MicrobeCare™

A PARASOL MEDICAL PRODUCT

A Unique, Patented, EPA Registered Bonded Antimicrobial Technology

Because The World Is Not A Cleanroom

AJIC American Journal of Infection Control

Independently Studied in the American Journal of Infection Control

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What is MicrobeCare™

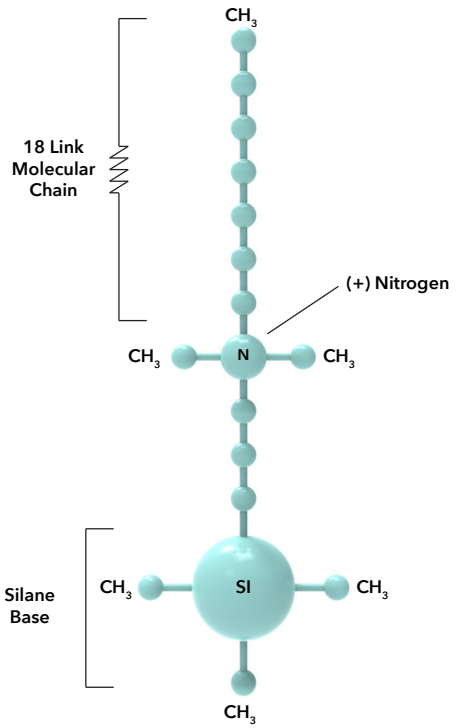
MicrobeCare™ is a unique bonded antimicrobial technology that is unscented, colorless, and non-leaching. MicrobeCare™ creates a durable, invisible barrier effective against mold, mildew, fungus, algae, and bacteria. MicrobeCare™ uses a molecular bond to hold the antimicrobial to its applied surfaces. It can be easily integrated into virtually any polymer, textile, or building material during manufacturing or as an end-of-process application. MicrobeCare™ eliminates harmful microbes and protects from mold and mildew stains and odor-causing bacteria.

The market is flooded with dozens of antimicrobial products making unvalidated claims on longevity and effectiveness. MicrobeCare™ has EPA approval and has been independently peer-reviewed multiples times to show efficacy not only in a GLP (good laboratory practice) setting, but also in a "real-life" clinical setting over an extended period.

How is MicrobeCare™ Different?

Disinfectants only work when they are wet. The minute they are dry, there is a rebound effect that occurs on any surface. Furthermore, most disinfectants are not used properly as they must remain wet on a surface for 5-10 minutes to obtain full sanitizing and disinfecting properties. MicrobeCare™ physically bonds to the treated surface. It has been clinically studied in the American Journal of Infection Control by leading infection control epidemiologists and showed persistence in preventing the rebound effect of microorganisms. (see pg. 5).

The MicrobeCare Molecule



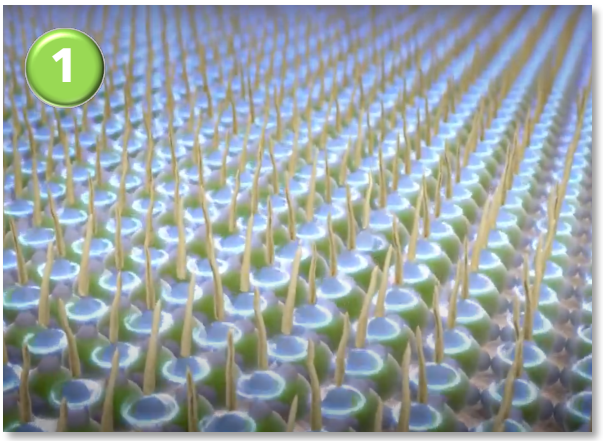
Long Molecular Carbon Chain – The first section of the long chain molecule is the "spear" like carbon chain.

Positively Charged Nitrogen – The second section of the long chain molecule is a positively charged atom of nitrogen atom.

Silane Base – The third section of the long chain molecule is a silane base, which enables the antimicrobial to anchor securely onto the substrate. A covalent bond is rapidly formed through hydrolysis.

