Active Defense Against Microbes

The Problem

H1H1... MRSA... E. coli... Salmonella... Mold... Allergens... The world we live in is a dangerous place. The media tells an ominous story that threatens us all - the story of **drug-resistant microbes and global pandemics**.
You take every precaution: you wash your hands and are careful about what you touch. Still, you can't help feeling vulnerable.

Chemists have responded with a dizzying array of products to destroy germs. Most of these antimicrobials use metals or poisons that leach into the surrounding environment to kill offending organisms. These agents create a halo of diminishing efficacy around the area of application. Microbes near the center of this halo are usually eliminated, but those on the outer edge, where the strength of the poison is greatly reduced, survive and mutate into resistant strains, known as "**Super Bugs**".

Scientists and medical professionals see the real danger: **most antimicrobials actually make the problem worse** by promoting adaptive strains of microorganisms.

The Solution

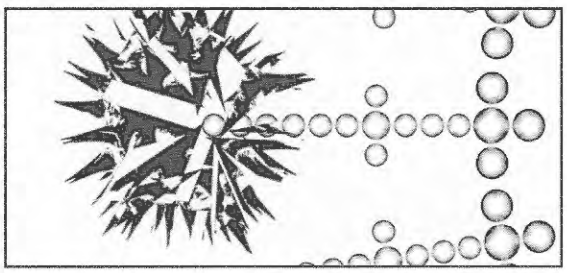
The answer? **The BactiBarrier Cleaning System**. The BactiBarrier® cleaning system approaches cleaning in a more logical way. We have achieved groundbreaking success using our two-step cleaning system.

1. First we remove and neutralize unwanted microbes by cleaning away pollutants using our premium EPA registered Disinfectant/ Cleaner antimicrobial.
2. Second we apply an odorless, bound, EPA-registered, antimicrobial barrier of protection on surfaces that may be exposed to future harmful microbial growth.

This two-part cleaning and protection system is a unique combination of both innovative procedures and chemistry. Efficient and effective cleaning procedures require careful attention to details. Proper application, coverage and dwell time of our Step 1 BactiBarrier Disinfectant/Cleaner antimicrobial will eliminate 99.9 % of the unwanted microbial growth that builds up on a hard surface.

BactiBarrier Protector or Step 2, applied properly, provides a bonded, long-term, antimicrobial protective barrier. This chemistry works slightly different than the first step. Its unique charged mechanical action actually works to eliminate microbial growth for months or even years on/in specific undisturbed hard and soft surfaces.

How the BactiBarrier Cleaning System Works



At the heart of our process is a molecule made of a long chain of atoms, forming a microscopic "spear". The silane base of this spear forms a covalent bond with virtually any surface and locks it, in turn, to each adjoining molecule. Built into the spear's shaft is a **positively charged nitrogen atom**. This positive charge irresistibly draws negatively charged, airborne microbes from the atmosphere, impaling them on the point of the spear. As the attraction pulls the microbe farther down the spike, they contact the positively charged nitrogen atom and are destroyed by its minute electrical discharge.

Since microbes are obliterated instead of being altered, they can not learn to adapt to this electro-mechanical process. **In over thirty years of field application, no adaptive strains have ever been documented.** Best of all, because nothing of essence is transmitted during the process, **the efficacy of our barrier does not diminish** - it keeps on working, month after month.

Now, imagine an entire field of these electrically charged spears - billions upon billions of them - bonded to a surface and interlocked one to another, points at the ready. This is the inhospitable bio-barrier that confronts any bacteria, virus, or fungi that ventures near the surface - our **active defense against microbes**.

Benefits of the BactiBarrier Cleaning System

- Proven BactiBarrier active bio-barrier
- Ongoing protection that lasts month after month
- Covalently bonds to almost any surface
- EPA registered & FDA approved products
- Effective against a broad spectrum of gram (+) & gram (-) bacteria, viruses, & protozoa, including mold, mildew, & algae
- Extensively field-tested for years in hundreds of products & locations
- Environmentally friendly, non-toxic, non-leaching products
- No noxious poisons, heavy metals, or harsh fumes
- Electro-mechanical action does not permit adaptive strains
- Uniform coating does not alter the texture of surfaces
- Reduces airborne contaminants while inhibiting surface growth
- Not affected by normal housekeeping procedures, including steam cleaning
- Presence & efficacy can be verified with a simple field test
- Minimizes institutional liability by demonstrating a proactive approach
- Long-term efficacy saves money over temporary treatments

Some examples of potential applications:

Healthcare, building and remodeling, athletic facilities, transportation, education, day-care, hotels and restaurants, correctional facilities, cruise lines, residential, business, marine, medical devices, industry and government, etc. This is just a small sampling of where BactiBarrier can be applied.

