

Reducing the Spread of Illness in School Settings

How whole-room disinfection systems reduce student, teacher absences, saving schools thousands of dollars annually.

Executive Summary

Today's modern school environments present a complex and persistent challenge for preventing the spread of infectious diseases. High-density populations, prolonged indoor exposure, and frequent contact with shared surfaces are just some of the reasons why traditional classroom settings are the ideal environment for viruses and other harmful pathogens to spread.



***AeroClave's RDS-3110 Room Decontamination System
being used to disinfect a classroom***

To better protect the health of students and staff, a growing number of schools have begun implementing advanced infection control systems into their routine cleaning protocols. These systems not only help prevent the spread of infectious diseases across campus, but studies show that when implemented as part of a routine cleaning protocol, schools experience significant reductions in illness-related absenteeism among both students and staff. This, in turn, improves operational continuity, decreases costs associated with hiring substitutes, and increases budgets for schools whose funding is based on Average Daily Attendance (ADA).

A growing body of research since the COVID-19 pandemic shows that enhanced disinfection protocols – beyond the traditional spray-and-wipe methods – can significantly reduce the transmission of harmful pathogens in school settings.¹ Studies show that viruses can remain viable on common classroom surfaces for several days.²

According to the U.S. Centers for Disease Control and Prevention (CDC), these contaminated surfaces can serve as reservoirs for pathogens for extended periods and become a source of widespread transmission, reinforcing the need for routine disinfection practices to prevent their spread through repeated contact.³

¹ Eykelbosh, A. et al. "Effects of Classroom Cleaning on Student Health: A Longitudinal Study." *PubMed*, 2022.

² Castaño, Nicolas et al. "Fomite Transmission and Disinfection Strategies for SARS-CoV-2 and Related Viruses." *arXiv preprint* (2020).

³ Centers for Disease Control and Prevention. (2024, April 26). *About Project Firstline*.

While traditional spray-and-wipe cleaning processes remain necessary, they often fail to provide effective, comprehensive and consistent coverage of high-touch and hard-to-reach areas. As a result, viruses and pathogens can persist on these surfaces and further propagate the transmission cycle.

This paper examines how whole-room aerosolized disinfection systems, such as AeroClave's Room Decontamination Systems (RDS), are being implemented in school settings to address these limitations. It synthesizes available research on the importance of integrating these advanced decontamination technologies into a school's routine cleaning process, evaluates the operational and financial benefits of reducing the spread of illnesses on campus, and explains how AeroClave's systems can be incorporated with minimal operational cost.

Background: The Invisible Threat in Modern School Settings

While every school is unique, there are certain traits they all share. Most schools are densely populated environments where students and teachers interact frequently and come into repeated contact with shared, high-touch surfaces. While these conditions support an effective learning environment, they can also facilitate the rapid spread of infectious diseases throughout a community.

Studies show that *illness* remains the largest driver of student absenteeism nationwide.⁴ In fact, a recent survey found that more than two-thirds of school-aged children report missing at least one day of school each year due to illness, while nearly one in five children miss more than 7 days each year because they are sick.⁵

Researchers examining disease transmission in school settings have found that some of the most common viruses, including Influenza A and Norovirus, can survive on typical school surfaces – such as plastics, metals, and composite materials – for several days.⁶ Once contaminated, these surfaces serve as vectors for indirect transmission throughout the community. When an individual comes in contact with a contaminated surface, they can start spreading the pathogen to other areas, creating new vectors; or acquire infection themselves by touching their face.⁷

Studies of real-world classroom environments have identified measurable microbial loads on some of the most common high-touch surfaces.⁸ In one study, researchers detected

⁴ Diliberti, M. K., Chu, L., Rainey, L. R., DiNicola, S. E., Lake, R. J., & Schwartz, H. L. (2025). *Chronic absenteeism still a struggle in 2024–2025: Selected findings from the American School District Panel and the American Youth Panel*. RAND Corporation.

⁵ Child and Adolescent Health Measurement Initiative. (2022). *2022 National Survey of Children's Health (NSCH): Number of school days missed due to illness or injury during the past 12 months, nationwide*. Data Resource Center for Child and Adolescent Health.

⁶ Castaño, Nicolas et al. "Fomite Transmission and Disinfection Strategies for SARS-CoV-2 and Related Viruses." *arXiv preprint* (2020).

⁷ Centers for Disease Control and Prevention. *Environmental Infection Control Guidelines*. CDC, 2023.

