

An operating room with a surgical table, overhead lights, and a disinfection machine. The disinfection machine is a tall, grey unit with a control panel on top, emitting a mist. The surgical table is black and has 'SKYTRON' and 'MISCO' written on it. The overhead lights are white and have 'ALM' written on them. There is a clock on the wall and a blue cabinet with drawers in the background.

The Buyer's Guide to Whole Room Disinfection

Your definitive guide to identifying the right technology for your whole room disinfection requirements.

INTRODUCTION

Getting Started

Whole room disinfection has recently garnered significant attention in the infection control landscape—and for good reason. Research tells us that manual methods of disinfection are not sufficient for combating the formidable threat of 75,000+ deaths caused by healthcare-associated infections (HAIs) per year.

For health systems, HAIs threaten the lives of patients as well as system reputation, profitability and efficiency. While much progress has been made in the fight against HAIs over the last decade, there is still much to be done. Without a widespread and systematic adoption of whole room disinfection technology, healthcare will never dramatically reduce HAI occurrence.

To make matters more complex, not all whole room disinfection systems are created equal. For infection control professionals, facilities managers and healthcare management, selecting the right whole room disinfection system for the job can be a complex feat—with numerous decision-making criteria that must each be satisfied.

If you have been tasked with identifying the right whole room disinfection system for your organization, you're in the right place.

Use this as your integrated guide to navigating the many decision-making factors you face, including:

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COVERAGE

Complete Coverage, No Exceptions

When it comes to **coverage**, the term “whole room disinfection” can be deceiving. In fact, many whole room disinfection technologies on the market today do not disinfect the whole room at all.

The least comprehensive coverage comes from manual disinfection. Even the most thorough manual disinfection is unable to target hard-to-reach pathogens and achieve uniform coverage. This is due to the inherent variation in procedures carried out by humans.

While a significant improvement upon manual methods, UV-based whole room disinfection systems are also unable to put the ‘whole’ in whole room disinfection. Because the UV system relies on light to disinfect, shadows, distance and line of site are its Achilles’ heels. The lion’s share of UV technologies require technicians to reposition the system around the room to improve coverage. With room turnover on the line, this is far from ideal.

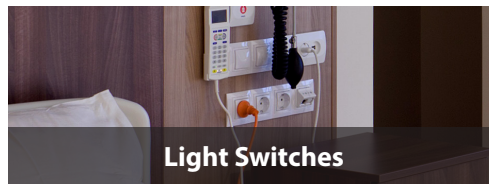
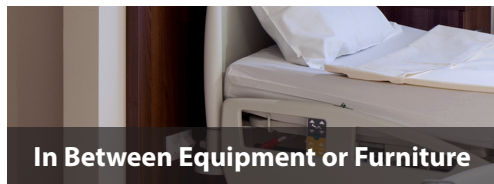
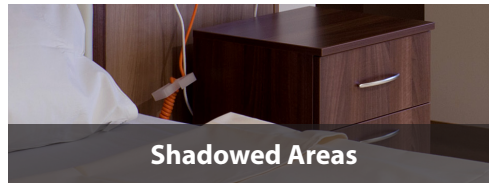
Coverage

The thoroughness and reach of a given disinfection technology throughout the space it is intended to disinfect.




Some may argue that crevices or shadowed areas such as under the bed, beneath the bed rails or in between furniture don't matter. However, this argument can be thoroughly debunked. Any residual spores or bacteria in these areas are capable of quickly reproducing, and ultimately infecting.

