



Shriners Hospitals
for Children®

A STUDY OF CHRISAL PROBIOTICS
FOR MORE EFFICIENT CLEANING
AND AS A METHOD OF
DECREASING NOSOCOMIAL
INFECTIONS AND RESPIRATORY
REACTIONS

With

A report on the relationship found between
ATP Testing & Culture Results

Project Coordinator

Sheryl Chewing, RN, CIC, CPHO, LHRM

Director of Performance Improvement, Risk Management, and Infection Control

OCTOBER 4, 2011

REASONS FOR THIS STUDY

NOSOCOMIAL INFECTIONS

In today's hospitals and care facilities there are a number of systemic problems to be overcome and needs to be addressed. Some of the current concerns would have been surprising 50 years ago. Hospitals have changed from being considered safe islands of healing into facilities to be avoided except for the shortest possible stays in order to evade nosocomial infections. In the USA these infections now cause as many deaths as from automobile accidents, AIDS and breast cancer combined, and cost hospitals well over \$30 billion annually.

Therefore, the number one pressing problem to be considered in this study is how to best address the requirement for environmental management to meet both the current and future needs for infection control.

An important factor in this regard is the growing awareness of the negative effects triggered by disinfectants which, paradoxically, complicate the very problems disinfectants and other chemical solutions are designed to prevent.

An unexpected statement made at the first evaluation meeting for this project was that "*disinfectants cause infections*". The explanation for this statement proved most interesting and became an important consideration for the investigation into a probiotic solution. This is covered in detail in the body of this study.

RESPIRATORY PROBLEMS

Another major unsolved problem for hospitals and nursing homes is that of respiratory distress, ironically triggered by the very disinfectants and other chemicals used in cleaning our facilities that are supposed to prevent just such problems.

The evaluation of the negative effects of disinfectants on both patient population and staff has not been fully studied in medical facilities in the past, and in recent studies users have determined that cleaning and sanitizing chemicals have far more negative impact on respiratory health than previously realized. Initially the concern was for the cleaning staffs that work directly with the chemicals. Then it was observed that the medical staff also had varying degrees of reactions and problems to the chemicals, which required an alteration of the cleaning schedule.

Furthermore, due to the growing incidence of asthma in children, and the reactions of some of the patients to the cleaning chemicals, additional exposure avoidance steps have been had to be implemented when using traditional toxic cleaning and disinfection protocols.

EFFECTIVENESS & THE DEGREE OF CLEANLINESS

The new probiotic technology has shown that the standards of what was traditionally considered “clean” are far outdated, and the importance of biofilm elimination in the control of the microscopic environment has now been put under intense scrutiny. The removal of biofilm is now considered of prime importance in providing a far cleaner environment, with a vastly reduced risk of infection.

EFFICIENCY & THE LABOR FACTOR

The reality of how training and management can make labor more effective also depends upon the efficiency of the products used and the degree of difficulty in using them (i.e. the use of caustic and toxic chemicals, etc. increased labor time). A part of this study is dedicated to quantifying the benefits of using probiotic products that have no negative effects on humans, animals, plants and the environment in general. It was also of interest that these PIP probiotic products have the ability to be used in ways that reach more areas easily and can, in part, make up for mistakes and lapses of attention by staff.

COSTS

A major concern for all facilities in these times where economic resources are stretched thin are additional ways to save costs, but not at the price of sacrificing quality. Since the new probiotic technology under test appears to save both direct costs and labor costs, this was also of major interest.

ENVIRONMENTAL IMPACT

The environmental impact of the products we use are of great concern and a growing problem. This is not only because of the desire to “be green”, but also because of the growing regulatory pressures mandating what chemicals can be used and the manner of their disposal.

Of major importance is that the components of the tested products are environmentally benign. The probiotics that are the core of the tested products have been certified organic and the chemicals used have received EcoLogo Certification. The Chrisal products had the added credibility of having been used successfully not only in many hospitals and medical facilities, but also on over a hundred farms over the past five years for the growing of all types of food animals and life forms from dairy cows and chickens to fish in aquaculture facilities.

GOAL SUMMARY

The Shriners Hospital Study was designed as a comprehensive, in-depth review of a new paradigm in cleaning that met the long term goals of providing a major improvement in efficacy, infection control, cost effectiveness, safety, ease of use, reduced environmental impact, and reduced material and labor costs.

The study was designed to go much further than to simply consider a substitution of products. It is part of an in-depth strategic effort to consider a method, that would solve a number of today's concerns and meet the requirements of the future for all of our facilities.

STUDY ENTITIES

THE SHRINERS HOSPITALS FOR CHILDREN.

The Shriners Hospitals for Children is a pediatric health care system of 22 hospitals dedicated to improving the lives of children by providing specialty care, innovative research and outstanding teaching programs. Children up to age 18 with orthopedic conditions, burns, spinal cord injuries, and cleft lip and palate are eligible for care. They receive the services in a family-centered environment without financial obligation to patients or their families. Shriners Hospitals for Children relies on the generosity of donors to deliver this mission every day. Locations are listed below and for more information, visit www.shrinershospitals.org.

Boston, MA

51 Blossom St.
Boston, MA02114
617-722-3000

Canada

1529 Cedar Ave.
Montreal, Quebec, CanadaH3G 1A6
514-842-4464

Chicago, IL

2211 North Oak Park Ave.
Chicago, IL60707
773-622-5400

Cincinnati, OH

3229 Burnet Ave.
Cincinnati, OH45229-3095
800-875-8580

Erie, PA

1645 West 8th St.
Erie, PA16505
814-875-8700

Galveston, TX

815 Market St.
Galveston, TX77550-2725
888-215-3109

Greenville, SC

950 West Faris Rd.
Greenville, SC29605
864-271-3444

Honolulu, HI

1310 Punahou St.
Honolulu, HI96826-1099
808-941-4466

Houston, TX

6977 Main St.
Houston, TX77030
713.797.1616

Lexington, KY

1900 Richmond Rd.
Lexington, KY40502-1204
859.266.2101

Los Angeles, CA

3160 Geneva Street
Los Angeles, CA90020-1199
213-388-3151

Mexico

Mexico City, MX
Av. del Iman No. 257, Col. Pedregal de
Santa Ursula, Deleg. Coyoacan, 04600,
Mexico, D.F. 011-52-555-424-7850

Northern California

2425 Stockton Blvd.
Sacramento, CA95817
916-453-2000

Philadelphia, PA

3551 N. Broad St.
Philadelphia, PA19140-4131
215-430-4000

Portland, OR

3101 S.W. Sam Jackson Park Rd.
Portland, OR97239-3009
503-241-5090

Salt Lake City, UT

Fairfax Road at Virginia St.
Salt Lake City, UT84103
801-536-3500

Shreveport, LA

3100 Samford Ave.
Shreveport, LA71103
318-222-5704

Spokane, WA

911 W. 5th Ave.
Spokane, WA99204
509-455-7844

Springfield, MA

516 Carew St.
Springfield, MA01104-2396
413-787-2000

St Louis, MO

2001 S. Lindbergh Blvd.
St. Louis, MO63131-3597
314-432-3600

Tampa, FL

12502 USF Pine Dr.
Tampa, FL33612-9411
813-972-2250

Twin Cities

2025 East River Pkwy.
Minneapolis, MN55414
612-596-6100

TEST SITE - THE SHRINERS HOSPITALS FOR CHILDREN - TAMPA

This study was performed at the Tampa Shriners Hospital for Children located on the Campus of The University of South Florida at 12502 USF Pine Dr, Tampa, FL 33612-9411. The hospital includes 179,000 square feet of treatment and support areas and provides a great range of services to children of all ages.



When the Shriners first became aware of the availability of a probiotic solution to provide a safer and healthier environment for their facilities, the Tampa hospital near to the Shriners' international headquarters was picked as the test site.

A multidisciplinary team was assembled to manage this study since there were a significant number of factors to be considered in addition to the direct testing. These included managing the possible changes in procedures and evaluating the associated potential health benefits. The members of the team involved in this study include:

Gene Bracewell,
Chairman Emeritus
Board of Directors (and Board of Trustees)
Shriners Hospitals for Children

Sheryl Chewning, RN, CIC, CPHO, LHRM
Director of Performance Improvement, Risk Management, and Infection Control
Pediatric Specialty Care, Tampa
Carol Ann Jenkins
Administrative Director of Support Services, Tampa

Jim Gamez
International Headquarters
Pediatric Specialty Care
Supply Chain Sourcing Specialist, Supply Chain Management Department, Tampa

Roberta 'Bert' Hardy
Director of Environmental Services, Tampa

Patty Veasey, Tampa

Tampa Hospital DAY Cleaning Crew Trained On Products:

Mary Mcneil
Carolyn Blackman
Camil Lancaster
Tommy Miller
Kenny Sneed

Hospital NIGHT Cleaning Crew Trained On Products:

Nilsa Fernandez
Rebecca Munoz
Horris Ray

Other Support Entities:

Dr. Marina G. Morris, M.D., Medical Sciences Group
Kim Metzler-Rice, Hygiene USA
Robert W. Yates, 3M Microbiology
Lino G. Morris, Chrisal
Howard Zalkin, Chrisal

PROJECT INTRODUCTION & EVALUATION

The study was initiated as a result of the problems experienced with existing toxic cleaning and disinfection solutions. When one of the Shriners' support entities suggested our organization look at a new probiotic solution for preventing nosocomial infections and providing more effective and economical cleaning, we were willing to review the data to see if the solution merited further study. The problem is that there are so many new products claiming a large range of benefits, that sorting through them requires a great deal of time.

A number of factors were considered. Due to the source of the recommendation and the initial studies provided, we looked into the Chrisal solutions. A large amount of additional medical and scientific data was presented and the results for the Chrisal probiotic solutions were impressive.

MICROBIOLOGICAL MECHANISM:

The key question for the Infection Control Department was to have an understanding of the actual mechanism of how the products worked. It was determined that if the products worked as stated, they were far ahead of any of the current solutions and provided a controlled domination of the microscopic environment (CDME).

THE BIOFILM FACTOR:

It should be noted that it is impossible to control the microscopic environment of any surface without being able to remove the existing biofilm and prevent its growth and re-growth. In general the public is unaware that the biofilm, produced by pathogens and other bacteria for protection, is not just the plaque on teeth or what darkens the grout between tiles, but is on all surfaces including our skin – and is estimated to be responsible for 80% of all infections.