⁸ Eykelbosh, A. et al. "Effects of Classroom Cleaning on Student Health: A Longitudinal Study." PubMed, 2022.

Influenza A on nearly 50% of surfaces they tested and Norovirus on approximately 22%.⁹ The most contaminated areas included the water fountain controls, desk surfaces, keyboards, and faucet handles.¹⁰

These findings not only underscore the persistent threat that these viruses pose, but also the limitations of conventional cleaning processes in trying to control the spread of pathogens in a school setting.

Financial Impact of Illness-Related Absences

While all schools have a duty to protect the health and well-being of their students and staff, for some schools preventing the spread of illness can have a significant financial impact as well. Schools whose funding is tied to the Average Daily Attendance (ADA) can save tens of thousands of dollars each year by reducing the number of illness-related absences among its students.

States with ADA-based funding:

- California
- Idaho
- Kentucky
- Missouri
- Texas

In California, for example, schools reportedly lose up to \$90 in funding for each student absent, each day.¹¹ In Texas, the average loss is \$45 per student, per day.¹² For institutions with funding tied to ADA, reducing illness transmission is both a public health priority and a financial imperative – with even a modest reduction in absenteeism resulting in significant financial gain.

Effectiveness of Enhanced Disinfection

Research shows a direct correlation between the implementation of enhanced disinfection procedures in a school setting and significant reductions in illness-related absenteeism among both students and staff.

A multi-school longitudinal study involving over 15,000 students found that enhanced cleaning and disinfection protocols led to a significant reduction in absenteeism.¹³ Further studies that compared schools with standard cleaning protocols and those with enhanced disinfection practices showed measurable reductions in absenteeism as a result of the enhanced processes.¹⁴

⁹ Bright KR, Boone SA, Gerba CP. *Occurrence of bacteria and viruses on elementary classroom surfaces and the potential role of classroom hygiene in the spread of infectious diseases*. J Sch Nurs. 2010 Feb

¹⁰ Bright KR, Boone SA, Gerba CP. *Occurrence of bacteria and viruses on elementary classroom surfaces and the potential role of classroom hygiene in the spread of infectious diseases*. J Sch Nurs. 2010 Feb

¹¹ Johnson, S. (2025). *Chronic absenteeism crisis is costing schools funding*. EdSource.

¹² Wood, S. (2024, July 31). *Showing up matters: Attendance drives student success and state funding*. Texas Association of School Boards.

¹³ Shaughnessy R, Hernandez M, Haverinen-Shaughnessy U. *Effects of classroom cleaning on student health: a longitudinal study*. J Expo Sci Environ Epidemiol. 2022 Sep

¹⁴ Talaat M, Afifi S, Dueger E, El-Ashry N, Marfin A, Kandeel A, Mohareb E, El-Sayed N. *Effects of hand hygiene campaigns on incidence of laboratory-confirmed influenza and absenteeism in schoolchildren, Cairo, Egypt*. Emerg Infect Dis. 2011 Apr

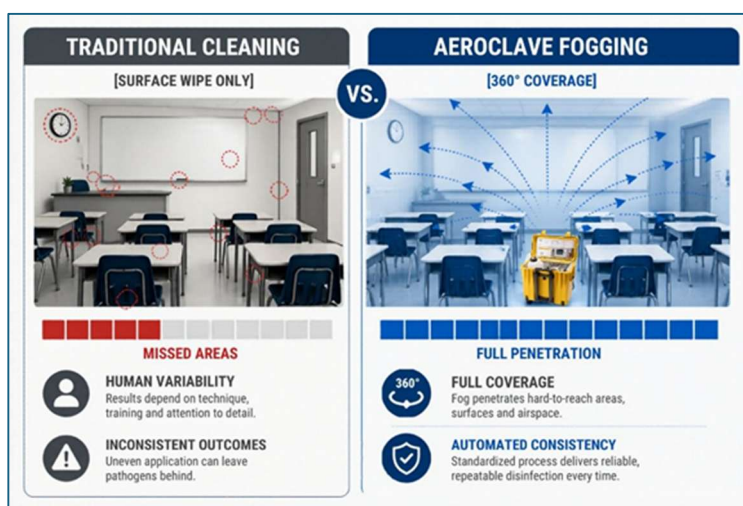
A study conducted at an elementary school in Bunell, Florida reported a 14% reduction in annual absenteeism after it began implementing daily disinfection practices, with a 50% reduction in absences during peak illness periods compared to the prior year.¹⁵

These findings further underscore CDC guidance recommending that schools routinely disinfect frequently touched surfaces, noting that viruses such as influenza can remain infectious on surfaces for up to 48 hours.¹⁶

Limitations of Conventional Cleaning

While traditional spray-and-wipe cleaning methods remain essential, they have inherent limitations. Manual cleaning processes, for example, rely heavily on human consistency and adherence to protocol. Variability can result in uneven coverage, particularly in complex or cluttered classroom environments, leaving contaminated surfaces behind.