Let's take a look at some of the nooks and crannies left untouched by many so-called whole room disinfection systems:



According to a recent survey of infection control professionals:

 **53 percent** feel that while UV systems generally disinfect, they **do not effectively reach shadowed areas or across large distances.**¹

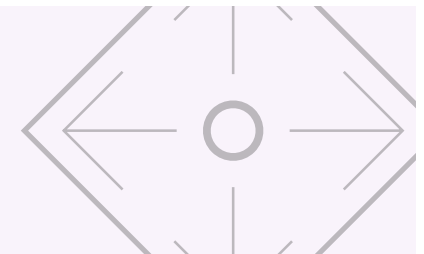
 **10 percent** feel that UV systems **do not work well at all.**¹

 Experts believe that **only 50 percent** of surfaces are disinfected during **manual cleaning and disinfection processes.**²



Halo-Sealed™ Beyond the Shadow of a Doubt

The Halo Disinfection System® ensures comprehensive and uniform surface coverage for the entire room—even in areas beyond the reach of manual or UV disinfection methods.

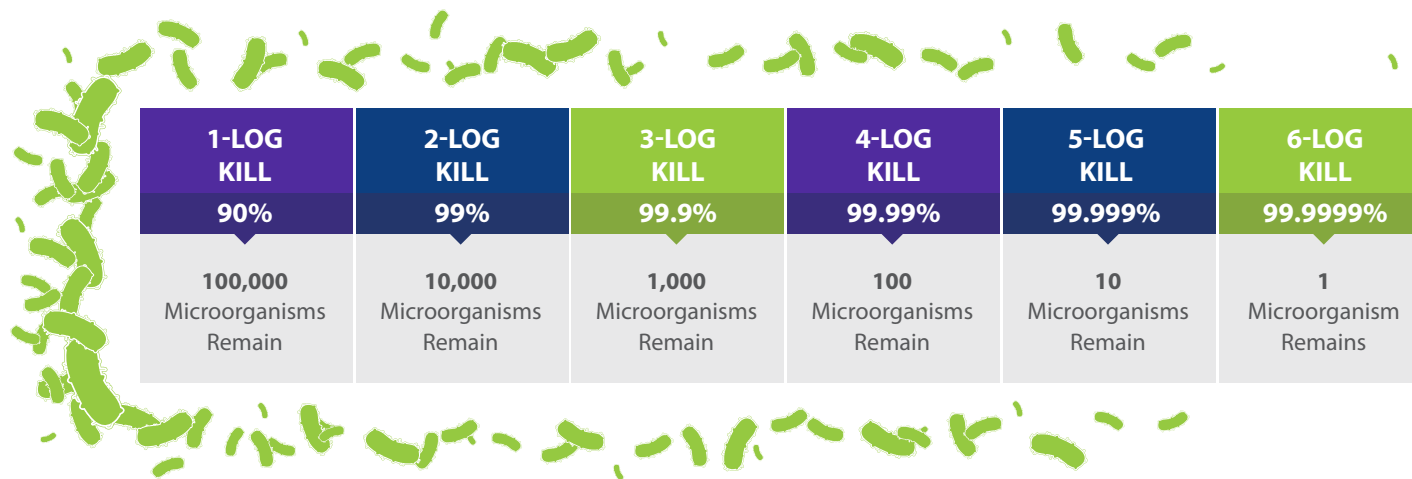


EFFICACY

Proving Efficacy, to the 6th Log

Where coverage addresses the reach of a given disinfection technology, **efficacy** refers to its ability to kill bacteria wherever it reaches. When it comes to your disinfection efforts, the importance of efficacy cannot be overstated. It takes but a few pathogens to infect a patient, so 'almost disinfected' simply isn't enough.

The industry measures efficacy on a logarithmic scale to show the relative number of microorganisms eliminated as a result of disinfection efforts. For every 1,000,000 microorganisms living in a hospital room, let's take a look at the impact of each logarithmic reduction:



Efficacy

A disinfection technology's ability to kill bacteria wherever it reaches.

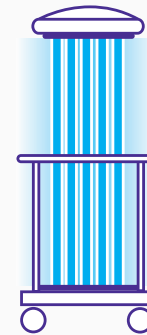
A 6-log kill rate is the highest validated efficacy on the market today and represents a near-sterilization of the disinfected space. In medical shorthand, this is often referred to as a “greater-than-6-log reduction” or a “6-log kill.” It is the gold standard for whole room disinfection—and the only standard for health systems looking to definitively protect their patients.