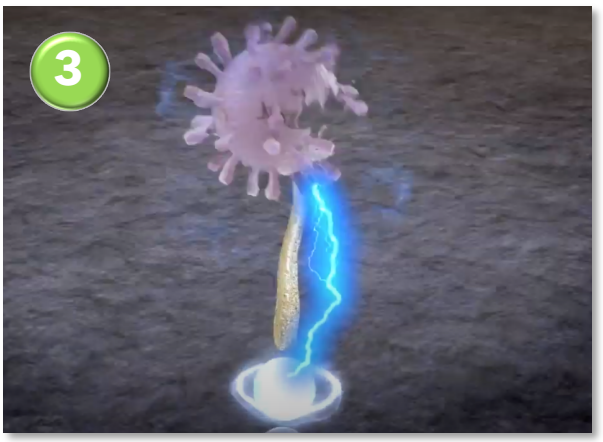
How it Works

Traditional antimicrobial solutions work by poisoning the cell and altering the DNA of microorganisms (chemical mode of action) taking up to a full day to kill them. MicrobeCare™ on the other hand, uses a much quicker and safer mechanical mode of action. MicrobeCare™ is bonded to a surface and provides protection through three functional elements.



The first element in the mode of action of MicrobeCare™ is a saline base that covalently bonds to the surface. Cross-linking with the adjacent molecules enabling them to polymerize, after they have coated the surface, to form an almost irremovable barrier on the entire treated surface

The second element is a positively charged nitrogen atom that attracts the naturally negatively charged microbe cell wall to the surface through a lipophilic attraction.

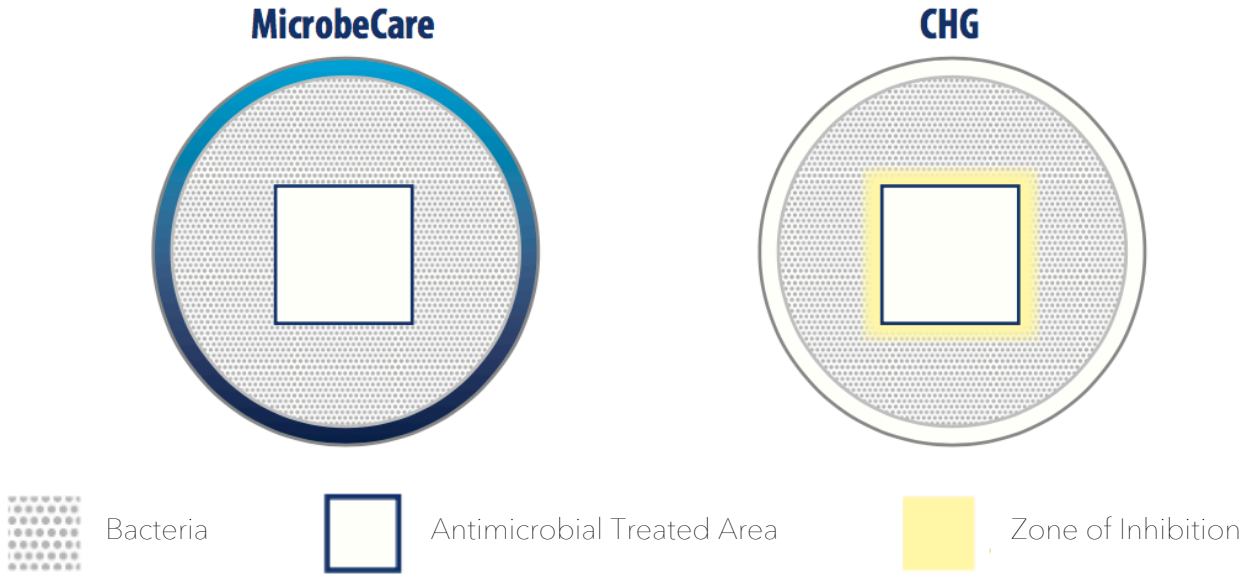


The third element is an 18 linked carbon chain that forms an impenetrable matrix of swords. As microbes are magnetically drawn to the surface. Contact with the long carbon chain and high cationic charge density exerted by the nitrogen atom by the cell membranes of single-celled organisms causes the physical rupture and inactivation of the membrane and death of the microbe. The depletion of the cellular electrochemical potential across the membrane and release of cytoplasmic materials provides complete destruction of the microbe without dissipation of the MicrobeCare molecule.[1]

[1] Monticello, R. A., & White, W. C. (2019). Inhibition of foundation colonzation of biofilm by surface modification with organofunctional silanes. In D. S. Paulson (Ed.), Applied Biomedical Microbiology: A Biofilms Approach (pp. 45-65). CRC Press.