Studies show that visible cleanliness does not necessarily correlate with microbial reduction, and that pathogens may remain viable even after standard cleaning procedures are complete.¹⁷ These findings highlight a critical gap between surfaces that are perceived clean, and those that are “actually clean.”



In addition, manual cleaning protocols are constrained by time and labor resources. Thorough manual disinfection of large facilities – such as cafeterias and gymnasiums – requires significant staffing and resources. As a result of these constraints, high-touch surfaces in these spaces are often prioritized, while less accessible areas – such as in crevices and the undersides of furniture – are often overlooked.

Cross-contamination is another concern. Studies show that improper wiping techniques or insufficient disinfectant dwell times can inadvertently spread pathogens rather than eliminate them.¹⁸

¹⁵ Flagler Schools. (2019, August 12). Press Release: *Flagler Schools reduces absenteeism rates and bioburden in elementary schools.*

¹⁶ Centers for Disease Control and Prevention. (2021). *How to clean and disinfect schools to help slow the spread of flu.*

¹⁷ Dancer SJ. *Controlling hospital-acquired infection: focus on the role of the environment and new technologies for decontamination.* Clin Microbiol Rev. 2014 Oct

¹⁸ Infection Control Today. (2008, August 22). *Experts issue reminders on proper usage of wipes to reduce cross-contamination.*

These limitations further underscore the benefit of integrating a complementary enhanced disinfection system as part of a school's current cleaning protocols to provide complete, consistent, and repeatable disinfection outcomes in both large and small areas.

The Benefits of Whole-Room Disinfection Systems

Whole-room disinfection systems, such as AeroClave's RDS-3110 and RDS-6110 systems, represent a significant advancement in infection control technology.

These automated systems convert liquid disinfectants into small, aerosolized droplets that fill a room like a dense disinfecting fog, reaching all of the exposed surfaces.

This approach ensures complete, consistent and uniform coverage of the entire space, and all of the surfaces in it, including areas that are difficult or impossible to reach during manual cleaning. The result is a complete disinfection of the entire environment.



***AeroClave's RDS-6110 Room Decontamination System
being used to disinfect a locker room***

AeroClave's patented systems have been used by schools, hospitals, and public health agencies for nearly two decades. The easily portable systems can be used to decontaminate a typical classroom in under 30 minutes, without requiring any additional labor or disrupting existing cleaning workflows. Once the process is complete, the aerosolized disinfectant fully dissipates without leaving behind any residue, making it safe for use on electronics, paper or any other standard classroom materials.

Impact on Staff Attendance and Operational Stability

The presence of pathogens on school surfaces not only puts students at risk, but can affect the health of teachers and staff as well. Teacher and staff absences due to illness remain a persistent operational challenge for school administrators.

Research indicates that by implementing the use of enhanced disinfection technologies, schools can reduce illness-related absences by 10-20%.¹⁹ This reduction not only improves a school's operational stability, but it reduces the costs associated with substitute staffing – potentially saving schools thousands of dollars each year.

¹⁹ Flagler Schools. (2019, August 12). Press Release: *Flagler Schools reduces absenteeism rates and bioburden in elementary schools.*

Integrating Enhanced Decontamination Systems in Schools

Enhanced disinfection systems are designed to complement – not replace – traditional cleaning methods. Aerosolized disinfection systems, for example, are most effective when integrated into a layered approach to infection control.

In practice, schools typically deploy these systems as part of their routine cleaning cycle and, when necessary, for targeted intervention following an identified illness or outbreak.

Common application areas include classrooms, cafeterias, buses, gymnasiums, administrative offices and other high-traffic areas. Portable systems allow for flexible deployment across multiple campuses, and custodial staff can often be trained to operate them with minimal disruption to their existing workflow.



