LIGHTHOUSE
Environmental Infection Prevention®

Lighthouse Customer

Study of Mops & Wipes

February 2022

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Overview

Thank you again for the opportunity to partner with XXXXXXXX to ensure the cleanest, safest possible environment for your facility staff and patients.

We have outlined our study which assesses the effectiveness of your current laundered wiping and mopping program. At your XXXXXXXXX location, we used comprehensive biological testing in one recently discharged patient room and one surgical room being prepared for the next procedure. The Lighthouse Team with the support of ResInnova Labs conducted 10 surface samples after cleaning with your current laundered products. We then ran 10 additional samples on those same surfaces after cleaning with single-use mopping and wiping products. For an effective analysis, the same processes and controls were used for all tests.

We look forward to continue working with you in your efforts to ensure the safest and healthiest possible environment for your facilities. We will work side by side with you, every step of the way.

Flavia Benson
Lighthouse Environmental Infection Prevention

Dr. Matthew Hardwick
ResInnova Labs CEO

About Us

Lighthouse Environmental Infection Prevention (Lighthouse) is the world-wide leader in Environmental Infection Prevention. Our solutions are best-in-class, and represent years of research, development and successful use in 500+ healthcare clients, 2000+ retail operations, professional sports teams, academia, conference centers and amusement parks.

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- Board certified specialist in Virology, Microbiology and Molecular Biology

About Us Cont.

About ResInnova Labs

ResInnova Laboratories is one of the top laboratories in the country, run by one of the most respected microbiologists, Matthew Hardwick, PhD. Their laboratory is certified by the International Antimicrobial Council (IAC), providing the highest quality testing. They implement the most current testing standards established by AATCC, ASTM, ISO and JIS and develop custom testing specific to our customers' needs. This strategy of combining standards and unique testing delivers usable data of the highest quality.

Dr. Hardwick has over 20 years of academic research experience at Georgetown University, where he completed his PhD in Cell Biology, and at Johns Hopkins University, where he completed two postdoctoral fellowships, one in the Bloomberg School of Public Health and the second in the James Buchanan Brady Urological Institute.

Matthew Hardwick, PhD, is an expert in antimicrobial surface technologies and the role of contamination on infection rates. With over 20 years of experience, he is widely published in the field of infection prevention.

Executive Summary

Surfaces and floors were still showing high levels of contamination after cleaning with current products, including Fungal/Mold units and MRSA. Switching to single-use products reduced CFU counts by over 90%.

The results of our testing revealed:

Surface Only Results:
Aerobic Bacteria Counts (CFUs) were reduced by 86.3%
Fungal/Mold CFUs were reduced by 100%
MRSA CFUs were reduced by 100%

Floors Only Results:
Aerobic Bacteria Counts (CFUs) were reduced by 80.6%
Fungal/Mold CFUs were reduced by 100%
MRSA CFUs were reduced by 100%

Process Description

We started the process in two recently discharged rooms that were cleaned utilizing current products and protocols.



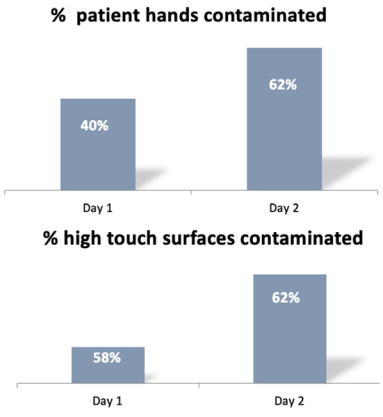
Surfaces biologically tested pictured at end of document

We then conducted biological tests on key high touch surfaces and floors. In the patient room we then proceeded to wipe down surfaces, dry mop floors and damp mop floors using single-use products and current protocols. *Unfortunately time did not allow for the after cleaning in the surgical room.*

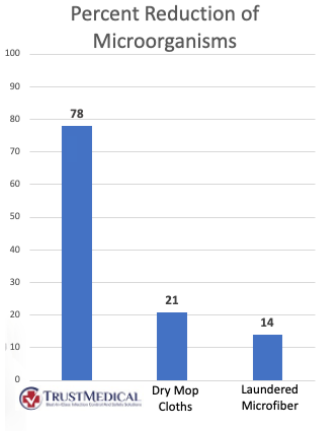
Then additional biological swabs were taken on the same surfaces as conducted before.