However, many professionals are also shocked to learn that the average adult human body is made up of 10 trillion cells, but that we normally have 100 trillion bacteria on our skin and in our bodies, (10 times more). In actuality humans are a composite life form comprised of 90% bacteria and only 10% "Us". A major consideration is that over the last few years science has determined how much more abundant and versatile the life forms around us are, and how rampant and hardy the biofilm they produce to protect themselves is. For those of us in infection control, this knowledge is a clear indication that the removal of biofilm is a major contributing factor in the prevention of infection and the re-infection that is caused by the use of disinfectants.

The capability of the Chrisal products to deconstruct biofilm at a microscopic level was of primary interest because (a) no other products have been shown to be able to eliminate biofilm in this

manner and (b) the only waste product that occurs in the conversion (deconstruction) of the biofilm by the Chrisal products is harmless CO₂. The Chrisal products were the only products able to eliminate biofilm in a way that was safe, practical and environmentally responsible. The fact that the products worked by using the normal function of nature itself and were easy to use and cost effective were the keys to the decision to formally test the products.

REQUIREMENTS OF USE:

The Hospital prefers not to use any products or solutions that require special equipment, handling or training. In this regard, the PIP probiotic products were extremely simple to use and required no special conditions, training or equipment. The only conditions with the probiotic products was to not mix or use them with other cleaning or disinfection products and that it was better not allow them to freeze. The probiotics were to be used in specific areas and were not to be mixed with any other products that were used in the same locations. The products have a shelf life of years, however it is important that once the concentrated products were mixed for use, that they are used within a week and not be allowed to be left sitting around for long periods. Other than that, the instructions were to simply substitute the Chrisal PIP Probiotic cleaners for the currently used products – and proceed with cleaning as the staff would normally operate.

Prior to the decision to start this study some of our staff tested and used the products on an individual basis and provided management with highly positive reviews. At the same time additional product, usage and test data from universities and hospitals was received and submitted to the Study Management Team. A meeting of all the parties was held at the Tampa Children's Hospital and the decision to proceed with a full scale study was proposed by the Management Team. This was agreed to by all parties, and the basic procedures were laid out and further refined at additional meetings over the month subsequent to the first evaluation meeting.

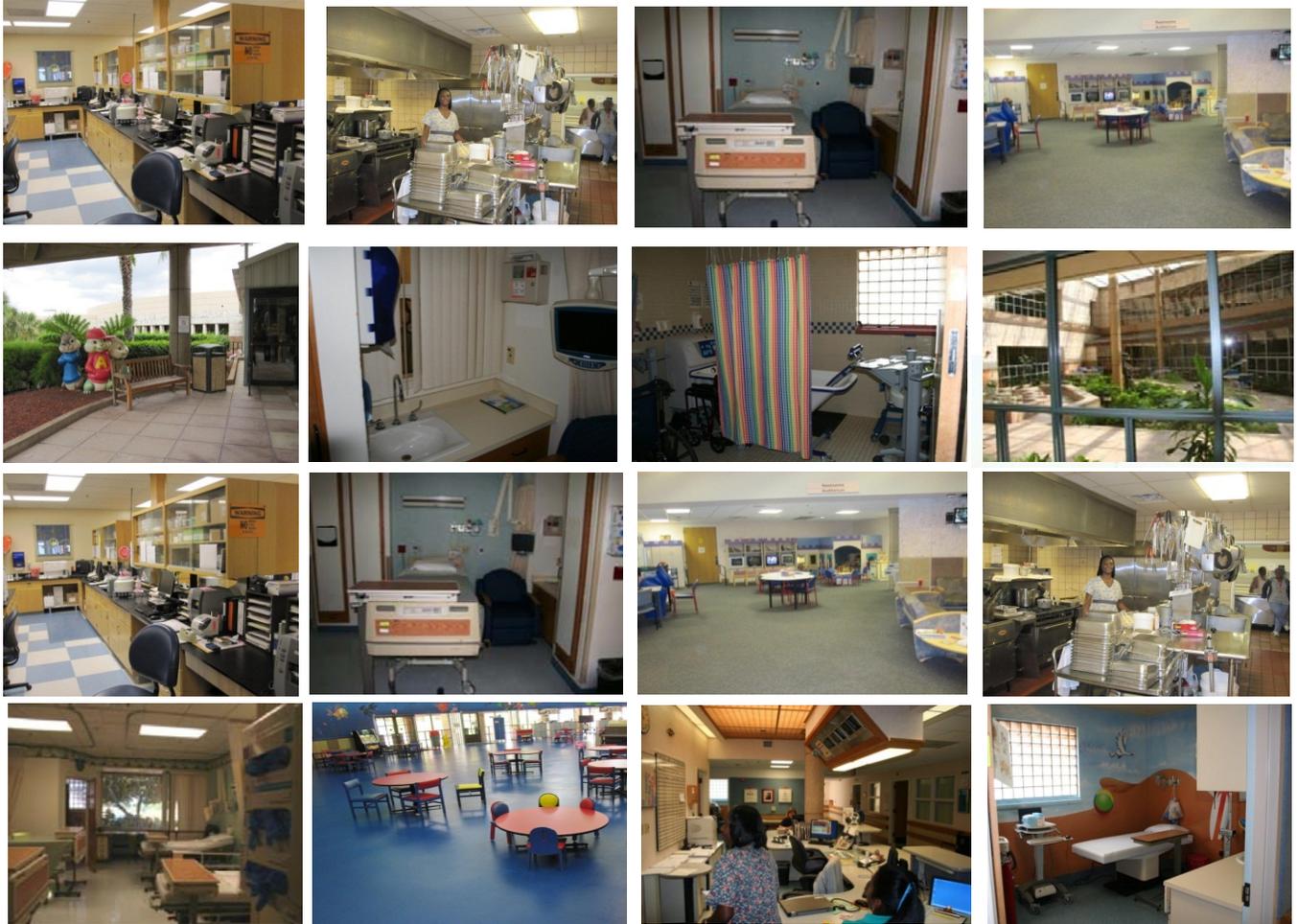
TEST AREAS

25 locations in the Hospital were selected. These included:

- Public areas: lobby, the Self-Check-in Desk computer keyboard and mouse used by the patient's parents
- The screens and hand controllers used by the children waiting in the lobby
- Men's and woman's rest rooms, with special attention to the handicap stalls, sink handles, soap dispenser and baby changers
- Patient room area
- Patient exam rooms, exam tables, sink, etc.
- Cast rooms
- Nurses stations
- Nurses locker room and bathroom
- Hallway hand sanitizer dispenser
- Hallway mounted staff computer keyboard and mouse
- Floor areas
- Kitchen areas
- Plus additional areas for visual changes such as public water fountains, etc.



The Shriners Hospitals for Children in Tampa various test areas.



TESTING PROCEDURES

The list of the final testing locations were approved by a team from the Tampa Shriners Children's Hospital including Sheryl Chewning, RN, CIC, CPHO, LHRM, Director of Performance Improvement, Risk Management, and Infection Control, Carol Ann Jenkins, Administrative Director of Support Services, Roberta Hardy, Director of Environmental Services and several other staff members.

BASELINE TESTING PRIOR TO THE USE, TESTING AND EVALUATION OF PROBIOTICS UTILIZING CULTURES & ATP METERS

In order to provide a base-line reference prior to the study, each area to be tested was first cleaned with the hospital's normal cleaning products.

At each location:

1. ATP (Adenosine Triphosphate) testing was done using Hygeina ATP test swabs for the sampling and which then were read using a Hygeina ATP Meter.

2. Cultures were taken of the same area using 3-M culture swabs which then were taken to the lab and poured onto 3-M culture media and incubated for 24 hours before being checked and then frozen for photographs.

ONGOING PROCEDURES & TESTING ONCE THE STUDY STARTED

After the initial base line testing was done, the trial was started by taking the following steps:

- each test area was listed and assigned a specific number;
- signs were posted in each room or area noting that only Chrisal products were to be used for that area;
- a special “Chrisal Only” cart was designated and labeled to carry only the Chrisal cleaning products and the mops and other cleaning items used;
- One of the sinks in the janitor’s closet in each area was set up to be used for the Chrisal PDU – Automatic Dilution Units.
- the cleaning staff was instructed to use only the Chrisal Probiotic PIP Products in each of the designated areas from that point on.

Thereafter, on Thursday of each week over the next month, both ATP testing and cultures were taken at each site where the Chrisal PIP Probiotic Products were used for cleaning. In addition, visual inspection notes were taken as well as reactions to the use of the products by the cleaning staff, the medical staff and the patients.

TRAINING

A week before the testing started, and under the supervision of Roberta Hardy, Director of Environmental Services, a day of training on the use of the probiotic products for cleaning was provided by Chrisal. The Day Cleaning Crew trained on the products were: Mary McNeil, Carolyn Blackman, Camille Lancaster, Tommy Miller and Kenny Sneed. Later the same day additional training was provided to the Night Cleaning Crew consisting of Crew Supervisor Nilsa Fernandez, Rebecca Munoz and Horris Ray.

In addition automatic dilution units were installed in the cleaning closets, and hooked directly to water outlets. It was clearly noted that the Chrisal probiotic products are heavily concentrated and are diluted by 99 parts water to 1 part product.

Medical facilities around the country over the years have found that that staff should not be required to properly dilute concentrated products, because it often results in over use. This wastage is significant and comes from the mentality shared by most people that *“if a little bit is good – then more must be better”*.

In the case of the Chrisal products, they are extremely effective at full dilution and do not need to be made stronger, so the process has been automated to remove any local judgment by staff.

Furthermore, the products have been color coded and numbered in addition to having Spanish as part of the labels (in Canada French is used). The vendor also provided their own personnel to work with the staff on a regular basis and during the test period while various observers visited from interested local groups.

NOTE ON INITIAL BASE LINE RESULTS

Several external observers noted that the initial testing to establish a base line showed extremely low readings compared to the measurements normally found in hundreds of other facilities from other hospitals and universities, to food processing plants. There were exceptionally lower than anticipated ATP readings and corroborating culture results in almost all the areas tested at the Shriners Hospital. The large group of both hospital staff and external people observing the initial testing noted and discussed the reasons for the unexpectedly low contamination levels found in this particular hospital facility, which were exceptional.

The Hospital staff was understandably proud of these results, especially when the professionals observing the tests kept commenting that in the pre-testing, the Shriners Hospital for Children in Tampa had the lowest readings of any of the other facilities they had seen tested over the years.