How effective are leading disinfection methods on the market? While manual cleaning methods may result in a 1-log kill, leading UV technologies have been proven to achieve between a 1- and 3-log reduction of harmful microorganisms under ideal circumstances.

Of course, this does not mean that infection rates will be 10,000 times higher with a UV system. It is to say, however, that with lives, reputation and outcomes on the line—this is not a chance that you should be willing to take, particularly when technologies with a 6-log kill rate are readily available.

When conducting the search for a whole room disinfection system, it is not only important to ‘look for the log’, but also to look for credible studies that validate efficacy. You’ll want the EPA or an equally regarded independent body to affirm the logarithmic reduction. There is no efficacy without proof.

According to a recent survey of infection control professionals:



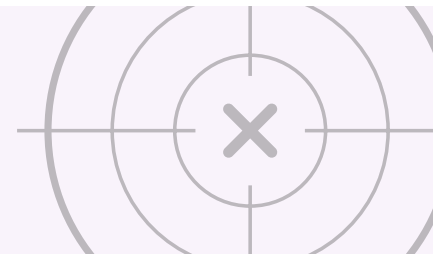
57 percent consider a 6-log kill a ‘must have’ for disinfection efforts.¹

13 percent feel that UV systems typically provide a 6-log kill.¹



Halo-Sealed™ for the Highest Possible Efficacy

The Halo Disinfection System® has been EPA validated to achieve a 6-log kill rate of dangerous *C. difficile* spores in healthcare settings, representing the highest possible efficacy on the market.



AFFORDABILITY

Getting a Comprehensive Picture of Cost

With healthcare systems under mounting pressure to cut costs, **affordability** is an essential consideration in selecting a whole room disinfection system. Typically, professionals associate affordability with tradeoffs in efficacy. However, this is not necessarily the case.

Identifying the most affordable system requires professionals to adopt a comprehensive view of the cost equation, including the following elements:



INITIAL COST

The cost of acquiring the technology, including the equipment itself, and costs associated with training and implementation.



OPERATING COST

The cost of operating the technology, including the demand for any consumables, as well as the cost of ongoing maintenance and service.



COST SAVINGS

The cost savings that result from preventing HAIs in the healthcare environment.







Affordability

The ability of a healthcare provider to afford the total cost of a disinfection system.

$$\text{Cost Savings} - \text{Initial Cost} - \text{Operating Cost} = \text{Net Cost / Return}$$

It is essential that projected cost savings be considered part of the cost equation from the onset, since the cost of care for a patient with an HAI is roughly 5.5x that of a patient without. Too often, whole room disinfection is relegated to a line item on the budget, without considering the boost to the bottom line that results from an effective effort.

Now, let's evaluate whole room disinfection methods in light of these considerations.

| |  Initial Cost |  Operating Cost |  Cost Savings |
|---|---|---|--|
|  UV Disinfection | High | High | Moderate |
|  HPV | High | High | High |
|  Halo Disinfection System® | Moderate | Low | High |



The average cost of care for a patient without an HAI is **\$35,000.**³

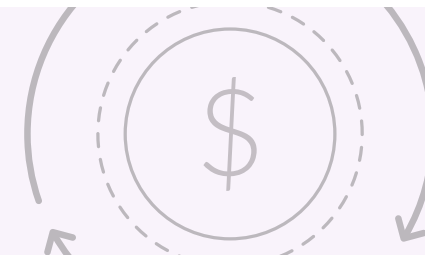


The average cost of care for a patient with an HAI is more than **\$190,000.**³



Halo-Sealed™ for the Ultimate Affordability

The Halo Disinfection System® provides the ultimate value in whole room disinfection with an affordable up-front cost, a low cost of operation and the ability to eliminate spiraling costs associated with HAIs.