Key Considerations

Floors and the spread of pathogens: A clinical study by Dr. Curtis Donskey revealed that pathogens can quickly move from floors to surfaces and travel throughout a building, leading to the potential spread of infections.

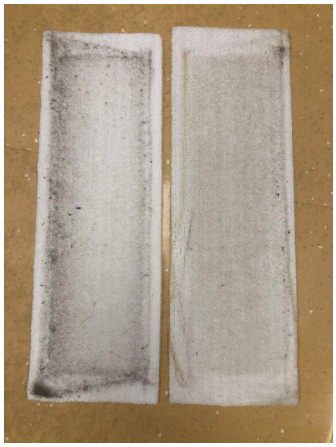


Koganti, S., Alhmidi, H., Tomas, M. E., Cadnum, J. L., Jencson, A., & Donskey, C. J. (2016). Evaluation of Hospital Floors as a Potential Source of Pathogen Dissemination Using a Nonpathogenic Virus as a Surrogate Marker. Infection control and hospital epidemiology, 37(11), 1374–1377. https://doi.org/10.1017/ice.2016.181



The following pictures show the organic matter that the single-use products removed that the laundered products had not.

Dry Mop Room

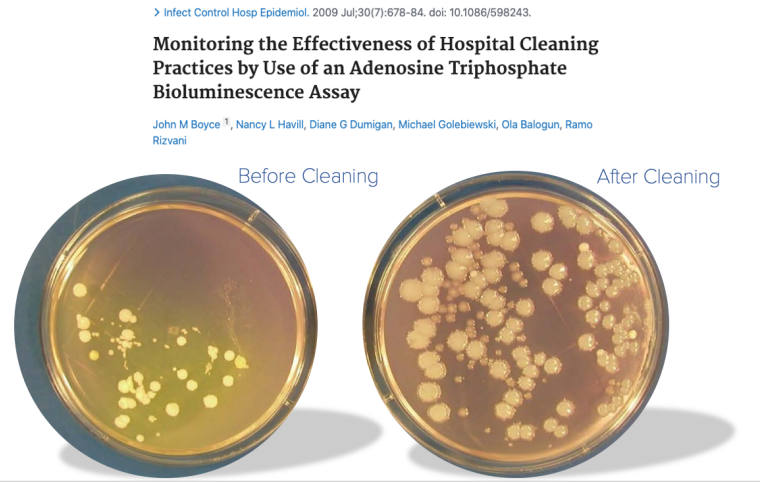


Wet Mop Room

The removal of organic matter during the dry mopping process is critical to allow any disinfectant to be effective during damp mopping. The material used in a wipe or a mop can be equally as important as chemistry in the removal of harmful pathogens as part of the disinfection process. The mechanical action of single-use products, such as the ones used in this study, have been shown to be more effective than traditional materials at removing pathogens such as C. diff. These pictures show the potential failure point of your current product to effectively remove organic material from the floor.

Key Considerations cont.

A concern with laundered/re-usable products is not knowing if the “clean” product you are starting with is actually biologically clean. It has been found that the laundry process as well as the processing and delivery process for these products may be a failure point in many programs. In a 2009 study, it was found that ineffective cleaning processes can actually make a surface biologically worse after cleaning.



To test the effectiveness of your current process, a clean mop and wipe were pulled from the bin and sent to the lab for testing.