Non-Leaching Technology

Antimicrobial agents can be classified into two main types; leaching and non-leaching. Most antimicrobials are leaching technologies that must come off the treated surface to exert antimicrobial properties. Leaching technologies result in a "zone of inhibition" often marketed as a positive. However, leaching allows the antimicrobial to migrate into the environment where it was not applied. As the antimicrobial leaches further from the application site, it exists in a weakened state, which will eventually allow for the cohabitation of microorganisms and the antimicrobial as the microorganisms build up resistance. Combined with many traditional antimicrobials use of chemicals that act like a poison, which allows the possibility of the survival of bacteria, viruses, molds, and other microbes, which then build immunity to these chemicals. This is effectively how superbugs and super viruses like Swine Flu, H1N1 and others evolve and develop. MicrobeCare is a non-leaching technology and uses a mechanical mode of action.



Product Safety

Consumer safety is our top concern. All MicrobeCare™ products are guaranteed non-toxic and have obtained United States EPA. Risk assessments by independent scientific bodies constantly reconfirm the safety of our antimicrobial additives. It does not volatilize, dissipate, or leach onto other surfaces. Its chemistry polymerizes where it is applied and forms a strong bond on the treated surface. Regular cleaning will not remove the treatment.

Proven Ingredients with Next Generation Technology

Quats (quaternary ammonium compounds) are potent disinfectant chemicals commonly found in disinfectant wipes, sprays, and other household cleaners that are designed to kill germs. It is often the ingredient that allows a product to claim to be antibacterial, as they are certified by the EPA as pesticides.

The MicrobeCare™ active ingredient is an organofunctional silane, part of the molecule is a quaternary compound. Unlike traditional quats, which have a limited kill spectrum, MicrobeCare™ technology provides long-term protection and controls a wide range of microorganisms. MicrobeCare™ does not contain any heavy metals. Tin, arsenic, silver, and copper are often used in other antimicrobials. Because of the exceptional chemical bond (a covalent bond), the bonded polymer is neither soluble nor volatile.

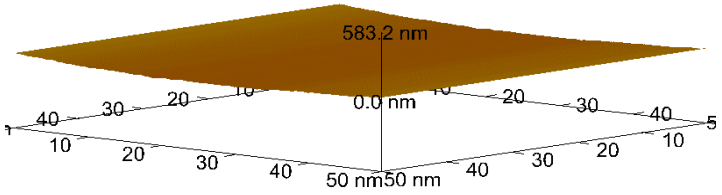
Micro Barrier of Protection

During the treatment, the molecules cover the surface one-layer deep. Similar results are published for many organic quaternary ammonium compounds.[1]

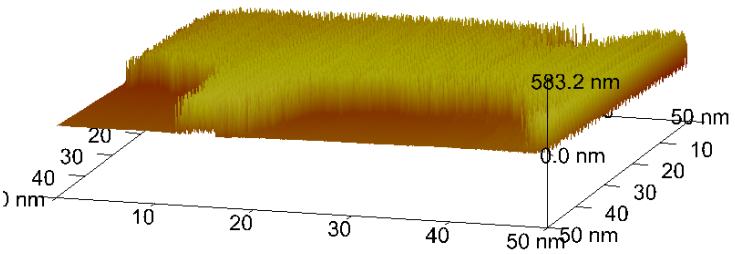
The second process is unique to the active ingredient in MicrobeCare. After they have coated the surface, the silicon functionality enables the molecules to polymerize and become an almost irremovable even on surfaces with which they cannot react covalently. Once hydrolyzed, the silanol groups are able to react with itself and available sites on the surface to form a dense polysiloxane network with an extremely high cationic charge density capable of destroying microbes.[1]

MicrobeCare antimicrobial technology occurs on the microscopic level. Each of the spikes in the Atomic Force Microscopy (AFM) image is a single MicrobeCare™ molecule. The organosilane molecule is approximately 1 billionth of a meter in size and a small bacteria microbe is approx. 20 billionths of a meter, so bacteria is easily impaled and destroyed by the closely bonded organosilane molecules