FLEXIBILITY

Adapting to Diverse Demands

When considering a whole room disinfection system, it is important to recall that whole room disinfection is one part of a larger infection control strategy that involves personnel procedures, cleaning regimens and more.

For that reason, it is imperative that a whole room disinfection technology be **flexible** enough to satisfy diverse demands and seamlessly support other infection control processes that are in place.

Flexibility

A whole room disinfection system's ability to adapt to the diverse demands of the healthcare environment.



In a given healthcare setting, there are myriad areas in need of disinfection—each with their own distinct requirements. Some of these include:



OPERATING ROOM

The OR is one of the most delicate disinfection spots, as patients are most vulnerable to any pathogen in the surrounding area.

For this reason, operating room disinfection efforts must be of the highest efficacy and safety.



HOSPITAL ROOM

The hospital room is where patients spend the majority of their stay.

Due to the pressure to compress room turnaround times, hospital rooms must be disinfected effectively, and in rapid succession.



EXAMINATION ROOM

The examination room is subject to high foot traffic and is therefore exposed to a diverse range of infection threats.

A multi-faceted solution is needed for this space, including manual disinfection protocols throughout the day, followed by whole room disinfection overnight.



EMERGENCY VEHICLE

In the ambulance, patients and staff EMTs are in a confined area where they are especially vulnerable to bacteria.

Many whole room disinfection solutions are too large or unwieldy to disinfect the confined ambulatory cabin.

In order to effectively disinfect all of these 'spaces and places,' a whole room disinfection system must meet the following criteria:



Easily navigable through the healthcare setting.

This means that moving the system from place to place must be easy for personnel tasked with disinfecting the healthcare environment.



Capable of addressing spaces of all shapes and sizes.

The disinfection requirements of healthcare do not fit neatly in a box. As a result, the system must be able to disinfect spaces of all shapes and sizes.



Multiple tools for comprehensive disinfection.

The system must be equipped with multiple disinfection tools so that healthcare professionals can build a regimen that works, and address spaces that are not optimized for whole room technologies.



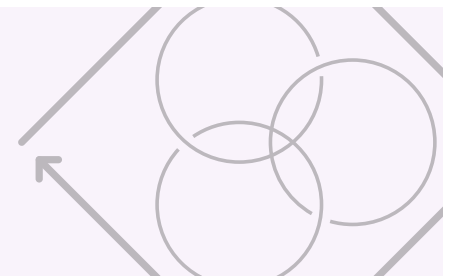
Equipped with features to support rapid deployment.

Because healthcare settings are fast moving and continuously serving patients, the system must be designed to disinfect multiple spaces in rapid succession.



Halo-Sealed™ for the Ultimate Flexibility

The Halo Disinfection System® delivers both dry-fogging and spot treatment technologies to support each organization's whole room regimen. Furthermore, the system's HaloFogger® is equipped with flexible features and nozzle sets to accommodate all of healthcare's diverse environments.



HUMAN SAFETY

Protecting Your Patients and Personnel

In the effort to protect your patients and staff from harmful HAIs, it is important that you not inadvertently do harm to them. The **safety** of patients and personnel must be a top priority when selecting a whole room disinfection system.

The EPA mandates its own safety and efficacy criteria to which commercial disinfection solutions must adhere. While all disinfectants on the market are capable of doing harm if not properly handled, some are safer than others.

For example, bleach has long been regarded as the most dangerous option for disinfection due to its harmful respiratory side effects and severe risk to eye and skin surfaces. Both hydrogen peroxide and UV-based disinfection are generally accepted as safer methods than bleach.

Human Safety

A whole room disinfection system's ability to be used safely around patients and staff members, assuming proper protocols are followed.



In your evaluation of a whole room disinfection system, look for the following safety criteria:

1

THE RIGHT CONCENTRATION

One pillar of a solution's safety is its concentration of disinfectant. While your first instinct may be to go for a higher disinfectant concentration, it is important to note that this does not always translate to higher efficacy. For every disinfectant, there is a proper concentration and formulation to ensure effectiveness.