In discussions as to why the Shriners facilities had such low ATP readings, what was dismissed was the fact that the results were skewed by the staff having advance knowledge that testing was going to be done. It was noted that perhaps the important fact that the staff is working with Children should not be ignored. Outside observers have stated that they had never seen comparable levels of dedication to those shown by all of the cleaning staff in comparison to staff efforts at other facilities. This may be no small factor. It is rare to find anyone who is not affected when working with children who have health issues. In evaluating the staff from this perspective, it was noted that the feeling of dedication appears not to dissipate over time by anyone that stays in service with the hospital.

TESTING WITH CULTURE MEDIA VS. ATP TEST RESULTS: In addition to testing with cultures, the Hospital also ran ATP testing. This was to evaluate the effectiveness and convenience of ATP testing which was of interest due to the speed of the test results and the ease for staff use.



The photos above show ATP testing of several of the Hospital sites that are part of this study

NOTES ON THE RELATIONSHIP BETWEEN CULTURES AND ATP TESTING: Cultures can be specific depending on the type of media being used and what will grow on that media. Cultures are commonly used to detect the presence of bacteria and are extremely important in detecting and quantifying the presence of infectious bacteria.

It should be noted that ATP testing looks not only at all organisms, but also at other sources of ATP, so there is not always a direct correlation between the two, however, ATP testing is an extremely good indicator of cleanliness and contamination. The actual function of ATP testing measures adenosine triphosphate (ATP), the universal energy molecule found in all animal, plant, bacteria, yeast and mold cells. Residues, particularly food or organic residue, contain large amounts of ATP, and when left on a surface can harbor and grow



bacteria, cause cross-contamination and develop biofilm. Microbial contamination also contains ATP except in rare situations like the probiotic solutions developed by Chrisal.

However, an ATP reading does not specify the organisms or sources that produce the detected ATP and so, though an excellent indicator of cleanliness, it cannot directly determine the presence of dangerous pathogens. ATP testing is an indication of cleanliness, and is normally an extremely effective tool in the determination of cleanliness. It must be noted however, that even small amounts of pathogens that fall within the accepted range of ATP testing numbers, can still culture into substantial growth over a relatively short period of time. This is a normal occurrence and has been seen in this and all testing.

In spite of fact that pathogens falling below acceptable ranges may be hazardous, ATP testing has proven to be of great value most importantly, because it is one of the only rapid ways of testing cleanliness because an ATP meter requires only 15 seconds for a determination whereas cultures require 24 hours for a determination depending on the type. Due to this possible discrepancy, periodic cultures should also be added to the routine testing to ensure that pathogen control is maintained.

CORRELATION: A base line correlation between ATP readings and cultures, is possible where each numerical reading of, “1” would equal approximately 1,000 bacteria. It should be noted that a reading of 10 would be considered low, but in a culture starting off with only 10,000 the bacteria count can rapidly grow in to the billions in 24 hours. Therefore the comparison of ATP and 24 hour cultures may diverge over a period of hours. ATP readings are primarily useful and accurate as an instantaneous indication.

TEST STEPS: ATP Testing is performed by simply rubbing the swab on any surface to be tested, from skin or a kitchen counter to an operating room table. The swab is then reinserted in the tube, the bulb is bent over to break the seal holding the reagent, the liquid drops into the swab compartment, and the entire assembly is shaken and then inserted into the meter. The OK button is depressed and an exact digital read out of the number value is obtained in 15 seconds. The system also numbers each test and is compatible with, and plugs in to any computer to provide permanent electronic records.

Note that any ATP reading of less than 30 is considered safe and over 30 is considered to have bacterial and/or other contamination.



The four steps in ATP testing

TEST RESULTS – 2011 AUG-24 – PRE-CHRISAL TESTING:

The following test results are from areas prior to the initial application of probiotic cleaning



materials. Cultures were taken shortly after cleaning by staff using standard hospital cleaning materials.

Seven of the cultures showed no activity due to the cleanliness of the facility. Though, pathogen growth is to be expected in public facilities, especially hospitals, it can be seen that, other than in a few locations, the readings are well under what is normally prevalent.

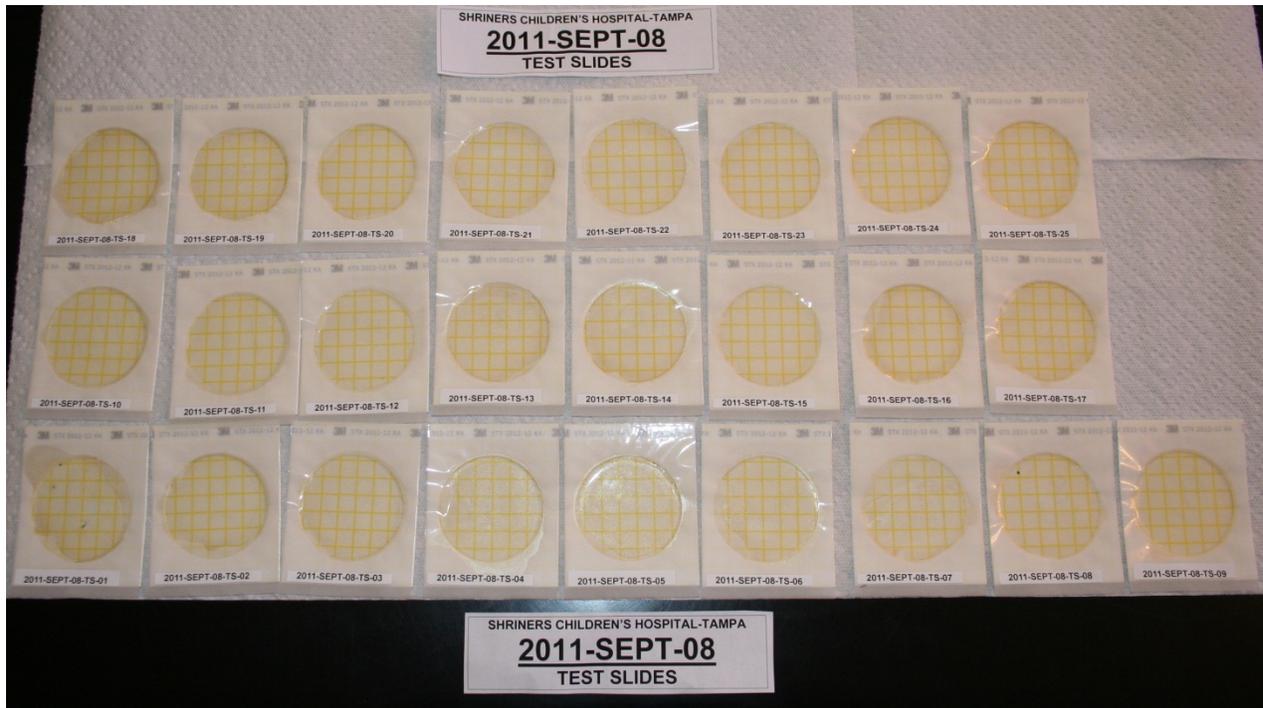
TEST RESULTS – 2011-SEP-01 – START OF THE CHRISAL USE TESTING PERIOD:

Below are the test results after the first week of cleaning with the Chrisal PIP Probiotic Products



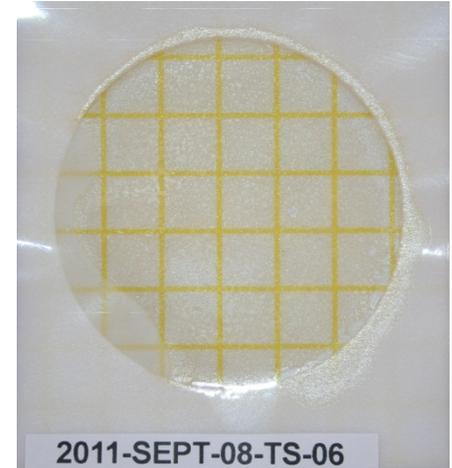
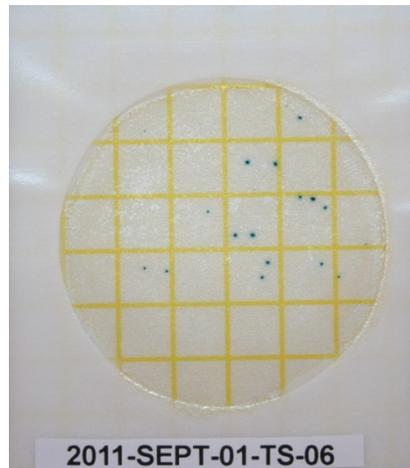
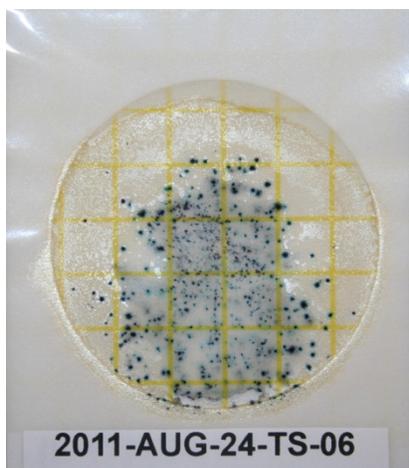
TEST RESULTS – 2011-SEP-08 – CHRISAL USE TESTING PERIOD:

These weekly results, when grouped together, show the progression and advantage of cleaning with probiotic. One of the most important aspects and advantages provided by the Chrisal PIP probiotic cleaning products is the control and deconstruction of biofilm.



Since it is now recognized that an important aspect of cleaning and infection control is to deconstruct biofilm, an important advantage of these probiotic products is that they work down to the microscopic level, eating the protective biofilm that is formed by, and in which bacteria reside.

In older facilities a great number of biofilm layers can build up, in which case it takes from a few days to two or more weeks to rid all surfaces of the biofilm. That is why the products are called PIP, for Probiotics-In-Progress. Once the probiotic deconstruct the biofilm, from that point on, the probiotic products provide a real ongoing control of the microscopic environment. (Chrisal calls this **CDME**, for Controlled Domination of the Microscopic Environment.)