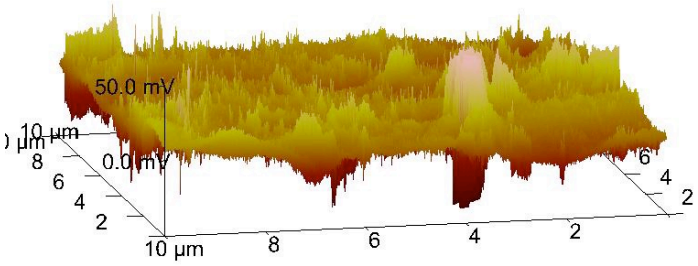
Actual atomic force microscopy images of MicrobeCare treated surfaces



Untreated Surface



1% Active MicrobeCare™ Treated Surface



2% Active MicrobeCare™ Treated Surface

Controlling Biofilm Development

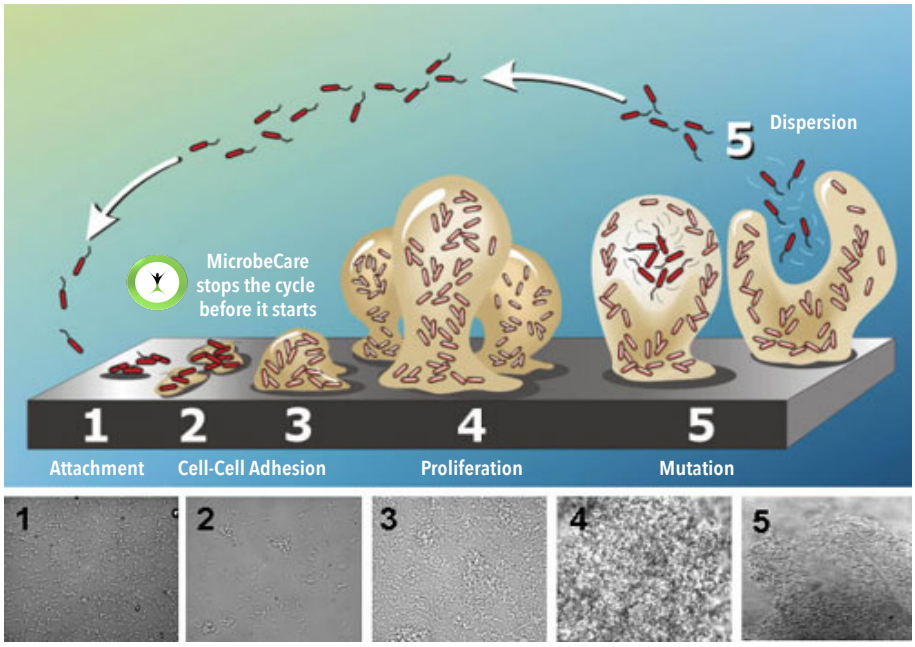
Microbial contamination and subsequent biofilm formation is a major cause of infection, contamination, and product deterioration. Controlling or even removing the biofilm after its development is difficult. Due to their inherent design, including a self-made exopolysaccharide matrix "shield", biofilms allow bacteria to proliferate and thrive on skin, devices, and surfaces, largely unaffected by external environmental factors and antibiotics.[1]

Danger of Biofilms in a Healthcare

Biofilms are complex communities of microorganisms that can attach to surfaces and represent one of the greatest challenges in controlling Hospital Acquired Infections (HAIs).[2-4] Biofilms that develop on indwelling medical devices arguably pose the biggest threat because they account for the vast majority of HAIs.[2] The most effective means of addressing biofilms is prevention. Preventing medical device-related biofilm HAIs requires knowledge of how they develop.

80%

Today, a staggering 80% of all microbial infections are attributed to biofilms.[5,6]



This diagram is a cartoon of the 5 stages of biofilm development: initial attachment, irreversible attachment, maturation 1, maturation 2 and finally dispersal. Under the cartoon are 5 electron micrographs showing what the biofilm actually looks like at each stage. Image by D. Davis form Monroe, D "Looking for Chinks in the Armor of Bacterial Biofilms" PLoS Biol, Vol 5, issue 11.