2

READY TO USE

A ready-to-use disinfectant eliminates the need for staff to handle or mix the formula on site. This not only ensures that the disinfectant is in a consistent and proper formulation every time it is applied, it also protects staff members from potential irritants.

3

GERM DESTROYING, EARTH FRIENDLY

A second pillar of safety is the whole room disinfection system's ability to be broken down into materials that are found naturally in the environment. For example, hydrogen peroxide is comprised of hydrogen and oxygen, and breaks down into harmless water and oxygen gas once the disinfectant has been applied.

4

THE IMPORTANCE OF THE RIGHT REGIMEN

Finally, no matter your whole room disinfection system, it is important that you identify the right regimen, disinfecting as frequently as is necessary to eliminate HAs in your environment. Part of protecting patients and personnel is using the right product, in the right environment, with the right frequency.



Halo-Sealed™ for a Higher Safety Standard

The Halo Disinfection System® is comprised entirely of elements found naturally in our environment, and breaks down into oxygen and water. The system's proprietary HaloMist™ disinfectant offers greater thermal stability and efficacy than hydrogen peroxide, replacing the commodity at a 1:5 ratio.



EQUIPMENT SAFETY

Protecting Mission-Critical Equipment

The medical environment is filled with life-saving electronic equipment that is both costly and critical. While some medical equipment can be easily moved, doing so takes time, care and effort. Still, other medical equipment is virtually immovable.

It is of paramount importance that your whole room disinfection strategy **protects this equipment** in its natural environment without having to relocate it every time you disinfect. A whole room disinfection strategy that does not protect and disinfect this equipment is not a viable strategy, particularly as electronics become more and more essential to the everyday delivery of care.

Equipment Safety

The ability of a whole room disinfection to be safely used in the midst of electronic medical equipment.





MANUAL

In order to be effective, conventional sprays must wet surfaces for long enough to appear visibly wet for several minutes. This wet delivery prevents such solutions from being safely used around sensitive electronics.



UV

Certain UV devices also pose a threat to delicate electronics due to their incompatibility with some materials.



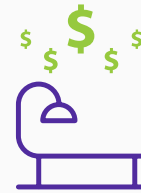
HPV

A hydrogen peroxide vapor (HPV) disinfection method utilizes a 30 percent H₂O₂ concentration that is highly effective but risks damaging treated surfaces with blistering or corrosion.



HALO DISINFECTION SYSTEM®

Alternately, dry mist fogging technologies begin with a liquid disinfectant that is aerosolized into an exceptionally dry mist that is safe to use around all types of electronic medical equipment.



The operating room equipment market is expected to reach **\$4.5 billion** by 2019.⁴

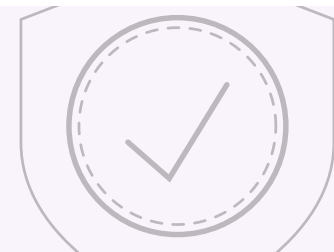


Up to **50 percent** of operating room costs are **attributable to equipment.**⁵



Halo-Sealed™ for Dry Fogging Delivery

The Halo Disinfection System® provides an exceptionally dry and noncorrosive fogging delivery, with a droplet size less than 10 microns. As a result, the technology is safe for use around medical equipment of all types—including expensive electronics and bedside computers.



SPEED

Compressing the Time to Results

Room turnaround is the time between one patient being discharged from a room and another being admitted to the same room. During this time, the healthcare provider must complete any necessary administrative work, terminal cleaning and disinfection regimens, as well as other preparations such as replacing the bed sheets and linens for the next patient.

An **efficient room turnaround time** can improve patient satisfaction by more quickly serving waiting patients. With that said, it is important to note that a quick room turnaround time cannot come at the expense of the next patient's safety. A provider that puts turnaround time over room readiness risks harmful HAIs that result in avoidable readmissions, poor patient outcomes and a damaged reputation.