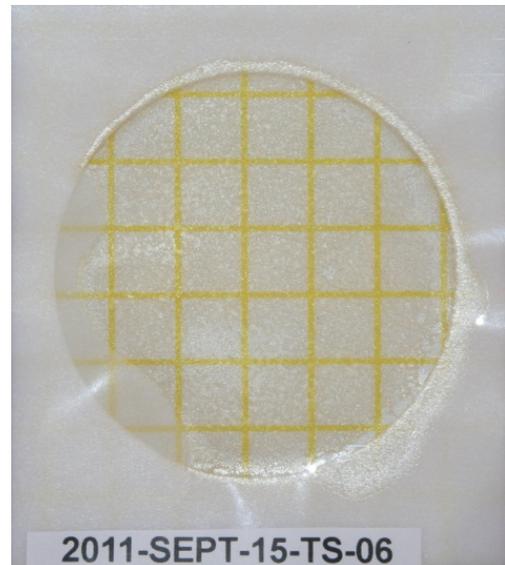
The 3 slides above represent the normal progression of the probiotic steps in controlling biofilm.

It can be seen from the fourth culture of this series
(*the slide to the right*➔)
that once the biofilm has been deconstructed, the
probiotics that cover the surfaces, applied during the
original cleaning, continue to work and protect all the
surfaces cleaned.

The key point and objective, is that once all the biofilm
has been removed, there is nothing left on the surfaces to
protect the pathogens, other bacteria and contaminants,
including viruses and dirt so that the surfaces stay clean
and safe year after year.

**ONGOING PROTECTION IS PROVIDED BY THE VERY
NATURE OF PROBIOTICS:**

Unlike chemical cleaners that stop working as soon as
they are dry, Chrisal probiotics are a living solution that
normally keeps working at full strength for up to three (3) days.



It was shown that during cleaning with the Chrisal PIP probiotic products, the probiotics deposited
as part of the cleaning process will continue to function for days, providing ongoing cleaning and
protection for all surfaces.

Subsequent testing indicated progressively lower (cleaner) ATP readings after hours and the next
day, without any additional cleaning. Non-probiotic cleaners showed re-contamination within
hours.

CONFIRMATION TESTING METHOD:

Using an ATP Meter or, cultures, a surface is tested prior to cleaning. An optimal testing regimen
would be to section off a surface and perform uniform tests with multiple cleaners to compare with
each other, including bleach and Chrisal probiotic.

Subsequent to cleaning the surfaces another test should be performed. In the vast majority of
instances the probiotic has had the lowest ATP reading and proven to be the best cleaner.

In performing additional tests again after a few hours and again the next day, invariably in all
cases, the areas cleaned with traditional toxic cleaners will be contaminated again within a short
period of time, while the segments cleaned using Chrisal probiotic products will actually give far
lower ATP (cleaner) readings, and show progressively increased reductions in contamination
over time.

TEST RESULTS – 2011-SEP-15 – CHRISAL USE TESTING PERIOD:



As noted in all of the testing to date, here in the Shriners Children’s Hospital in Tampa and corroborated by test results from other hospital and university studies, by the end of the third week, all probiotic treated surfaces have become biofilm free, and as long as the surfaces continue to be cleaned with the probiotics once every three days, they tend to stay free of pathogens, contaminants and allergens.

It should be noted that if fresh contamination is placed on top of the surfaces cleaned with probiotics, and swabbing performed, there may be short period of time for which a microbial spike will occur, however, once the probiotics have had the time to take hold and control an area, then the contamination will not spread and will become inactive due to the competitive advantage of the probiotic solutions.

SCHEDULE RESTRICTIONS WHEN USING TRADITIONAL CLEANING SOLUTIONS :

Different areas within the facility have different cleaning schedules and restrictions. Public access areas are cleaned twice a day, by the day and evening shift personnel, with special cleaning for any spills or problems. However, there are a number of patient areas that cannot be cleaned with regular schedules, such as some of the out-patient rooms which are dependent upon variable staff and patient scheduling.

In addition to issues revolving around scheduling, there are special considerations when using traditional toxic chemicals in proximity to patients and hospital personnel. Special consideration must be made when using normal chemical cleaner in areas where patients with respiratory conditions, such as asthma are in residence. In cases where allergic reactions ranging from slight to extreme present, toxic chemical use must be carefully controlled. One of the nurses that works within the area under study reacts so violently to any of the conventional cleaning solutions that she cannot be near any area cleaned for a period of time after their application.

An interesting result during the testing period was that when the probiotic PIP products were used to clean the nurse's desk area, her phone, computer and the floors around the nurse's station and the floors were mopped with the Chrisal probiotic in that entire wing, that nurse experienced no adverse reactions.

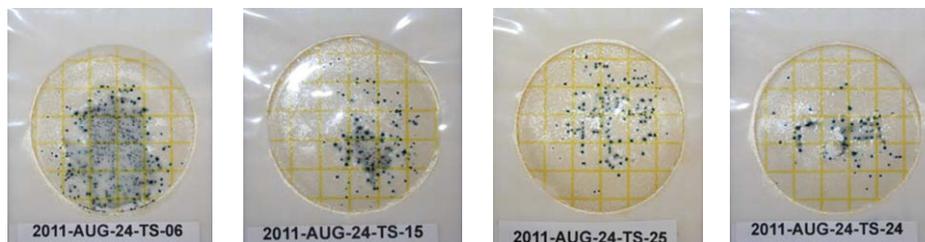
Another observed benefit was that asthmatic patients in the area under study had no adverse reactions to the probiotic cleaning solution.

PATTERN OF SAMPLING RESULTS & NOTES ON ANY VARIATIONS:

In the pre-probiotic sampling, 7 out of 27 cultures showed a zero count.



5 of the 27 locations had high counts. These included areas such as on the baby changing station, the game controllers used by the children in the lobby section, the patient log-in area.

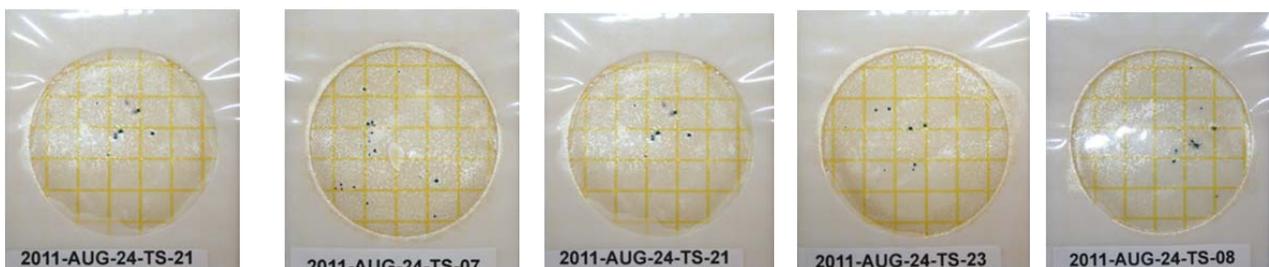


The medium count plates were from areas like the sink handles and counter tops, computer keyboards and mouse, the push bar for the hand sanitizer, the handicap railing in the bathrooms.

The light count plates included exam room floors, and a mix of the same type of areas that showed both medium counts and zero counts.

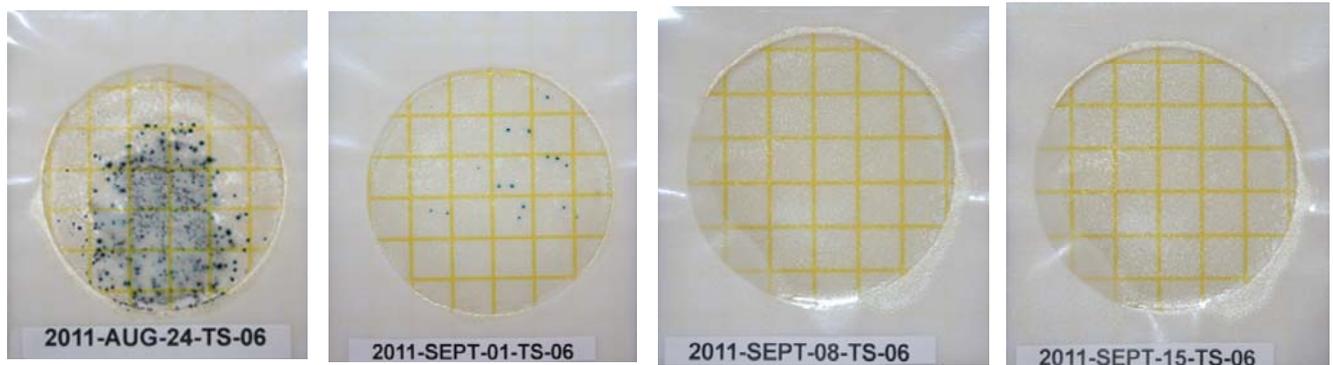
This indicated that for similar type locations and items tested, the variables depended upon what users had access to the area, and how the cleaning schedules were arranged.

Therefore, it was expected that the use of a probiotic cleaner would be able to help alleviate the variance by removing the biofilm that supported a great deal of contamination and pathogen activity.



