <sup>(7)</sup>

*"Respiratory health effects, such as infections and asthma, are most closely associated with increased absenteeism."* <sup>(4)</sup>

EPA

### Testing validates effectiveness and enables CPI (Continuous Process Improvement)

### Work-Related Asthma in California



With dozens of lab tests, clinical and case studies, and data from "live environments" schools can be assured the right solution sets will perform as claimed before budgets are allocated. More importantly, testing for surface bio loads, airborne bacteria, mold & fungal spores, particulates, and VOCs gives schools the data they need to drive continuous improvement of IDC capability and IAQ metrics.

# TESTING: VALIDATING RESULTS

## Leveraging Data

One forward thinking SEC (South Eastern Conference) University's Facilities Management team is using analytics on data they collect measuring the surface bio loads with ATP (Adenosine Triphosphate) bioluminescence testing. The data enables them to:

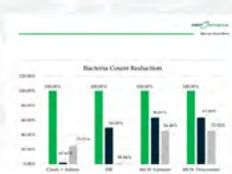
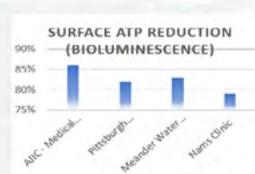
- ID problem areas sooner
- ID what surfaces are commonly missed
- Improve cleaning processes
- Improve training for staff
- Better manage and reduce consumption of cleaners and disinfectants
- Optimize staff resource allocation

So far, the university has saved millions, and they did not need to be coerced to implement the strategy. In fact, they "Volunteered"!



## Proving ROI: Data, Testing & Outcome Assurance

1. 55+ Clinical Studies, Case Studies, Lab Tests, and Papers – Documented Clinical Outcomes
2. Measure Pre-Deployment IAQ (Bacteria, Spores, Fungi) & Surface Bio Loads
3. Measure/Monitor Post-Deployment IAQ (Bacteria, Spores, Fungi) & Surface Bio Loads



Summary

The results shown in the graphs represent percentage reductions in total counts for the following:

1. Spores (totalated) in CFU/m<sup>3</sup>
2. Bacteria (totalated) in CFU/m<sup>3</sup>
3. Fungi (totalated) in CFU/m<sup>3</sup>

The average reduction across all five (5) locations tested for both scenarios is 85% and will keep you:

Test	Reduction
Spores	85%
Bacteria	85%
Fungi	85%





One in every 4 buildings in the United States has been effected by mold infestation. [All mold has the potential to cause health effects.](#)

## THE OPPORTUNITY:

SAFER AIR. CLEANER AIR. IMPROVED PERFORMANCE.

***AIR QUALITY IS AN ASSET. LEVERAGE THE ASSET.***

### **Safer, cleaner air benefits everyone.**

A unique opportunity exists for schools to use ESSER \$'s to improve both IDC capability and IAQ. Making air safer and making air cleaner are not mutually exclusive goals. Schools can:

- Respond and best position themselves for new variants or other pandemic events in the future
- Significantly improve and expand IDC capabilities making schools safer
- Significantly improve IAQ which improves performance for staff and students
- The value that staff, students, parents, and prospective new hires place on air quality continues to increase.