Furthermore, it is also important to recognize that disinfection is often just a small fraction of the overall time between patients.

Speed

The total time it takes for a whole room disinfection system to complete a cycle, from the time a patient leaves the room until the time a new patient can occupy the room.



Terminal Disinfection's Role is Very Important.

Terminal disinfecting eliminates any potentially harmful microorganisms from the environment so that they cannot affect the next patient.

A Comprehensive Look at 'Speed'

Evaluating the real speed of a disinfection solution requires examining multiple factors, including:

1 SPEED OF PREPARATION

The first consideration is the speed of preparation. How long does it take to ready the room for disinfection? This includes removing any equipment and sealing off vents and doors.

2 SPEED OF CYCLE

The second consideration is the speed of the disinfection cycle. How long does it take the system to disinfect a given space?

3 REPOSITIONING CYCLES

A third element that impacts speed is whether or not a whole room disinfection system must be repositioned and cycled again in order to disinfect the entire room. This can have a substantial impact on room turnover.

4 WAITING TIME

The fourth consideration is waiting time. How long must the room sit following disinfection before a new patient is able to occupy it?

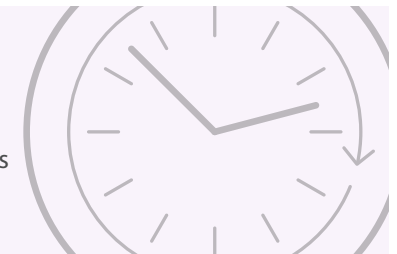
5 POOR RESULTS

The fifth element that impacts speed is whether or not the disinfection system has substandard results, causing unnecessary patient stays and avoidable / unreimbursed admissions. Even the fastest room turnover is in vain if the system does not effectively prevent HAIs.



Halo-Sealed™ for Fast Turnaround with No Compromises

The Halo Disinfection System® accommodates a reasonable room turnaround time, with the highest possible efficacy on the market today. This ensures that healthcare professionals can achieve their goals for room turnaround, while mitigating the risk of sickening or killing patients due to avoidable HAIs.



USABILITY

Increasing Utility through Usability

In the ever-moving and workflow-driven healthcare environment, a whole room disinfection system is only as effective as it is **usable**. Therefore, the ideal system must not only achieve the outstanding efficacy required to combat HAIs, it must also be able to integrate seamlessly into each hospital's unique workflows without causing any disruption.

The first step in defining what makes a whole room disinfection system usable is understanding the manner in which it will be operationalized and used. In most healthcare environments, environmental services personnel will interact with the system on an ongoing basis—usually in the context of a normalized cleaning and disinfection regimen that is replicated and repeated over time. Because environmental services personnel are tasked with a diverse range of tasks within the healthcare environment, of which disinfection is only one, the whole room disinfection system should work to make their jobs as intuitive and efficient as possible.

Usability

A whole room system's ability to be easily operationalized and integrated into daily workflows.



Below are some of the characteristics that define a highly usable whole room disinfection system:



EASY TO USE

First is the most obvious. At the most basic level, the whole room disinfection system must be easy to use. This means that the system must have clear functionality, intuitive controls and easy to follow steps for room preparation.



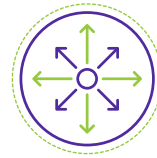
LITTLE TRAINING REQUIRED

The second is closely connected to the first. In addition to being easy to use, it must be easy and efficient to internally train new personnel without sacrificing quality.



EASY TO MAINTAIN

This includes the reliability and ease of maintaining the system without the need for daily flushing or routine service from the manufacturer, both of which introduce unnecessary expenses and potential scheduling issues.



EASY TO MOVE

A whole room disinfection system is moved from room to room throughout the hospital. For this reason, the fourth element of usability addresses the ease with which a whole room disinfection system can be moved. A usable whole room disinfection system must be easy to relocate and extremely durable.