Here are the results:

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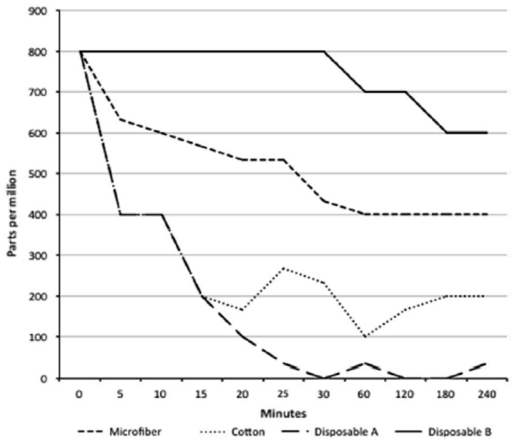
Results – Total CFUs per Sponge ([redacted] - 17 FEB 2022)

Sponge ID#	Description	Total Aerobic Count	Total Fungal Count	MRSA
4282	Laundered Mop	514,600	2,600	5,750
4283	Laundered Wipe	694,300	1,200	1,810

As you can see it was found that the “clean” mop and “clean” wipe both had substantial Aerobic Count of micro-organisms of which many were Fungal and many were MRSA.

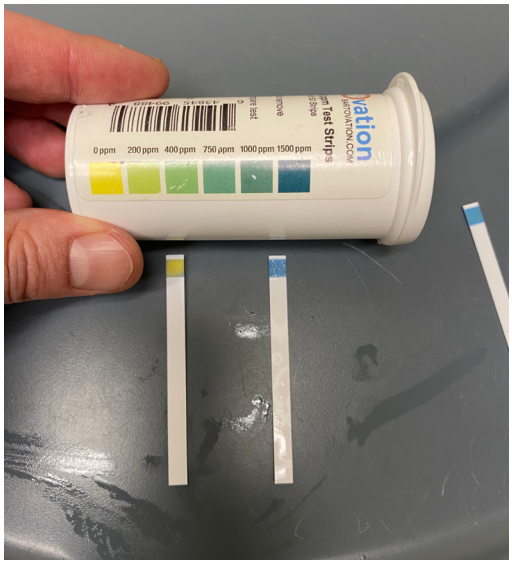
Key Considerations cont.

Quat Binding: A study by Dr. John Boyce showed the binding of quaternary ammonium (quats) chemicals to cotton and microfiber cloths, robbing the amount of disinfectant that is transferred to the surfaces. This chart shows how quickly quat chemicals can bind to different materials.



Boyce, J. M., Sullivan, L., Booker, A., & Baker, J. (2016). Quaternary Ammonium Disinfectant Issues Encountered in an Environmental Services Department. Infection control and hospital epidemiology, 37(3), 340–342. https://doi.org/10.1017/ice.2015.299

In a simple test of one of your EVS carts, we read the parts per million (ppm) of the current chemistry coming out of the dispenser and then tested it again by squeezing a saturated wiper and seeing if the active chemical actually did “cling” to the cloth. As you can see pictured below, the ppm test showed that your disinfectant was running around 1000 ppm out of the dispenser but dropped to nearly 0 coming off the cloth. As shown in the above study, quats bind quickest to microfiber cloths like what you use today and this binding can lead to cleaning with an ineffective product.



Conclusion

A study was conducted on the effectiveness of laundered wiping and mopping products by measuring pathogen / fungal levels on surfaces and floors. The significant pathogen levels found after cleaning causes concern in the potential risk for patients and staff.

The performance of single-use products showed far greater effectiveness in reducing pathogen levels on both surfaces and the floors. These products prove to be a robust solution for a healthier environment for the XXXXXXXXX Health System.