The comprehensive BactiBarrier Cleaning System can dramatically reduce the bio-load on touch surfaces, while lowering airborne contaminants in the process. BactiBarrier creates a biological safety net over your entire environment, protecting you from pathogenic organisms and fungi, month after month.

For more information, visit www.bactibarrier.com

The research rooms were in the Swan Hotel. Room 409 was cleaned by housekeeping staff and was unoccupied at the time of the research. Room 457 was not cleaned and was unoccupied at the time of the research. Moisture readings were within normal limits on structural materials at the time of the research. Walls, ceilings, bathroom fixtures and contents (e.g., telephone, remote control, thermostat, upholstery, etc.) were cleaned followed by an electrostatic application of BactiBarrier™.

The self-contained HVAC units were sealed at the time of cleaning and application of BactiBarrier™. Pre-cleaning samples were collected and following cleaning and treatment post-cleaning/treatment samples were collected.

Sampling Procedures

The information and results collected during this study have been divided into the following categories: Visual Inspection, odors, and Microbiology.

Visual Inspection: A limited visual assessment was conducted throughout the units. Units were reasonably clean and consistent with occupancy.

Odor: Observations were made for detectable odors.
A musty, earthy moldy odor was apparent on entering each room.

Microbiology: Microbiological sampling to measure microbial levels on surface and air samples were collected out of doors and inside the units and swab and dust samples were collected from various surfaces (e.g., countertops, bath fixtures, telephone, remote control, carpet and upholstery).

Microbiological Testing

When collecting samples, this represents the environmental conditions that are present at the time of sampling. It is a snapshot of the current conditions, which change with the time of day, amount of indoor activity, and weather conditions.

10 Adenosine triphosphate (ATP) samples were collected. ATP measures the biological activity on surfaces (bacteria, mold and other biological contamination). The counts are measured in relative light units (RLU).

In room 409 (Cleaned-Vacant):

	RLUs Pre Clean Treatment	RLUs Post Clean with BactiBarrier™	
Counter top	143	27	Reduction 81%
Telephone	61	33	Reduction 46%
Bathroom sink	137	12	Reduction 91%
In room 457(Not cleaned-Vacant):			
Counter top	402	12	Reduction 97%
Remote control	181	20	Reduction 89%

Laboratory Analysis

32 Samples were collected and examined by EMSL laboratories (see attached reports). Outside samples were taken as a reference point. Note: The outside samples collected on the second day (post clean) were higher than on day 1.

	2/13/12	2/14/12	
	RLUs Pre Clean Treatment	**RLUs Post Clean with BactiBarrier™**	
	Air–O–Cell-Cassettes		
3107 -Outside air	1280	1870	
3129- Hallway	139	126	
3215-Bedroom air	253	800*	See HVAC note
3279-Bedroom air	295	127	Reduction 57%
3315-Bath entry air	211	169	Reduction 91%
3247-Bedroom air	168	42	Reduction 25%
3231-Bedroom air	211	0	Reduction 100%
3198-Bath entry air	928	42	Reduction 96%

*HVAC note: This sample was collected by an HVAC unit that required service.

Surface Samples Swab Method

3405 Countertop	None detected	None detected
3406 Thermostat	Rare	None detected
3407 Countertop	Rare	None detected
3408 Thermostat	Rare	None detected

Identification and Enumeration of Culturable Fungi

	Pre Clean Treatment	Post Clean with BactiBarrier™
3401 Chair	75 CFU/in^2	None detected
3402 Carpet	None detected	None detected
3403 Chair	25 CFU/in^2	None detected
3404 Carpet	None detected	None detected

Results

Odors were reduced significantly after cleaning and application. Based on the data reported, the cleaning and BactiBarrier™ application compare favorably to other similar indoor environments and reduced microbial burden. The microbial reduction observed was substantial.

Thank you for allowing me the opportunity to research this new technology that can be applied to material and surfaces, reducing contaminants and making the surface antimicrobially active. If you have any questions or require additional information, please do not hesitate to give me a call.