Prevent the Issue Before it Occurs

MicrobeCare™ controls biofilms before it starts. By controlling both the adhesion properties and colonization of microorganisms, MicrobeCare™ is a two-level barrier to prevent biofilms. The MicrobeCare™ molecule increases the hydrophobic properties of the treated surface to prevent microorganism adhesion. The molecule also directly destroys single-cell organisms through the mechanical mode of action. Because MicrobeCare™ is a non-leaching technology, it does not leave the surface and does not diminish its overall strengths.

[2] VanEpps JS, Younger JG. Implantable device related infection. Shock. 2016; 46(6): 597-608.
[3] Percival SL, Suleman L, Vuotto C, Donnelli G. Healthcare-associated infections, medical devices and biofilms: risk, tolerance and control. J Med Microbiol 2015; 64: 323-334.
[4] Donlan RM. Biofilms and device-associated infections. Emerg Infect Dis. 2001;7(2):277-281.
[5] Khatoon Z, McTiernan CD, Suuronen EJ, Mah TF, Alarcon EI. Bacterial biofilm formation on implantable devices and approaches to treatment and prevention. Heliyon 2018; 4(12):e01067.
[6] Hogan S, Stevens NT, Humphreys H, O'Gara JP, O'Neill E. Current and future approaches to the prevention and treatment of staphylococcal medical device-related infections. Curr Pharm Des 2015; 21(1): 100-13.

Independently, Clinically Studied

Dr. Charles Edmiston is Professor of Surgery & was previously the Hospital Epidemiologist at Froedtert Hospital - Medical College of Wisconsin in Milwaukee, Wisconsin & Adjunct Professor, Vanderbilt University School of Medicine, Nashville, Tennessee. He is the Director, Surgical Microbiology Research Laboratory, Department of Surgery, Medical College of Wisconsin.

For 15 years has served as a consultant to the Food & Drug Administration as an expert on the infection control implications of implantable biomedical devices, including as Chairman of the General Hospital & Personal Use Device Panel of the Medical Devices Committee of the Food and Drug Administration. Recipient of the 2005 FDA Advisory Committee Award for Distinguished Service.

He has served as a consultant to the Hospital Infection Control Practice Advisory Committee (HICPAC) of the Centers of Disease Control and Prevention. He is also a member of 3 Editorial Boards: Surgery, Infection Control and Hospital Epidemiology, Infection Preventionist and past member of the American Journal of Infection Control editorial board.

Author of 375 published manuscripts, book chapters, editorials, reviews, monographs and abstracts. Dr. Edmiston has delivered over 400 National and International invited lectures.

Dr. Edmiston's Study of MicrobeCare

Dr. Edmiston began studying MicrobeCare™ as our largest skeptic. With decades of infection control experience in terminally clean operating rooms, he was hesitant to accept the claims of MicrobeCare™. Looking to discredit the product, he conducted a study at Froedtert Hospital at the Medical College of Wisconsin in Milwaukee. Dr. Edmiston tested the bioburden of terminally cleaned OR surfaces prior to treating with a single application of MicrobeCare™, and then again 1 week and 6 weeks later following the treatment.

Since then, Dr. Edmiston has independently studied MicrobeCare™ in the intensive care unit (ICU) setting and is currently working on an emergency room study.

"A single application of MicrobeCare™, [provides] a significant and persistent, long-term reduction in OR surface contamination."

Dr. Charles E. Edmiston Jr. PhD, SM (ASCP), CIC (CBIC)
Emeritus Professor of Surgery, Medical College of Wisconsin

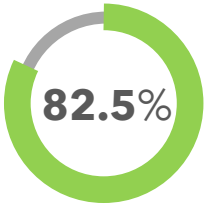
On-Going Independent Sources

MicrobeCare™ is currently being tested by the US military and the French government for efficacy against common and high-profile microorganisms and longevity on treated surfaces.

Operating Room (O.R.) Study

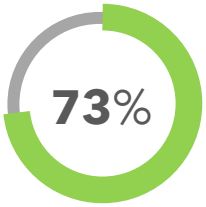
4 operating rooms in a tertiary medical center were sampled three times over a **6-week period**. The operating rooms included two general surgical O.R., a hybrid O.R. where open and endovascular procedures are preformed, and an O.R. used for kidney and liver transplants.

of **terminally cleaned** O.R. surfaces tested culture-positive with **heavy** bacterial contamination before being treated with MicrobeCare™



of O.R. surfaces tested were **culture-negative 6-weeks** after treatment.