Biological Intro

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CONFIDENTIAL TEST REPORT No. LH-177a
February 24, 2022

LIGHTHOUSE
John LaRochelle

Microbial Evaluation of Sampling Sponges – [redacted] - 17 FEB 2022

Test Method Details

Collection	Samples collected by sterile sponge *in situ*, then shipped on ice packs overnight to microbiology laboratory.
Recovery	Each sponge was recovered in 10 mL sterile buffer solution of phosphate buffered saline (1x) + Triton X-100 (0.1%) surfactant and homogenized for 1 minute.
Growth Conditions	Each recovery solution was then serially diluted and plated onto: ○ Nutritive (tryptic soy) agar for Total Aerobic Microbial Counts, ○ Selective (Sabouraud dextrose) agar for Total Fungal Counts, and ○ Selective (MeReSa) agar for Total Methicillin-Resistant *Staphylococcus aureus* (MRSA) counts. • All agar plates incubated at 30°C or 37°C (as applicable) for 48-96 hours before counting the resulting colonies.
Evaluation	• Serial dilution plate counts were used to calculate the Colony Forming Units (CFU) per sponge for each media type. ○ Note: The limit of detection is 10 CFU/sponge for each evaluation.

ResInnova Laboratories
8807 Colesville Rd, 3rd Floor
Silver Spring, MD 20910

IAC International Antimicrobial Council Certified Laboratory

Biological Results

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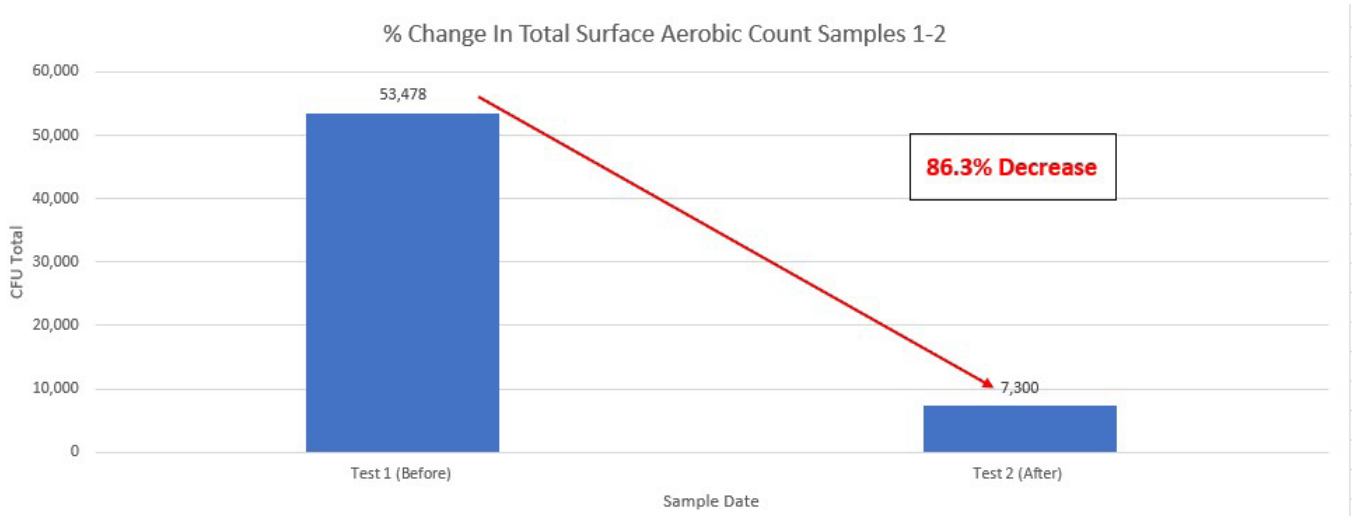
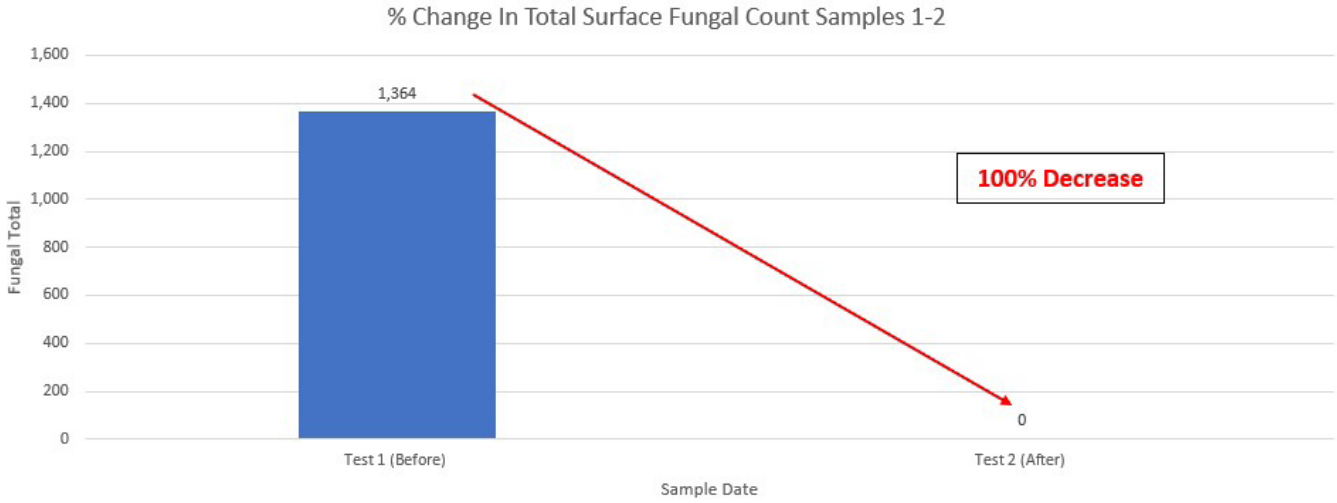
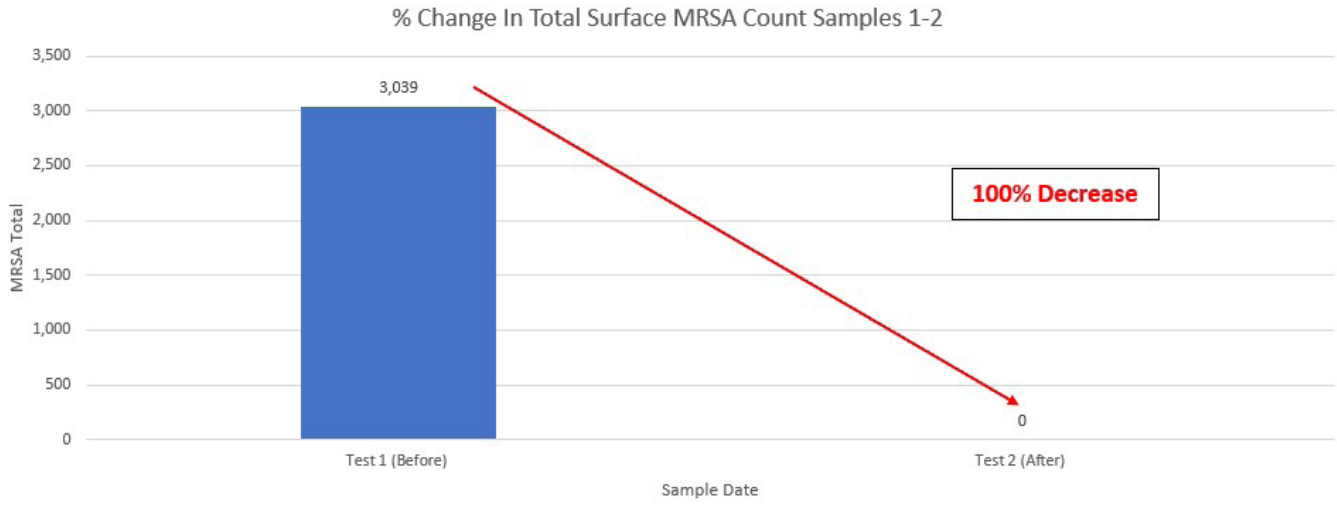
Results – Total CFUs per Sponge - 17 FEB 2022)