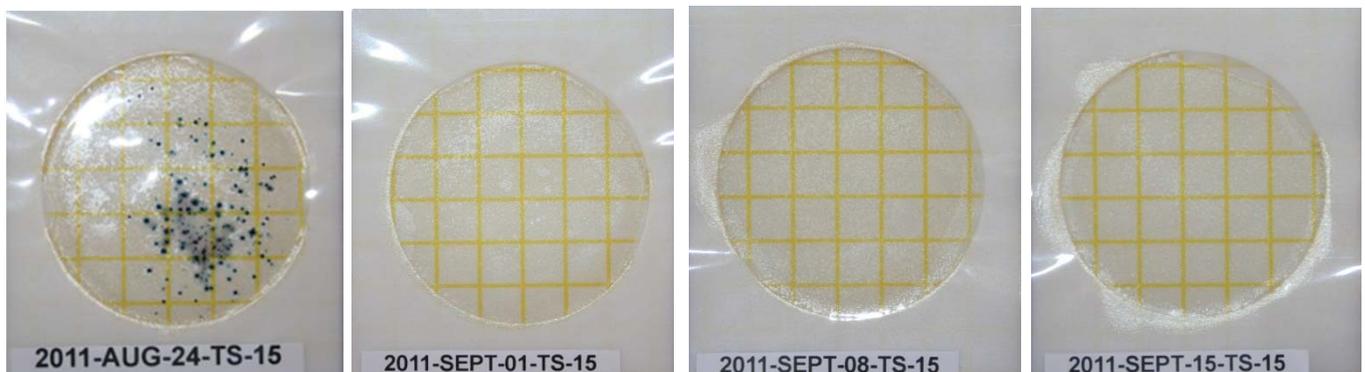
PROGRESSION OVER THE TEST PERIOD

Results Test Site-06): Taking the high count plates as a good example of the progression of probiotic cleaning, the following depict the progress of each area tested, starting with test site-06



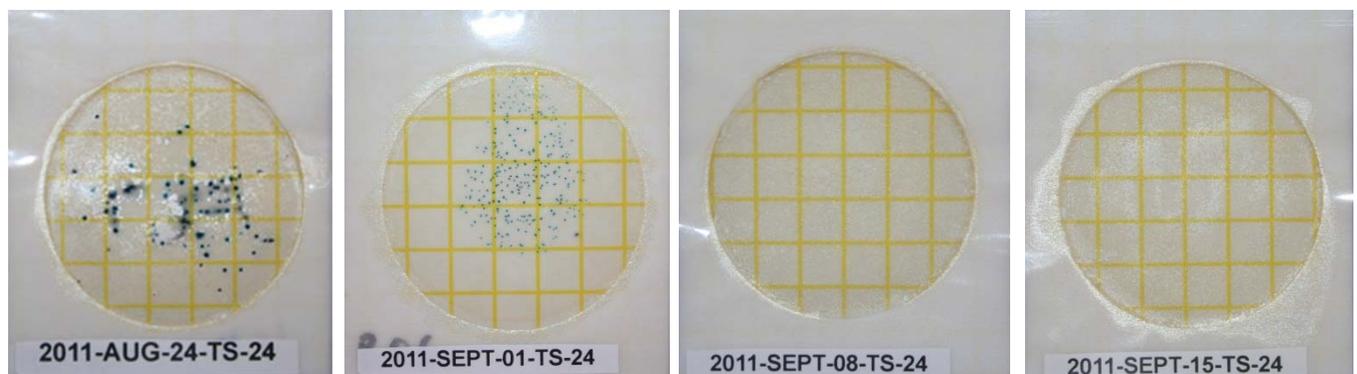
The above cultures show the progression of test location-06, with the first culture on the left being the results of testing the area cleaned with the hospital's normal cleaning and disinfecting products. The second culture is the week after application of the PIP Probiotic cleaners. Each subsequent slide thereafter indicates the weekly test results from the PIP Probiotic cleaned area.

Results Test Site-15:



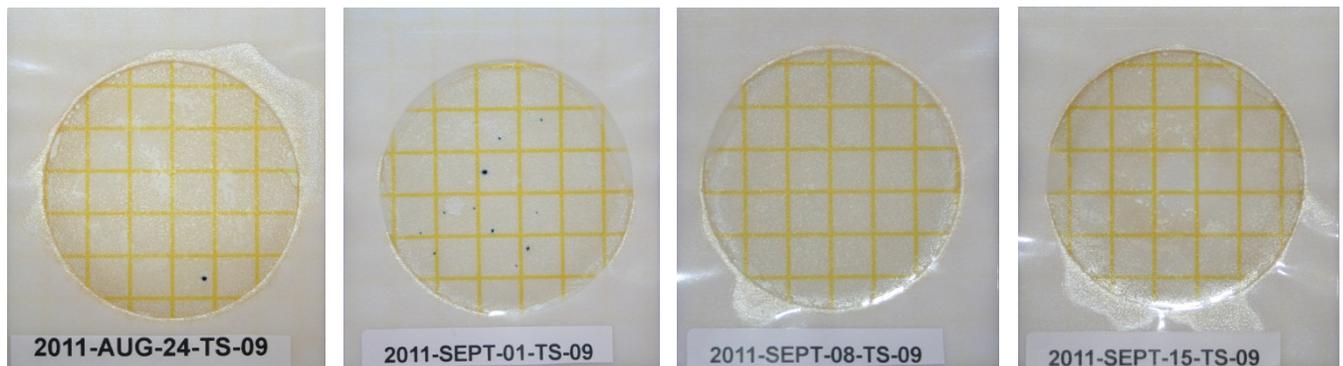
The above slides indicate the progressive reduction in pathogens when the probiotic solutions are used. In all cases the results match those found in dozens of other studies we examined.

Results Test Site-24:



Site-24 is another normal progression of probiotic cleaning.

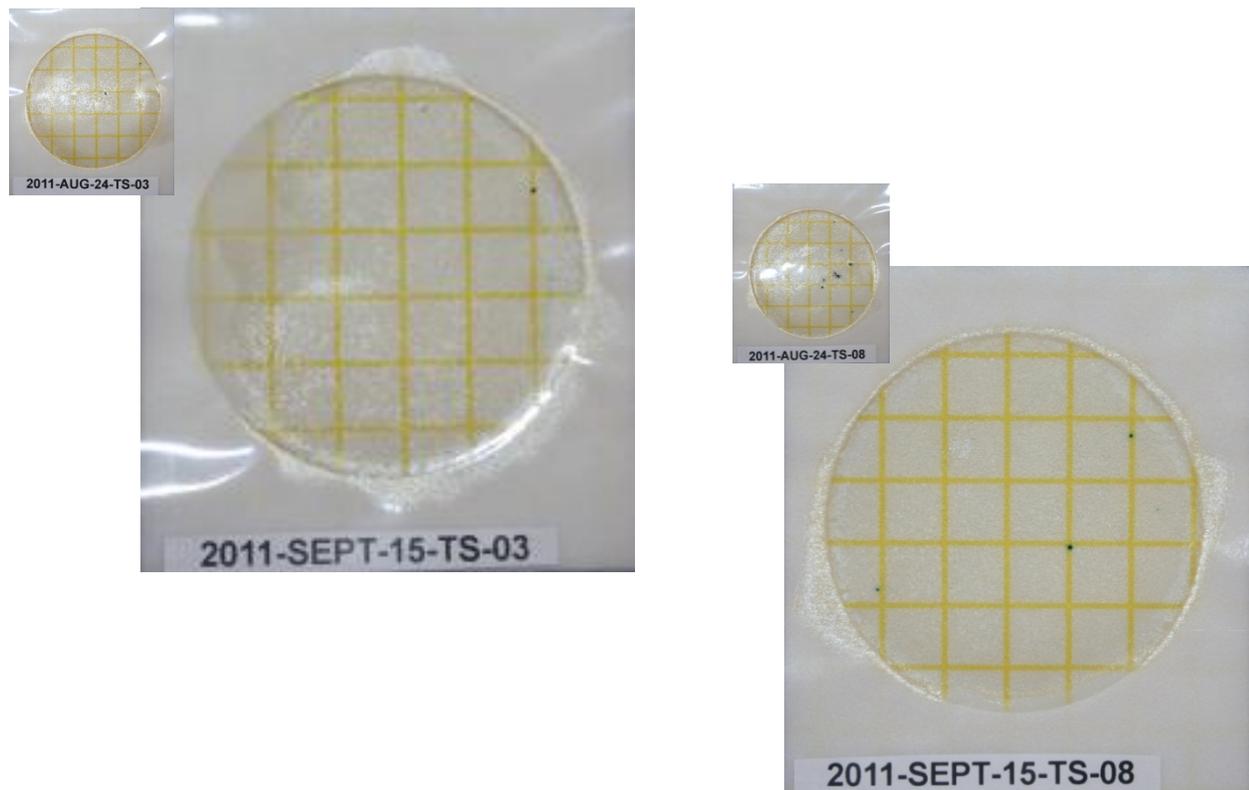
Results Test Site-15 – Note The Variations:



The anomaly in, Site-09 demonstrates that, until the biofilm is totally removed, there remain areas that afford protection for pathogens and other contaminants. As a result, because there were resources remaining for pathogen growth in the first week, until the second week when the probiotic took full control, the pathogens were able to continue to survive.

Notes on Additional Variations:

Below are the cultures from two sites that showed minimal counts during the third week of testing. It was noted at the time of testing that these two cultures were from test sites in front of urinals. The other test was performed on the grout in front of a toilet where at the time of the tests, photos were taken of a large splatter of fresh urine and footprints in front of the urinal that had not been cleaned. There was also recent soiling around the toilet. The interesting thing about both of these situations is that test swabbing of the soiled matter, spiked the microbial load, but the bacteria did not gain a foothold and did not continue to grow on the surfaces treated with the Chrisal PIP Probiotics.