Of the surfaces that were culture positive, the mean colony count **after 6-weeks for treated surfaces was 0.8 cfu**, compared 14.3 cfu of untreated surfaces



reduction in ATP scores **6-weeks** after treating O.R. surfaces with MicrobeCare™

mean ATP score after 6-week; untreated surface =279.9 RLU treated = 75.9 RLU

AJIC American Journal of Infection Control

Assessment of an innovative antimicrobial surface disinfectant in the operating room environment using adenosine triphosphate bioluminescence assay. Lewis, B. J., Spencer, M., Rossi, P. J., et al. *Am J Infect Control, Vol 43, p283-285.*

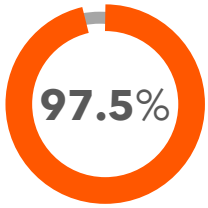
"We found that a single application of MicrobeCare™, [provides] a significant and persistent, long-term reduction in OR surface contamination."

Dr. Charles E. Edmiston Jr.
PhD, SM (ASCP), CIC (CBIC), FIDSA, FSHEA, FAPIC
Emeritus Professor of Surgery,
Medical College of Wisconsin

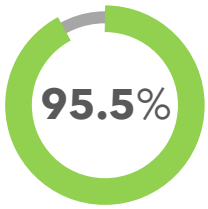
Serves as consultant to the Hospital Infection Control Practice Advisory Committee (HICPAC) of the Centers of Disease Control and Prevention.

Intensive Care Unit (I.C.U.) Study

Selective high touch surfaces in a 26-bed medical intensive care unit at a tertiary medical center were sampled over a **6-week period**. The sample sites included telephone handpieces, computer keypads, surfaces of physician workstations, and selective patient items (blood pressure cuffs and patient bed tables).

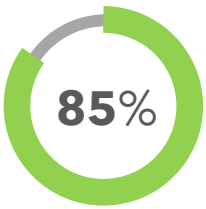


of surfaces were assessed as "dirty" before being treated with MicrobeCare™



of I.C.U. surfaces tested **culture-negative 6-weeks** after treatment,

Of the surfaces that were culture positive, the mean colony count **after 6-weeks for treated surfaces was 0.83 cfu** compared 51 cfu of untreated surfaces



reduction in ATP scores **6-weeks** after treating high touch I.C.U. surfaces with MicrobeCare™

mean ATP score after 6-weeks; untreated surfaces = 327.6 RLU, treated surfaces = 44.7 RLU

AJIC American Journal of Infection Control

Assessment of a novel antimicrobial surface disinfectant on inert surfaces in the intensive care unit environment using ATP-bioluminesence assay. Edmiston, C. E., Spencer, M., Lewis, B. D., et al. Am J Infect Control.

Nontreated ICU sampling sites yielded multiple Gram-positive and Gram-negative microbial isolates, including multidrug resistant strains of MRSA and extended spectrum beta-lactamanse Gram negative pathogens.

- For each of the studies., ATP bioluminescence and RODAC culture were obtained from selective sites to assess microbial recovery.
- An ATP value of <= 45 relative light units (RLU) reflected a surface containing little to no bioburden. A value of >= 46 reflected a bioburden contamination as per manufacture recommendation (Getinge USA).
- Surface yielding 0-5 colonies were assessed as excellent, 6-20 colonies were assessed as moderate, while >= 20 was viewed as significant contamination. cfu = colony forming units

Patented Solution with a Customized Approach

Unlike other antimicrobials that have limited applications, MicrobeCare™ can be incorporated into a near infinite number of materials, including woven and synthetic textiles, adhesives, rubber, foam, plastics, glass, roofing materials, structural materials, upholstery, counter-top surfaces, chrome, aluminum, steel, other metal polymers, and many more.

Patented Treated Articles

Parasol Medical™ maintains a diverse and ever-growing patent portfolio of products treated with MicrobeCare™, including antimicrobial stethoscopes, catheters, adhesive dressings, office and hospital furniture, and many more.