EASY TO INTEGRATE

Finally, the system must be easy to integrate into existing workflows, including its ability to disinfect space after space in rapid succession.



Halo-Sealed™ for Five Star Usability

The Halo Disinfection System® addresses all five elements of usability, including:

- ✓ **No touch disinfection technology** with simple operator controls
- ✓ **Less than one hour of training required** for the average user
- ✓ **Long-lasting and easy to replace** HaloMist™ disinfectant
- ✓ **Outstanding durability; lightweight** and easy to move
- ✓ **Nozzle flexibility** to disinfect multiple spaces in rapid succession



ANTI-RESISTANCE

Overcoming the Threat of Resistance

The healthcare ecosystem continues to express its heightened concern over the phenomenon of **bacterial resistance**. In fact, the World Health Organization has identified bacterial resistance as a global health threat, calling for additional measures to strengthen control policies.

Bacterial resistance refers to the phenomenon by which a certain bacterium becomes resistant to a disinfectant or drug, rendering that disinfectant or drug useless.

Most deaths related to antibiotic resistance happen in healthcare settings, and the vast majority of HAIs are related to antibacterial-resistant pathogens.

This rise in bacterial resistance is largely driven by the overuse and misuse of antibiotics on the market. However, experts note that disinfection also plays a role. Disinfection methods that have subpar efficacy or apply only one mechanism of killing action risk the formation of resistant bacteria.

Anti-Resistance

A whole room disinfection system's ability to combat or, at the very least, not contribute to the concerning phenomenon of bacterial resistance.



Antibiotic resistance causes

2 million illnesses and 23,000 deaths in the United States each year.⁷



Antibiotic resistant infections cost the US healthcare system

\$21-34 billion each year.⁸

An anti-resistant whole room disinfection system will accomplish the following:

1

APPLY MULTIPLE MECHANISMS OF KILLING ACTION

Most disinfectants on the market today rely on a single mechanism of killing bacteria. These systems risk the formation of resistant bacteria. It is important to look for a system that provides multiple mechanisms of killing.

2

OUTSTANDING EFFICACY AND 6-LOG KILL

Using a less effective disinfection system can be equated to the risk of stopping an antibiotic midway through the course of treatment. A lower kill rate leaves bacteria in the environment that can become resistant to the disinfectant.

3

INNOVATIVE USE OF DISINFECTION MECHANISMS

Innovation does wonders for combating the risk of antibacterial resistance. Look for a disinfection system that uses minute traces of materials like silver, which research has noted can make antibiotics 10 to 1,000 times more effective.⁹







Halo-Sealed™ to Fight Resistance

Halo Disinfection System®'s proprietary HaloMist™ formula disinfects in a powerful one-two punch using a combination of hydrogen peroxide and minute amounts of ionized silver. By applying two mechanisms of killing action and achieving the highest possible validated efficacy, the Halo Disinfection System® combats the threat of antibacterial resistance.



Solution Comparison Chart

Use the following chart to compare manual disinfection, UV disinfection, HPV disinfection and the Halo disinfection and the Halo Disinfection System® across each of the nine whole room disinfection criteria.