SHRINERS HOSPITALS FOR CHILDREN-TAMPA - TEST SITES & RESULTS FOR CHRISAL													
2011 Test Dates		PRE-CHRISAL TESTING-AUG-24			POST-CHRISAL TESTING SEPT-01			POST-CHRISAL TESTING SEPT-08			POST-CHRISAL TESTING SEPT-15		
Site #	Test Site Location	ATP #	Culture Results	Notes	ATP #	Culture Results	Notes	ATP #	Culture Results	Notes	ATP #	Culture Results	Notes
GUEST QUARTERS-Bathrooms-Pharmacy Hallway				planned 20 used 25			Numbers?			Numbers?			#s= 101 - 126
Men's Bathroom													
1	Baby Changer	10	0	L19-T1 / T27 (T21?)	1	0		0	4		1	0	
2	Handicap Stall Handrail	176	17	L19-02 / T21	2	2?	L19-02 ?	0	0		0	0	
3	Floor in front of right-urinal	153	2	L17-T2 / T24	5	2	L17-T2 ?	18	0		5	4	
Woman's Bathroom													
4	Handicap Stall Rails	77	0	L4-T2	3	0	L16-T2	0	0		7	?	
5	Handicap Push button	16	0	L3-T2		0	L20-T2	1	0		0	0	
6	Diaper Changer	596	TNTC	L18-T2 / T22	1	18	L18-T2 ?	4	0		0	0	
	Toilet in middle stall	43		L18-T1 / T25	3								
7	Soap Dispenser Top	10	23	L15-T2 / T28		0	L15-T2 ?	6	0		2	0	
BEACHCOMBERS InPatient Unit													
Nurse's Locker Room													
8	Floor in front of toilet (grout)	142	11	L9-T2 / T26	47	9	L9-T2 ?	23	1		35	4	
9	Sink Handles	6	1		3	11		2	0		4	?	
*	Wall Visual												
*	Floor Visual												
Patient Room -20													
10	TV by sink	2	0	T23 - Not occupied		0		0	1		52	0	
11	Sleeper Chair by Sink	7	0	L10-T1 recently		0		4	0		3	0	
Patient Exam Room													
12	Sink handle & counter top by blue paper towel dispenser	7	23	L8-T1 L13-T2		0	L13-T2 ?	0	1		3	0	
13	Patient bedside table	22	9	L7-T1 L14-T2	2	0	L14-T2 ?	2	0		6	0	
Nurse's Desk													
14	Computer keyboard-R	28	93	L6-T1 L11-T2		2	L11-T2 ?	4	?		4	0	
15	Telephone-L under monitor	103	158TNTC	L9-T1	6	0		1	0		3	0	
OUTPATIENT DEPARTMENT													
Cast Room-17 -													
16	Exam Table Mattress	3	0	L13-T1		0			0			0	
17	Counter Top & Sink Handles	7	19			2		2	0			0	
Cast room-18													
18	Exam Table Mattress	3	0	L15-T1		1		0	0		1	0	
19	Floor in front of Exam Table	4	1	L14-T1		0		7	0		20	0	
20	Computer keyboard+mouse	26	43	L17-T1		6		6	0		0	0	
21	Floor @ table head next to trash marked can	122	10			0		7	?		4	0	
OUTPATIENT HALLWAY													
22	Computer Keyboard-hallway betw rooms 17+18	103	29	L2-T1		0		3	1		1	0	
23	Hand sanitizer-t betwn rooms 4+6	59	9	L16-T1		3		10	0			0	
MAIN LOBBY & KIDS PLAY AREA													
24	Patient Log in Computer & Mouse	75	73?	L4-T1	17	TNTC			0			0	
25	Hippo Screen game for kids	34	134	L5-T1		9			0			0	
26	Kid's game controller- left side	104	TNTC	L12-T1		10						1?	
*	Lobby Water Fountains & Wall												
*	Lobby Rest Rooms-Mens												
MEN'S BATHROOM													
	push handicap butrton	9	L1-2	L10-T1-02 Just cleaned	23		See urine splash in photo						
27	baby changer	no	2	L2-T-2 Just cleaned		0							
	handrail/handicap stall	30	L5-T2	Just cleaned									
	Floor in front of unrial	1	X	Just cleaned									
KITCHEN													
	floor in front of fryer	30		L3-T1	50						102		
	Raw meat sink/counter	14	L1-T1	Washed after each use							103		
	floor in front of raw meat sink	85	L2-T1		18						104		
24-Aug-2011 notes													
Note-01: Had just been cleaned minutes before testing.													
Note-02: Had just been cleaned minutes before testing.													
Note-03: Had just been cleaned minutes before testing.													
Note-04: Had just been cleaned minutes before testing.													
Note-05: Patient room had not been occupied recently since disinfecting.													
Note-06: Patient room had not been occupied recently since disinfecting.													
Note-07: Mattress was cleaned with cavi-wipes recently after patient was discharged from room.													
Note-08: Sink and counter tops were cleaned with cavi-wipes recently after patient was discharged from room.													
Note-09: Mattress was cleaned with cavi-wipes recently after patient was discharged from room.													
Note-10: Very low ATP reading on floor below where patient sits which may be due to being wiped with caviWipes if anything dripped on floor.													

STUDY CONCLUSIONS

The study undertaken at the Shriners Hospital in Tampa started with a list of key questions and goals. The questions about the viability of probiotic products for applications in our facilities were formulated in a logical order to cover all items of concern and of interest utilizing a step by step protocol.

The results of the study were well received by all parties, and the answers to the questions and conclusions from those results are as follows:

- 1) **DO THE CHRISAL PIP PROBIOTIC CLEAN AS WELL AS WELL AS THE CURRENT HOSPITAL CLEANING PRODUCTS?** The answer is, yes, they do. In every single case, using the PIP probiotic products yielded better results in all aspects of cleaning and infection control when compared to the existing products used in the hospital.
- 2) **HAVE THE CHRISAL PIP PROBIOTIC PRODUCTS PROVEN TO BE SUPERIOR TO ANY OF THE CURRENT HOSPITAL CLEANING PRODUCTS – AND IF SO, HOW?** All of the probiotic products tested proved to provide far superior results in a number of ways.
 - a. **CLEANING ABILITY:** in just the first few days of the study it was noted that the Chrisal Probiotic Products produced visibly better cleaning than conventional products. An ATP meter was not required to see the substantial positive difference in cleanliness of the surfaces. In the Nurses Locker Room with only one cleaning, a badly soiled and dull blue tile wall became so much cleaner that a number of the staff commented on the visible improvement in its appearance.

In the lobby area, the water fountains and the splash guard on the wall behind them that were previously cleaned every day with the Hospital's standard products were cleaned by the PIP products. After 20 minutes both the fountains and the wall behind and adjacent to the fountains looked like new. These types of improvements were evident on all surfaces tested over the course of the study
 - b. **FLOORS:** An interesting effect that we noted is that in normal mopping, the water starts turning cloudy and slightly gray as the staff mops the floors. However, with the Chrisal Probiotic Products, as they started to break up the biofilm, the water actually started to turn black from all the extra dirt removed by the PIP Floor & Carpet Cleaner. It was also determined that by simply fogging over carpeted areas with the Chrisal Probiotic Environmental Control product, dirt and soil on carpets become unbound by the probiotic action as it breaks up the biofilm, so that simple vacuuming becomes far more effective. The fact that the dirt was more easily removed from the carpet with vacuuming alone means that shampooing of carpet areas can actually be performed less frequently providing additional cost and labor savings, as well as extending the life of the carpet. , An added benefit of the Chrisal probiotic product action is that by ridding the carpet of biofilm, contaminants and microbial load are reduced thus providing safer surfaces. This is of special concern where children are playing on carpets.
- 3) **HOW SAFE ARE THE CHRISAL PIP PROBIOTIC PRODUCTS COMPARED TO THE STANDARD HOSPITAL PRODUCTS USED?** This is one of the most important aspects of the probiotic cleaners from Chrisal. We noted:
 - a. **NO DANGEROUS CHEMICALS - OR FUMES.** This was one of the most important aspects to the cleaning crew and greatly appreciated by management. Even though the

Chrisal Probiotic products proved to be extremely effective cleaners, there are no dangerous chemicals in the products so they can be used without protective equipment or gloves without question or concern. Of course in a hospital setting gloves should always be used where there is a possibility of infectious materials being present. We noted however that chemical irritation and many associated problems that are common with chemical use, disappear when we used Chrisal products. Therefore, even when spills or accidents occur, the risk of injury is no more than that of simply getting soap in the eyes during a shower instead of the normal high risk of sustaining permanent irreparable damage.

The greatest risk to the general and patient population using conventional cleaners is the release of toxic fumes generated by traditional chemicals. This is a well-recognized problem of major concern. The change to Chrisal probiotic has eliminated the risks and impact posed by these toxic chemicals on patients, staff management and the public visiting the facility. Additional data on this subject is available in the section on respiratory considerations.

- b. **SAFETY NOTE:** Because the Chrisal Probiotics are so safe to use, it was noted that these products would be of use for facilities treating mental patients or care facilities where patients have dementia and even for the treatment of prisoners, as these products cannot be used as weapons to inflict harm intentionally or unintentionally.
- 4) **EASE OF USE CONSIDERATIONS?** The Chrisal Probiotic Products have proven to be simple to use, even without instructions. In most situations it is a case of simply spraying on and wiping off or mopping on and mopping off. The unique ability to fog and spray with the Probiotic Environmental Control products adds a totally new dimension to cleaning and labor saving procedures. The probiotics are shelf stable for years and once diluted for use, should be used within a week. They retain full efficacy when stored above freezing and below 122 degrees F.
- 5) **DILUTION:** Each of the hospital units have a PDU (automatic self contained Portable Dilution Unit) so that the probiotic products are properly metered automatically for use and the staff is not responsible for determining or measuring for accurate dilution. The product containers simply thread into any standard sink with a hose. Activating the unit using a button, automatically delivers exactly the correct diluted product into a spray bottle – or for filling buckets to wash the floors, the unit hooks on the side of any wash-bucket and has a lock on the trigger for filling large volumes.

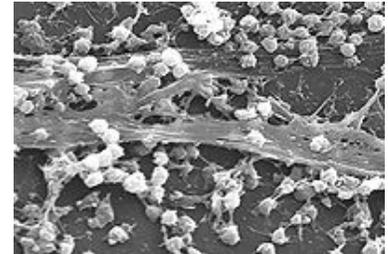
INFECTION CONTROL

This was the crux of the study. Even the best run hospital will be contaminated to some degree by bacteria that are either brought in from outside; as in the case of those transported in from public areas by patient, staff and visitor traffic, , or by microbes that manage to gain a foothold in areas that are difficult to clean on a consistent basis.

The new scientific data generated over the last few years pinpoints the degree of culpability of biofilm in the propagation of infection. There is also new information of how much larger and more pivotal the role of the microscopic environment is on health. Compounding the problem is the rapidly growing resistance of pathogens to antibiotics and the realization that the problems are being caused by the very chemicals created as a means to combat them.

Chrisal's probiotic products were chosen for this study because no other products claiming to have probiotic activity have been found to meet all of the criteria required and to have sustainable non-toxic probiotic constituents and prolonged shelf life. In addition, there is a very large body of scientific and medical testing that has been conducted over the past five years on the Chrisal products that are extremely positive. Therefore the following factors of prime importance were met:

- 6) **THE REDUCTION OR ELIMINATION OF BIOFILM:** The need to focus on cleaning and reducing or eliminating biofilm as a way of reducing bacteria load rather than trying to just kill bacteria with disinfectants was clearly demonstrated.



Biofilm is built by bacteria as a “protective housing” – it is an aggregate of microorganisms in which cells adhere to each other on a surface. These adherent cells are frequently embedded within a self-produced matrix of extracellular polymeric substance (EPS), which is also referred to as slime. Biofilms will form on both living and on non-living surfaces and is prevalent in natural, industrial and hospital settings, as well as homes and all other surfaces.

- 7) **UNDERSTANDING THE DANGERS OF BIOFILM:** Biofilms have been found to be involved in a wide variety of microbial infections in the body. By one estimate **80% of all infections**. Infectious processes in which biofilms have been implicated include common problems such as:

- urinary tract infections,
- middle-ear infections,
- gingivitis,
- and less common but more lethal processes such as endocarditis,
- infections in cystic fibrosis,
- catheter infections,
- formation of dental plaque,
- coating contact lenses,
- and infections of permanent indwelling devices such as joint prostheses and heart valves.