Economic Considerations: Return on Investment

Integrating the use of advanced disinfection technologies into a school's cleaning protocol requires a significant upfront investment. That said, due to the minimal cost required to routinely operate these systems, and the financial benefits of reducing illness-related absences, they often provide schools with a significant return on investment in a relatively short period of time.

For schools with funding tied to ADA, reducing illness-related absenteeism can save schools tens of thousands of dollars each year. Schools with more traditional funding models also benefit by reducing substitute staff costs and improving operational continuity. Even a modest improvement in a school's overall attendance rate – by preventing the spread of illnesses on campus – can yield significant financial savings.



SPECIFICATIONS	RDS-3110	RDS-6110
Voltage	110VAC	110VAC
Dimensions		
- Width	20"	20"
- Height	12"	46"
- Depth	18"	25"
Weight	48 lbs.	154 lbs.
Static Heads	2	4
SmartPorts	1	2
Reservoir Size	1.2 Gal	2.64 Gal
Max Room Size	5,000 ft ³	15,000 ft ³

With a per-treatment cost of approximately \$1.50 per room and no additional labor requirements, these systems quickly offset their initial investment. Over time, the return on investment continues to compound as operating and maintenance costs remain minimal.

Real-World Case Study

A multi-year study done by the municipal fire department in Winter Park, Florida showed a significant reduction in illness-related absences after it began using AeroClave's system on a regular basis.

In 2012, after seeing a steady increase of unscheduled illness-related absences throughout the depart, the Winter Park Fire Department began using AeroClave's RDS-3110 to regularly decontaminate their vehicles and fire stations.



AeroClave's RDS-3110 Room Decontamination System being used to decontaminate the Winter Park, FL fire station

Prior to utilizing the AeroClave system, the department's cleaning routine involved the use of a hospital grade disinfectant and the standard spray-and-wipe method.

After four years of using the AeroClave system, the department reported a 34% reduction in illness-related absences among its staff. This reduction, according to the chief, not only resulted in substantial cost savings for the department but also led to a widespread sense of well-being that had permeated through the staff.

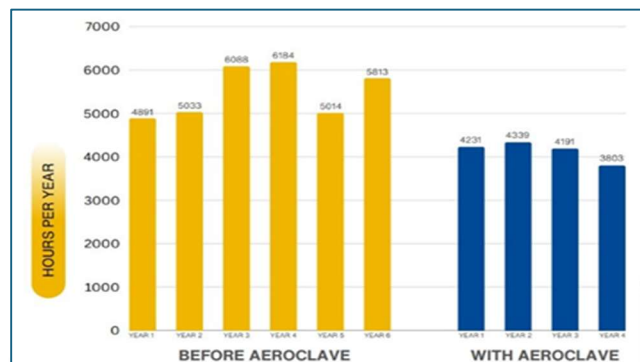


Table 1: Annual Unscheduled Leave Hours Reported by Winter Park Fire Department

Pandemic Preparedness and Community Confidence

Schools play a unique and central role in their community's overall health ecosystem; and their ability to manage the spread of infectious diseases has implications that extend far beyond their campus boundaries.

One of the lessons learned as a result of the COVID-19 pandemic was the importance of taking proactive infection control measures to maintain educational continuity and public confidence.

By investing in advanced disinfection systems, schools further enhance their ability to respond to future outbreaks and reduce disruptions. The regular use of these technologies also serves as an important signal to parents and communities that student health and safety are an institutional priority.

Conclusion

Preventing the spread of infectious diseases in a school setting is an ongoing challenge with significant educational, operational, and financial implications.

Studies show that while traditional cleaning practices are essential, they alone are insufficient. Integrating whole-room disinfection systems into a school's standard cleaning protocol can effectively reduce the presence of pathogens on high-touch surfaces. The regular use of these systems can reduce the spread of illness and illness-related absences – and further strengthen a school's ability to respond to future outbreaks.

For many schools, the use of these systems not only provides a meaningful public health benefit but also a significant return on investment, as well, by increasing attendance-based funding, reducing substitute costs, and improving overall operational continuity.

About AeroClave, LLC

AeroClave, LLC is a privately held company located in Winter Park, Florida. Its mission is to develop cost-effective technologies to prevent the spread of infectious diseases.

AeroClave's founder, Ronald D. Brown, MD, is an emergency physician and past EMS Medical Director with over 35 years of clinical experience. For more information, please visit www.aeroclave.com