MicrobeCare™ can be deployed throughout a wide range of products and materials and is being utilized throughout a diverse list of industries such as healthcare, furnishings, textile, and industrial. MicrobeCare has partnered with global corporations looking to further add to their products, as well as start-ups looking to distinguish themselves in the market. Our clients have protected their products and surfaces with MicrobeCare™ to add value to their technologies and help reduce contamination and extend its useful life. Built-in MicrobeCare™ protection will also give you that edge of competitiveness over other similar product manufacturers by offering the compelling benefit of fresher, more durable, and safer products. Our engineers can help develop a strategy to seamlessly integrate MicrobeCare™ into your finished products or manufacturing process without significant changes.

Stethoscope Study

A baseline study was conducted at a150 bed hospital. 70 stethoscopes were sampled prior to being treated with MicrobeCare™. The stethoscopes were retested **107-days** following a single application of MicrobeCare™.

100%

of untreated stethoscopes were culture-positive with **heavy** bacterial contamination.

85.7%

reduction in average ATP scores **90-days** after a single application of MicrobeCare™

mean ATP score after **90-days**; untreated surface =288.4 RLU, treated = 45.5 RLU

100x

more contamination on untreated stethoscopes than stethoscopes treated with MicrobeCare™ **90-days** after treatment.

*36% of treated stethoscopes were **culture-negative 107-days** after a single application of MicrobeCare™.*

Facility treatment

For customers that need help applying MicrobeCare™ in their facilities, Parasol™ has partnered with Data Clean®. For 40 years, Data Clean® has professionally removed harmful contamination from critical environments to help ensure safe and reliable operations. Our technicians are highly skilled in treating facilities, including critical environments like hospitals, cleanrooms, critical electronics manufacturing, and data storage. Our technicians are thoroughly trained to work around sensitive equipment in today's state-of-the-art environments.

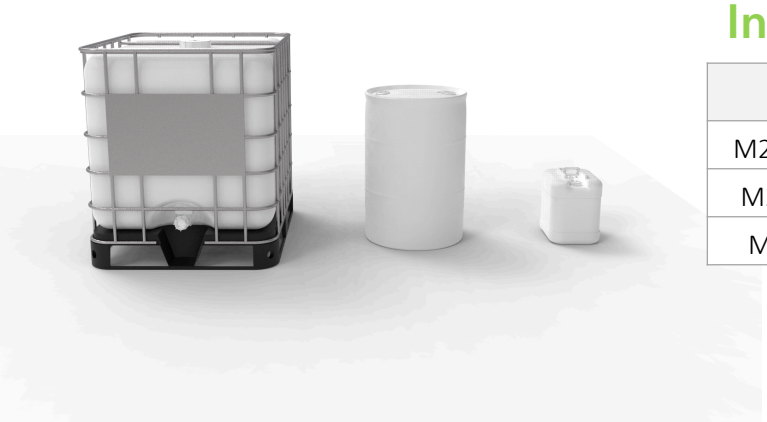
We utilize the most effective techniques including electrostatic sprayers when treating facilities. Electrostatic spray technology is a new way to apply MicrobeCare™ to help facilities treat surfaces, often in less time and with better coverage than traditional cleaning methods. The technology also helps avoid liquid pooling often associated with trigger sprayers. The electrostatic spray is electrically charged, allowing MicrobeCare™ solution to wrap around and evenly coat all types of surfaces. As the chemical exits the electrostatic sprayer, it's given a positive electrical charge. The droplets then become attracted to surfaces which are naturally negatively charged, covering the visible area, underside, and backside, with the MicrobeCare™. Surfaces that are already covered will repel the spray, making the method extremely efficient.

The main features and benefits of electrostatic spray disinfection include:

- Reduces the time it takes to cover and disinfect all surfaces and hard-to-reach places by 50% compared to conventional methods. Save money, reduce labor and chemical costs by using electrostatic technology. More surface coverage, less wasted chemicals
- Applies chemicals in a more efficient, controlled manner, eliminating the dangers of overuse.

Consumer Products

Part No.	Description
M2W1G-1001-0412	2 oz Bag on Valve Spray Can, Locking Cap
M2W6-1012-0513	4 oz Bag on Valve Spray Can, Locking Cap
M2W4-1025-0515	6 oz Bag on Valve Spray Can, Locking Cap
M2W2-1025-0525	1-gallon jug



Industrial / Bulk Products

Part No.	Description
M2W260G-0109	5-gall pail
M2W55G-0210	55-gallon bucket
M2W5G-0311	260-gallon tote