Sponge ID#	Description	Total Aerobic Count	Total Fungal Count	MRSA
4262	**Surgical Floor (before)**	640,000	None Detected	387
4263	**Surgical Bed (before)**	24,000	None Detected	None Detected
4264	**Instrument Table (before)**	36,900	None Detected	None Detected
4265	**Surgical Chair (before)**	42,000	None Detected	None Detected
4266	**Surgical Bed (before)**	28,200	None Detected	121
4272	**Bed Rail (before)**	22,800	64	245
4273	**Sink (before)**	78	None Detected	None Detected
4274	**Table (before)**	16,000	1,300	2,700
4275	**Potty Chair (before)**	14,600	None Detected	94
4276	**Floor (before)**	295,000	868	170
4277	**Bed Rail (after)**	1,900	None Detected	None Detected
4278	**Sink (after)**	None Detected	None Detected	None Detected
4279	**Table (after)**	None Detected	None Detected	None Detected
4280	**Potty Chair (after)**	5,400	None Detected	None Detected
4281	**Floor (after)**	57,100	None Detected	None Detected
4282	**Laundered Mop**	514,600	2,600	5,750
4283	**Laundered Wipe**	694,300	1,200	1,810

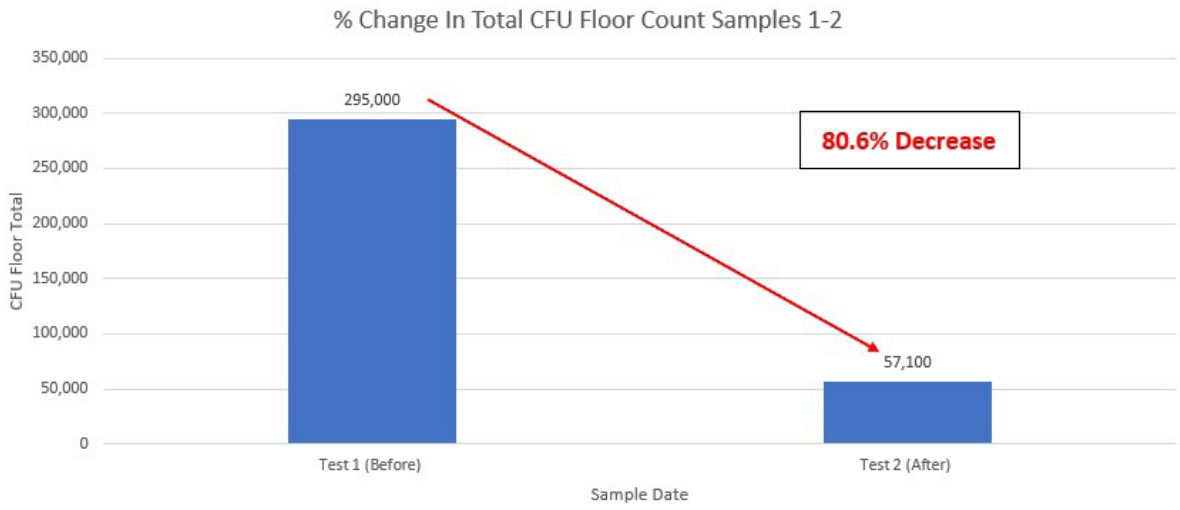
Biological Summary

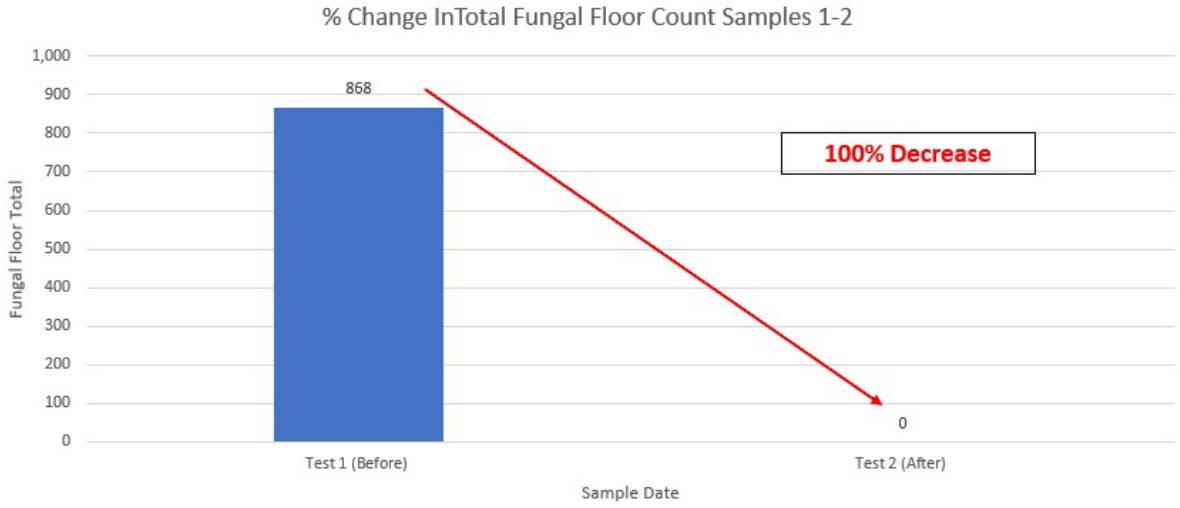


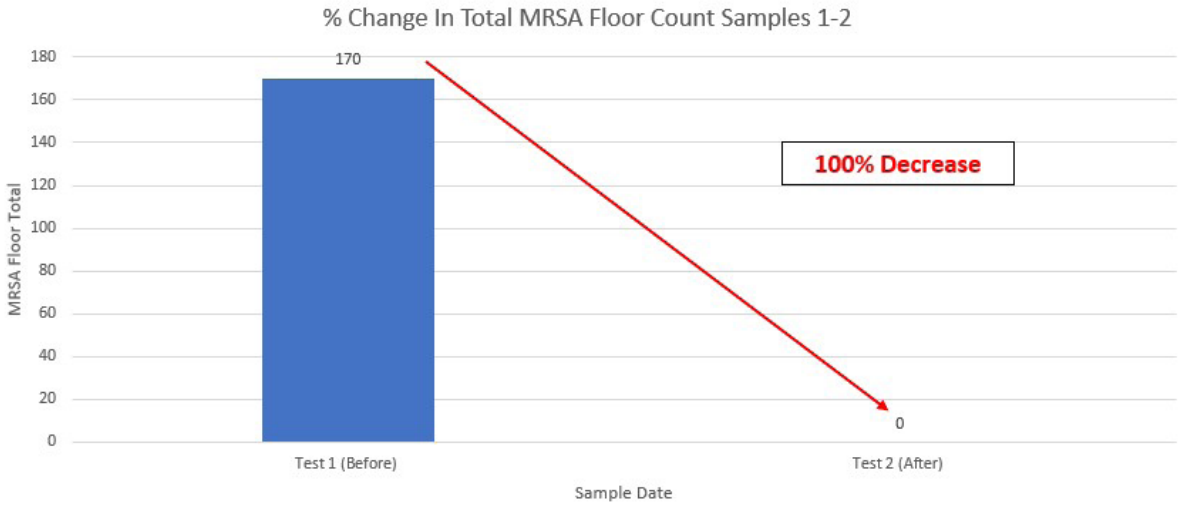




Biological Summary







Treatment Room 24

Surgical Room