| |  MANUAL |  ULTRAVIOLET |  HPV |  HALO DISEFNECTION SYSTEM® |
|-------------------------|---|---|---|---|
| COVERAGE | Uneven application with limited reach. | Limitations including long distances and shadowed areas. | Comprehensive coverage of the entire room. | Uniform coverage for the entire room. |
| EFFICACY | 1-log kill | Between a 1- and 3-log kill | EPA-validated 6-log kill | EPA-validated 6-log kill |
| AFFORDABILITY | Low initial cost, low operating costs and low cost savings from results. | High initial cost, high operating costs and moderate cost savings from results. | High initial cost, high operating costs and high cost savings from results. | Moderate initial cost, low operating costs and high cost savings from results. |
| FLEXIBILITY | Limited flexibility in complex spaces. | Limited flexibility in complex spaces. | Better suited for complex spaces than UV alternatives. | Highly mobile and equipped with features for use in complex spaces. |
| HUMAN SAFETY | Exposes operators to potentially hazardous chemicals. | Safe when proper operating protocols are followed. | Exposes operators to potentially hazardous materials. | Safe when proper operating protocols are followed. |
| EQUIPMENT SAFETY | Wet disinfectant delivery is hazardous to electronics. | Some systems can overheat electronics. | High concentrations of H2O2 risk damage to surfaces. | Dry fog delivery is safe for use around electronics. |
| SPEED | No preparation or waiting time, though subpar results compromise room turnover and utilization. | Some waiting time is required. Repositioning cycles may be involved. | Some preparation and waiting time is required. | Some preparation and waiting time is required. There is no need for repositioning cycles. |
| USABILITY | The simplest system to use with no training required. | Intuitive to use with some complications when it comes to maintenance. | Varying usability depending upon the system, most deployed as a disinfection service. | Intuitive to use with very simple maintenance requirements. |
| ANTI-RESISTANCE | May apply only one mechanism of killing action. Leaves significant bacteria behind to become resistant. | Applies only one mechanism of killing action. | May apply only one mechanism of killing action, risking bacterial resistance. | Applies two mechanisms of killing. No bacteria have exhibited resistance to the proprietary formula. |

Make Sure It's Halo-Sealed™

The Halo Disinfection System® eliminates the risk that less effective disinfection methods leave behind.

An integral component of the system, the HaloFogger® ensures the uniform delivery of spore and bacteria killing HaloMist® disinfectant throughout every room, even in crevices and other areas beyond the reach of sprays, wipes and UV lights.

The HaloFogger® leads its industry in surface coverage and effectiveness, helping healthcare, long term care, athletic and educational facilities to raise their standards for whole room disinfection. Delivering the highest possible effectiveness on the market today, **it is EPA-proven to kill 99.9999% of *C. difficile* spores in healthcare settings.**

Pairing its industry-leading effectiveness with affordability and ease of use, the HaloFogger® delivers a business value that is unmatched by other chemical or UV-based whole room disinfection offerings. HaloFogger® generates a turbulent aerosol that uses evaporation to quickly disperse H2O2 vapor and increasingly concentrated micro-droplets everywhere in complex rooms to kill germs where they hide. No other whole room disinfection technology is more effective.



HALOMIST®

HaloMist® is our proprietary, ready-to-use fogging formula registered in all 50 states. Our unique stabilization process blends the long-leveraged power of hydrogen peroxide with antimicrobial silver ions to provide multiple killing mechanisms for attacking pathogens. HaloMist® and its chemically-identical, HaloSpray® companion product ensure the highest possible effectiveness with no risk of increased resistance for the targeted pathogens.



The Choice is Clear.

Are you interested in bringing the Halo Disinfection System® to your facility?

CONTACT HALOSIL TODAY

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91 Lukens Drive
New Castle, DE 19720 USA

Tel: +1 302.454.8102

Fax: +1 302.454.8009

www.halosil.com

About Halosil International

Halosil is the leader in disinfection and infection control, delivering an unmatched level of impact and value to its customers through an exceptionally effective, holistic disinfection system and proprietary hydrogen peroxide-based formulas.

Delivering its formula through an arsenal of high-impact formats capable of disinfecting surfaces, environments and water, Halosil is the disinfection solution provider of choice across a diverse set of critical environments and infection-conscious industries—from healthcare and long term care facilities, to research laboratories and compounding pharmacies, to athletic facilities and educational institutions.

Driven by the foundational understanding that there is no such thing as “a little contaminated,” Halosil and its breakthrough capabilities have a no-tolerance policy for harmful microorganisms and are raising the standard for disinfection efforts around the globe.