Respectfully submitted,
Daniel Bernazzani

Daniel Bernazzani,
PhD Candidate Environmental Studies
Antioch University New England
225 Humphrey St., #3
Swampscott, MA 01907

Master Restorer- IICRC
Applied Microbial Remediation Specialist- IICRC

Enclosures: Laboratory Analytical Data Sheets

Study 1

Improved Control of Microbial Exposure Hazards in Hospitals: A 30-Month Field Study

R.A. Kemper1, L. Ayers2, C. Jacobson3, C. Smith4, and W.C. White5

Abstract

The microbial colonization of environmental surfaces in hospitals and other buildings can produce infective, allergenic and toxigenic risks for occupants. Traditional disinfectant/sanitizer formulations do not provide sustained control of microbial contamination at low levels and their extended use is potentially dangerous to man and the environment. This study evaluates the effectiveness of a new class of antimicrobial agents that covalently bond to surfaces and are not chemically reactive with the microbial cells. This organosilicon antimicrobial, 3-trimethoxysilylpropyldimethyloctadecyl ammonium chloride (BactiBarrier® Antimicrobial), produces antimicrobially active surfaces on a variety of substrates. After modifying the interior surfaces of a flood-damaged hospital with this antimicrobial, we evaluated airborne microbial concentrations for 30 months. The results show a significant and sustained reduction of viable airborne microorganisms.

Conclusions:

The data from this study show that significant control of airborne microorganisms results from the modification or interior building surfaces with an organosilicon antimicrobial. Even when evaluated under severe environmental conditions, the antimicrobial activity of these modified surfaces provides substantive reduction of airborne microbial concentration. The initial reduction of airborne microorganisms and the sustained control of microbial levels during the 30 months of this study are unprecedented in the literature. When viewed collectively, the safety, efficacy, and durability of this 9h 03/2005 Hospital Study technology provide a unique opportunity to control the risks associated with microbial contamination in buildings.

See full Study www.bactibarrier.com/studies

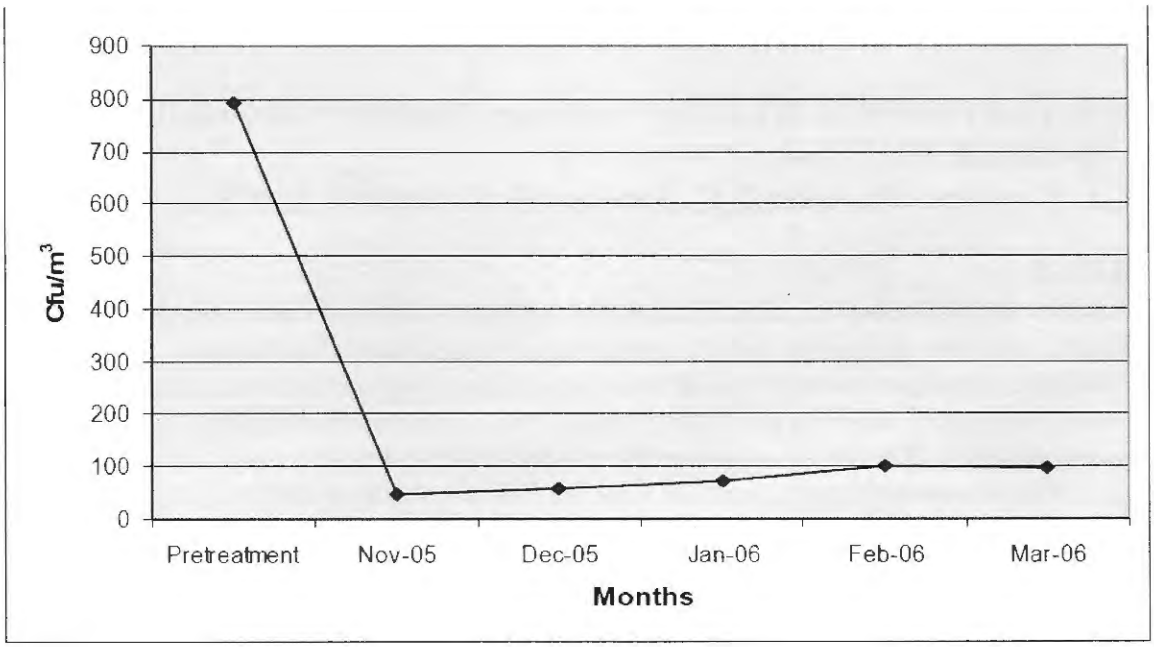


Figure 2 shows the retrieval averages of pre and post-treatment samplings in the building.