More recently it has been noted that bacterial biofilms may also:

- may impair cutaneous wound healing
- and reduce topical antibacterial efficiency in
- or treating infected skin wounds.

- 8) **“DISINFECTANTS CAUSE INFECTIONS”:** This counter intuitive statement is the quandary posed by disinfectants and an extremely important factor that has only recently come to be recognized about the disinfectant process. The key to understanding the reasons that the disinfecting process causes infections is simple. Many of the organisms killed by disinfectants cannot be mechanically removed. The normal method and mechanics of wiping with paper towels or cloth to pick up all the “bodies”, even on the smoothest of surfaces fails to remove all the microbial carcasses – the problem is that most surfaces that appear smooth to the naked eye, may be compared to the fractured, uneven and pitted surface of the moon scaled at a microscopic level. This is a major problem in that many of these microbial bodies are physically unreachable in cracks, holes, pits, depressions and other geographic features of the surfaces of most objects on a microscopic level.

- a) **Add the serious complication of BioFilm.** There are normally many complex layers of biofilm in all of these fissures on surfaces as well as on the surfaces themselves (i.e. the plaque on teeth or stubborn darkening of the grout between tiles are excellent examples).

The problem is that disinfectants normally can never properly penetrate biofilm – and so all the bacteria, viruses and other contaminants protected by the biofilm are not at all affected by even the strongest hospital grade disinfectants.

- b) A major factor in infection control is that all **disinfectants and cleaners stop working as soon as they are dry or shortly thereafter**. The Chrisal products continue to clean for a minimum of 72 hours after they dry.
- c) **Why Conventional cleaning and disinfectants cause increase risk of infection:** After being disinfected, the treated surfaces retain billions of dead organisms that are food available to the first opportunistic organisms that land on that surface or migrate upward from the biofilm below. This surface then provides pathogens, which are more aggressive than good bacteria, with a massive source of carbohydrates and proteins, while eliminating the competing benign bacteria that normally keep dangerous organisms in check.

Recognizing the benefits of the probiotic paradigm over the conventional “kill 99.9% method” the Hospital study team decided to center our evaluation around the probiotic solutions provided by Chrisal because Chrisal controls the microscopic environment, instead of laying waste to it, and consequently constantly creating an environment where pathogens have a cyclic advantage each time a surface is disinfected.

Consequently since pathogens tend to be hardy and prevalent organisms, even though they normally are only a small percent of the total microscopic population, they seem to be the ones that cause rapid spikes in infectious cultures.

Therefore, by destroying all of the bacteria, including the vast balance of “good” bacteria that help protect from the harmful ones, **disinfectants have actually created a breeding ground that leads to an upward cyclic spiral of increasing pathogens after treatment** .

Note: We chose to use Chrisal products in our study because they alone do not promote the cyclic growth of pathogens by providing food with every cleaning but rather instead change the paradigm to that of removing the resources and protection pathogens require to live thus causing their removal from the cleaned environment

- 9) **THE BIOFILM FACTOR:** It should be noted that it is impossible to control the microscopic environment of any surface without being able to remove the existing biofilm and prevent its re-growth. Once the biofilm has been eliminated, it has been found that as long as the Chrisal Probiotic Products are used to clean with a frequency of at least once every three days, biofilm will not grow back. In other studies we noted that even when live MRSA was applied to a surface where biofilm has been removed using Chrisal probiotics, MRSA failed to become viable.
- 10) **DECONSTRUCTING BIOFILM:** The results of our testing indicate that the efficacy of the Chrisal products were very evident from the initial application on day one of the study. The concept of PIP (probiotics in progress) proved also to be accurate; not only do the Chrisal products perform as well or better in keeping surfaces visually free of contamination as conventional products, but they provided the added benefit of totally deconstructing and removing biofilm down to the bare surface over a brief period, something no other traditional cleaner or disinfectant is able to do in a practical way.

That means that Chrisal's PIP Products, from the first application, start breaking down the biofilm, and as they eat away at it, remove the protective matrix that shields the bacteria and viruses, and that retains contamination and other dirt on the surfaces being treated. As result, as each layer of biofilm is eaten away, the surface becomes cleaner and safer.

PIP – THE TIME FACTOR IN THE REMOVAL OF BIOFILM: We noted that probiotics require from two days to several weeks to deconstruct biofilm on most surfaces. (again, this is the reason for the PIP designation). For locations with extremely well entrenched biofilm, it may take up to three or four weeks, but this is a rare situation, and typically substantial and measurable improvement will still be seen in the first weeks.

- 11) **RE-GROWTH ELIMINATED:** Once the biofilm has been eliminated, it has been found that as long as the Chrisal Probiotic Products are used to clean with at least once every three days or so, then biofilm will not grow back.
- 12) **SOLUTION CRITICAL AREAS - THE COMBINATION OF CHRISAL AND DISINFECTANTS:** Recognizing the downside of disinfectants only raises the additional issue of the regulatory requirement to disinfect to 99.9%. Because it is therefore currently impossible for Hospital and medical facilities to stop using disinfectants in the foreseeable future, as such changes require overcoming conventional thinking and acceptance of the new paradigm, we have noted that there is a way to gain the advantage the new paradigm provides, while adhering to the regulatory requirements. It is to utilize both methods as noted below.

THE PERFECT “ONE-TWO PUNCH” COMBINATION: When it is understood that one of Chrisal's key functions is to totally eliminate contaminants and biological matter from any surface, it becomes obvious that Chrisal and a disinfectant now can provide the perfect synergistic process. In another study we noted that at the Lokeren Hospital, Chrisal is being applied in every area of the hospital ongoing and for the last four years. In order to adhere to the regulations requiring disinfection in critical areas such as in the operating rooms before operations, the hospital utilizes Chrisal on a normal basis before scheduled operations, disinfects just prior to procedures and then returns to using Chrisal subsequent to the procedure. Since changing all the hospital's cleaning supplies, with the exception of the required operating room disinfectant, to Chrisal, the Hospital has now risen to being in the top 3% of the all hospitals in the country having the least amount of infections.

Therefore, Chrisal not only makes disinfectants far more effective by eliminating the biofilm that protect pathogens from disinfectants, but Chrisal then also eliminates all the organic matter resulting from the disinfection process. This is a vast improvement in infection control and meets or exceeds all of the criteria of our study.

- 13) **ADDITIONAL PROTECTION OF INTEREST:** It should be noted that in addition to all the studies to date showing that the use of the Chrisal Probiotic Products tend to lower infection rates by 70% to 80% in hospitals, there are also studies showing how effective Chrisal can be against spore based organisms, including C-Diff, which is now a serious problem. (We referenced the report from the University of Liverpool report on C-Diff and Chrisal. Of additional interest to our study are all the reports indicating the elimination of MRSA by Chrisal, including one from the University of Ulster and another from the Burn Center in Kiev. The study relevant to the control of MRSA is covered in-depth in the study from the University of Gent, the Lokeren Hospital and in the Italian University Study).

- 14) **WHAT IS THE WASTE PRODUCT?** In the case of the Chrisal Probiotic solution, the only waste product from the deconstruction of the biofilm and digestion of dead organisms is CO₂. Therefore these probiotics exhibit a highly effective modality that has a number of beneficial attributes while having no negative properties or processes.
- 15) **NEGATIVE FACTORS IN USING CHRISAL.**
We experienced no negative factors what-so-ever in using Chrisal products
- 16) **DID THE CHRISAL PRODUCTS VALIDATE THE ABILITY OF THE NEW PARADIGM TO PROVIDE BETTER CLEANING AND INFECTIOUS CONTROL FUNCTIONS:** This study provided clear and consistent results indicating that the application of the PIP probiotic products from Chrisal radically reduced pathogenic bacteria levels in any sites where they were used. This is demonstrated by the series of culture plates collected before, during, and after the study. ATP testing further corroborated these findings. In addition, all areas cleaned with Chrisal were visibly cleaner and brighter – and became odor free. It should be noted that the Chrisal products used during this test did not cover up odors, but actually eliminated all odor. It was determined that the ability of the Chrisal products to remove odors was due to the fact that Chrisal PIP worked down to the microscopic level actually eliminating all odor causing contamination and bacteria so that there was nothing left on the surface to produce odors. Another facet of interest is that the surfaces cleaned with Chrisal tended to feel smoother to the touch. Because this was subjective measure, a number of entities were asked to test this factor along with confirming the visual perception of improved cleanliness. Ultimately there was a general concensus that the surfaces actually did feel smoother after cleaning with Chrisal.

IMPORTANT RESPIRATORY FACTORS

RESPIRATORY DYNAMICS: Another major problem that has been solved by utilizing Chrisal Probiotic Products is the elimination of the respiratory problems triggered by the disinfectants and chemical cleaners currently in use.

Hospitals are treating more and more asthmatic and other patients having respiratory problems. Our study has proven that Chrisal Probiotics, do not trigger any respiratory problems, distress or negative responses in patients. We have noted contrary to most other conventional products, that in fact, Chrisal also removes allergens and irritants from the environment so that there is a benefit to both patients and staff. An important note: During the test not one negative comment was forthcoming from the cleaning, medical staff, management or patients.

Normally during daily cleaning there are constant comments about the cleaning materials. Instead, comments were received from staff about how pleasant the products were in use. We are acutely aware that there is probably not one medical facility that has not had employee compensation claims due to chemical fumes and even burns. The study clearly allowed us to conclude that this problem would be totally alleviated by using the PIP probiotic products.

- 17) **COST FACTORS:** In addition to being more effective, it has been estimated that using the Chrisal Probiotic products should lower the costs of cleaning materials by up to 50% or more. In addition, Chrisal products have been shown to reduce labor costs by up to 50 percent.

There is an extremely large cost benefit to the reduction of infections caused by hospital stays. Preventing just one hospital contracted infection per year yields a cost savings in excess of the yearly cost of using the products. In essence we have determined that changing to Chrisal products reduces the costs of cleaning to the hospital, considering cost avoidance, to ZERO!

- 18) **REDUCTION IN NUMBERS OF DIFFERENT PRODUCTS REQUIRED:** Normally a large number of different cleaning products are used to accomplish the required results in a hospital facility. The Chrisal PIP product line appears able to replace most of these traditional chemical cleaners with only four (4) safe probiotic products that have greater efficacy and that are more cost effective. Using these products also reduces overhead and space costs as well as lowering labor demands on the cleaning staff.