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Air Disinfection & Sanitation		
Product Information	Research	Other Air Resources
<ul style="list-style-type: none"> <li>• <a href="#">How NanoStrike Works (video 2:33)</a></li> <li>• <a href="#">NanoStrike Technology Brochure</a></li> <li>• <a href="#">NanoStrike Product Line Brochure</a></li> <li>• <a href="#">WellAir US Educational Product Line</a></li> <li>• <a href="#">WellAir US Education General Brochure</a></li> <li>• <a href="#">WellAir NV 1050 Spec Sheet</a></li> <li>• <a href="#">WellAir NV 900 Spec Sheet</a></li> <li>• <a href="#">WellAir NV 200 Spec Sheet</a></li> <li>• <a href="#">WellAir NV 1050 User Manual</a></li> <li>• <a href="#">WellAir NV 900 User Manual</a></li> <li>• <a href="#">WellAir NV 200 User Manual</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">WellAir US Research Summary</a></li> <li>• <a href="#">Hungary 5-Yr Study</a></li> <li>• <a href="#">Cork Inst Air Simulation Study</a></li> <li>• <a href="#">NV 900 Bioaerosol Efficacy</a></li> <li>• <a href="#">NV 1050 A. Niger Endospores Efficacy</a></li> <li>• <a href="#">NHS Clinical Trial Summary</a></li> <li>• <a href="#">PreK IAQ Testing Summary</a></li> <li>• <a href="#">WellAir – Comprehensive Research Library</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">School Cares Act Funding</a></li> <li>• <a href="#">WellAir Schools Brochure</a></li> <li>• <a href="#">Flu Checklist Infographic</a></li> <li>• <a href="#">NanoStrike Key Outcomes Table</a></li> <li>• <a href="#">Coronavirus Flyer</a></li> <li>• <a href="#">NV 1050 FDA – FAQs</a></li> <li>• <a href="#">Air Quality &amp; Athletic Performance</a></li> <li>• <a href="#">Exercise and Rhinitis in Athletes – European Medical Journal</a></li> <li>• <a href="#">Hospitality – Clean Air and The Guest Experience</a></li> <li>• <a href="#">Mold: The Problem &amp; Mitigation Options</a></li> </ul>

Safer Solutions: Surface Bio Load Management	
Product Information	Research
<ul style="list-style-type: none"> <li>• <a href="#">MicrobeCare Persistent Bonded Antimicrobial – Flyer</a></li> <li>• <a href="#">BAC – 99.99% Effective Botanical Antimicrobial Cleaner – Spec Sheet</a></li> <li>• <a href="#">BAC – Applications</a></li> <li>• <a href="#">Noroxydiff – Flyer</a></li> <li>• <a href="#">MicrobeCare SDS</a></li> <li>• <a href="#">BAC SDS</a></li> <li>• <a href="#">Noroxydiff SDS</a></li> <li>• <a href="#">Envirocleanse-A SDS</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">MicrobeCare – Accelerated Aging Test – Med Device</a></li> <li>• <a href="#">MicrobeCare – MRSA Cert</a></li> <li>• <a href="#">MicrobeCare – American Journal of Infection Control – OR Study</a></li> <li>• <a href="#">MicrobeCare – American Journal of Infection Control – ICU Study</a></li> <li>• <a href="#">Envirocleanse-A Virus &amp; Microbe Testing</a></li> <li>• <a href="#">Cleaning product use affecting asthma more during COVID-19 measures</a></li> <li>• <a href="#">Exposure to Disinfectants, Cleaning Products Linked to COPD Risk Among Female Nurses</a></li> <li>• <a href="#">Household Cleaning Products as Bad as Smoking</a></li> <li>• <a href="#">People with asthma could be negatively affected by increased disinfectant use in the COVID-19 era</a></li> <li>• <a href="#">Chemical &amp; Engineering News: Do we know enough about the safety of quat disinfectants?</a></li> </ul>

# SOURCES AND LINKS (cont.)

Other Resources	
Videos	Additional Information
<ul style="list-style-type: none"><li>• <a href="#">How MicrobeCare Works (1:04)</a></li><li>• <a href="#">MicrobeCare Health Briefs with OR Study Overview – (5:00)</a></li><li>• <a href="#">MEDformance: Disinfectant Dilemma – (1:21)</a></li><li>• <a href="#">Science Academy – For Kids: Indoor Air Quality Matters (1:34)</a></li><li>• <a href="#">MEDformance: Safer Solutions – (1:03)</a></li><li>• <a href="#">Possible Link Between Quaternary Ammoniums and Reproductive Health (1:10)</a></li><li>• <a href="#">Types of Toxic Mold That Can Hurt You (5:33)</a></li></ul>	<ul style="list-style-type: none"><li>• <a href="#">U.S. Army – Industrial Hygiene Public Health Mold Assessment Guide</a></li><li>• <a href="#">EPA – Managing Asthma in the School Environment</a></li><li>• <a href="#">NIEHS – Asthma Overview</a></li><li>• <a href="#">Framework for Effective School IAQ Management</a></li></ul>





# SAFER CLEANER SCHOOLS

Please reach out if you would like to learn more about how healthcare-proven solution sets are mitigating the risk of infectious disease transmission and improving IAQ.



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