Study 2

Measurement of Cleaning Effectiveness in School Buildings: Evaluation of a Candidate Standard Method

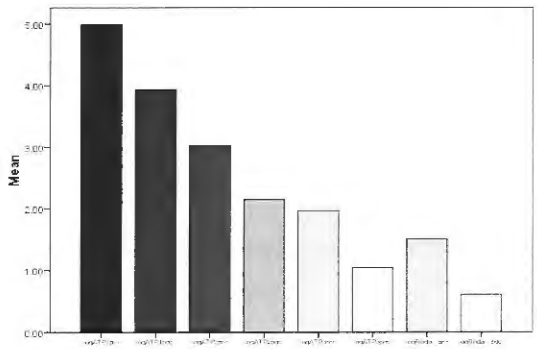
Eugene C. Cole, DrPH[1], Richard Shaughnessy, PhD[2], Ulla Haverinen-Shaughnessy[3] PhD, Keith E. Leese[4]

Cleaning procedure on school desks:

A cleaning protocol combined initial dry wiping with microfiber cloth, followed by spray disinfectant-cleaner, and a final microfiber wiping until dry. Surfaces were measured before and after cleaning by three commercially available and widely used ATP systems in each school using a swabbing technique and 25 cm^2 template. Each school was sampled three times per week – each time with a different ATP system. Sampling included 5 desktops per 5^{th} grade classroom (2 classrooms per school). Each desktop was marked to assure it was sampled on each day; and the areas sampled were different on each sampling day to avoid re-sampling of the same areas. Similarly, 5 cafeteria tables were also similarly sampled on each of the 3 sampling days using the same approach. Sampling of restroom surfaces included 10 interior stall door surfaces and 10 sink side areas. Samples from each surface/site were also taken for total culturable bacteria using surface contact agar plates as a measure of microbial reduction and improved hygiene.

Conclusion:

Specific ATP values/ranges appear to be a function of both surface material type and location within a school building, and further study is expected to confirm unique values for such critical compartments of the school building ecosystem. It is anticipated that such "normal" ranges can be established for each surface type, and that these can be used in the routine monitoring of cleaning effectiveness in school buildings.



5 Acknowledgements
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Study 3

Reducing Microbial Contamination in Hospital Blankets
By James W. Krueger

NOSOCOMIAL INFECTION

Nosocomial infection is a serious issue for health care facilities. According to recent articles, 1.8 million Americans contract nosocomial infection from hospitals every year. 20,000 patients died in 1998 as a direct result of nosocomial infection and 70,000 die from complications caused by infection. The cost of treating nosocomial infection in the United States is estimated at $4.5 billion a year. Controlling infection in an environment which is contaminated by the nature of its function is difficult at best and requires a multifaceted approach.

1. Will hospital blankets, protected by the BactiBarrier Protector technology, end nosocomial infections? No.
2. Will hospital blankets, protected by the BactiBarrier Protector technology, reduce bacterial and fungal contamination on the blanket? Yes.
3. Will the use of hospital blankets, protected by the BactiBarrier Protector technology, be a positive step toward asepsis in the patient=s immediate environment? Yes.
4. Is the use of hospital blankets, protected by the BactiBarrier Protector technology,

a component of practicing reasonable care? Yes.

Summary:
The In-use study on Spartan Mills blankets correlates well with the simulated study undertaken earlier in the year. Both studies clearly show that blankets protected by the BactiBarrier Protector technology have a significantly lower bioburden and will present less of a risk in the patient environment. Historical data generated by American Hospital Supply and Dow Corning Corporation support these findings. These data generated by university, medical and industrial laboratories represent some of the most extensive microbiological work ever performed on antimicrobial treated substrates for use in the medical community. The control of the microorganisms is impressive and provides numerous benefits.

- Prevents blanket staining due to mold and mildew growth that occurs on damp blankets

prior to laundering.

- Controls blanket deterioration due to microbial growth that occurs on blankets during

storage.

- Controls odors caused by bacteria and fungus normally found in blankets.
- Provides 3 times more protection from bacteria and fungus than an untreated blanket.

See full Study www.bactibarrier.com/studies