- 19) **ENVIRONMENTAL IMPACT:** The environmental impact of the disinfectants and chemical products are a growing problem because of the growing local, state and federal regulatory pressures in how these products are to be used, stored and in the methods required for disposal. Chrisal eliminates these problems as the core ingredient in the products are FDA Registered as a dietary supplement and are completely non toxic and benign. Even when used in facilities with septic tanks, Chrisal's probiotics proven to be beneficial.

- 20) **REACTIONS AND EVALUATIONS FROM STAFF & USERS:** There were several stages to the evaluations of the probiotic products and due to the results and the reactions of the

users, it is worthwhile to detail some of them for a better understanding of the impact of the products, which had a significant determination on the decision to go forward with this study. A report submitted by each staff member indicating their experience during the study with Chrisal is available. In all, every single staff member using the products have evaluated the Chrisal products indicating that they are much better than the old products. They rated Chrisal products as "very good" to "We love the products and never want to go back". Almost every staff member has noted that they can now breathe without worry about respiratory allergic responses or topical allergic reactions. In each case individually and as a group the staff endorsed the concept of probiotic cleaning and wanted to change from traditional cleaners to the Chrisal products.

- 21) **PRE-DETERMINATION USER REPORTS:** A study of the products was not initially considered when the Hospital was first presented with information about the Chrisal Probiotic Products. They were simply presented as a solution that might be of interest. Samples were provided to some of the management and staff to try off-site in a home setting. At the time, it was proposed that if the users saw positive results, perhaps the hospital would like to test the products in auxiliary building areas like the trash room and other non-medical areas and then over time the use of the products might expand to more areas.

The test results proved so positive that it was recognized that the probiotic products might prove to be of great use to the Hospital. The fact that a great deal of test data in a number of other hospitals and universities supported and were consistent with our findings expedited our conclusion that a full onsite study was in order. Examples of the off-site reports from users included examples of:

- (a) Far better cleaning
- (b) Complete odor removal
- (c) And, of the elimination of allergens and other factors that relieve respiratory distress.

Some specific examples of this were a test where a pet had been repeatedly urinating in the same area of a room for some years and no other cleaning agent was able to clean and remove the odor sufficiently to break the animal of the habit. . However, within just a day or so of using the Chrisal Probiotic Products, the area became totally clean and odor free to the point that the animal could no longer smell the old scent and stopped urinating in the house. Anyone with pets will know how impressive that is – and for a hospital staff, an interesting indication of what can be done with hospital odors.

In other tests, staff members reported that their children with asthma had significantly reduced breathing problems in just a matter of days after starting to use the probiotic products. This of course is of significant interest to a children’s hospital.

22) **TESTING USER REPORTS:** Once the study was initiated at the Hospital, the staff was constantly polled for their opinions.

Some withheld judgment for the first few days, but within a week, all of the staff responses ranged from very happy with the probiotic products to extremely enthusiastic about them.

An example is the report from Rebecca Munoz who has problems with the fumes from the standard chemical cleaners. She said: using the Chrisal products, not only do they clean better, but was like “a breath of fresh air.” What was telling was when staff members asked how they could buy the products for their own use as they felt enthusiastic and safe using them in their own homes once they saw the results.

The final indications from all of the cleaning staff, including the director and both the day supervisor and the night crew supervisors was that they all highly endorsed the Chrisal products and all thought working with these probiotic solutions was a major plus for the hospital’s cleaning efforts. They felt that that the Chrisal products afforded the hospital its staff and patients, a safer chemical and odor free environment, while improving the convenience and cleanliness of the facilities over the performance of existing products.

No negatives were reported by any of the cleaning crews or any of the associated staff members. In addition, several of the cleaning staff commented that they never wanted to go back to the old type of cleaning products. The approval rating of all staff members for the Chrisal PIP Probiotic Products was 100%.

STUDY CONCLUSION SUMMARY

Our study revealed that the Chrisal probiotic paradigm meets and in all categories, Chrisal exceeds the criteria set forth in our goal to find a new method and process that:

- (1) Improves cleaning**
- (2) Reduces the risk of infection**
- (3) Eliminates adverse respiratory and allergic response in staff and patients,**
- (4) Reduces both material and labor costs while**
- (5) Is safer and easier to use than standard products**
- (6) Reduces our impact on the environment and eliminates special disposal considerations.**

It is our intention therefore to change from conventional cleaners to Probiotics, and to introduce Chrisal to our organization as a paradigm of choice for the benefit of our patients, staff and management.

ADDENDUM SECTION

ADDITIONAL DATA, PRODUCT INFORMATION AND BACKGROUND ITEMS

SEGREGATING THE TEST AREAS:

Note that each room and area where the Chrisal PIP Probiotic Products were used was indicated for restriction from the use of the normal disinfectants and other chemical cleaning materials. Signs were put up in each area and the staff was instructed to not cross-contaminate any of the areas with different products. In some of the areas, of course, disinfectant pump bottles were on treatment counters, however these were restricted in use, for the most part, for patient clean up and for instruments.



Below are some of the cleaning staff during training on Chrisal and while using the products:



← at left are the water fountains cleaned with Chrisal Probiotics in the visitor's lobby that now look like new
Above is the tile wall in the Nurse's Locker that look refurbished by using Chrisal

PROBIOTIC PRODUCTS TESTED:

The Chrisal PIP Probiotic Products that were tested for this study are listed below (with the product descriptions provided by the mfg):



CHRISAL PIP PROBIOTIC ALL-PURPOSE CLEANER

The Chrisal PIP Probiotic All Purpose Cleaner uses organic probiotics for its core activities and any green ingredients added to speed the cleaning process have been certified by EcoLogo. The Cleaner actually cleans all the way down to the microscopic level, deconstructing the biofilm that shields dirt, harmful bacteria, viruses and other contaminants. It reduces the risk of infection and effectively eliminates odor at its source.

The Chrisal Cleaners are also effective on mold and mildew and, most importantly, keeps cleaning and protecting surfaces for up to 3 days after each application by leaving a long-lasting layer of beneficial probiotics that create a safe, stable and odor free environment.

The products have proven to be extremely effective, yet are safe and gentle on skin - with no chemical odors or dangerous fumes. The Cleaner is safe for all washable surfaces, skin and clothing, and removes unpleasant odors at their source and not just masks them. The PIP cleaners are also extremely economical and require little space as they replace a number of other products normally used and are strongly concentrated. the recommended dilution is 100 to 1 with tap water. Chrisal products are totally safe to handle and are non-toxic, non-volatile, non-flammable, are 100% Biodegradable and not harmful to children or pets.

CHRISAL PIP PROBIOTIC FLOOR & CARPET CLEANER

All of the information above about the Chrisal Probiotic All-Purpose Cleaner applies equally to the Chrisal Floor & Carpet Cleaner. The main difference is that, if a carpet or floor cleaning machine is going to be used, then the PIP Floor & Carpet Cleaner should be used because it has anti-sudsing added to reduce the foam produced by machines and high agitation.

The Chrisal PIP Floor Cleaner is a versatile and efficient cleaner that can be applied to all kinds of floors, including wood, tile, marble, linoleum and all other washable or damp dry surfaces. Like all Chrisal PIP products, it has the same key probiotic formulation as do all Chrisal PIP Cleaners, to provide a long-lasting, multi-day effect on dirt and grime of up to three days at a time. It cleans and degreases quickly and thoroughly. Of added importance is that the probiotic action will normally return grout and floor tiles to their original colors in just a matter of weeks.

CHRISAL PIP PROBIOTIC ENVIRONMENTAL CONTROL (PEC)

PIP Probiotic Environmental Control (PEC) is a probiotic liquid suspension (Biotic Mist) that establishes a healthy and stable microbial community for any environment. It can be used in all types of facilities by means of a simple and economic fogging or spraying method. With the establishment of a stable healthy microbiota, the need for disinfection becomes largely redundant.

Fogging with Chrisal's PEC is an incredibly effective way to reach all areas and surfaces (including walls, counters, carpets, hard to reach places, air conditioning vents, etc.) and also provides a major savings in time and labor.

Most important is that Chrisal's PEC Biotic Mist is an extremely effective and chemical free way to remove dust mite and other allergens which are essential to eliminate for the relief of any type of respiratory problems.

Further, because the PEC works down to the microscopic level, it removes the sources of odors instead of covering them up like most deodorizers – and so has proven to be the most effective deodorizer ever tested.

CHRISAL PIP PROBIOTIC SANITARY CLEANER

The Chrisal PIP Probiotic Sanitary Cleaner is also enriched with safe probiotic bacteria and is recommended for use in areas heavily contaminated with organic matter or areas requiring a more thorough cleaning, such as toilets and showers.

It is strongly concentrated and has a long-lasting effect on dirt and grime. It cleans quickly and thoroughly, and creates a stable and healthy microbial environment on any surface.

PIP Sanitary Cleaner is safe for all washable surfaces, skin and clothing. It removes unpleasant odors, is non-toxic, non-volatile, and non-flammable. The Chrisal's cleaners are also extremely economical and require little space as they normally replace all other products used in the past and they are strongly concentrated and are normally diluted 100 to 1 with tap water. They are also totally safe to handle, 100% Biodegradable and not harmful to children or pets.

CHRISAL PIP PROBIOTIC ALLERGY FREE SPRAY

Chrisal's ALLERGY FREE Spray lowers the risk of suffering caused by various allergies. Chrisal's Hypoallergenic PIP (Probiotics-In-Progress) ALLERGY FREE Spray safely removes dust mite allergens and other contaminants and irritants in a natural, green, eco-friendly way to create a healthier environment. It also eliminates odors at their source – not just covers them up!

By applying a mist of Chrisal PIP Allergy Free Spray to pillows, bedding, upholstery, drapes, carpets, stuffed toys and all other surfaces, allergens and dangerous biofilm are removed, and replaced by a long-lasting, protective layer of PIP beneficial organic probiotics creating a safe, stable and odor free natural environment for days. Gentle to the skin, but tough on allergens, each spray keeps working for up to 3 days at a time to provide ongoing protection wherever it is used. Chrisal's Allergy Free BioMist Spray actually works at the microscopic level, applying a protective coating of organic probiotics that lets you create and control a healthier, natural, safe, stable and odor-free environment for homes and work areas.

PDU – PORTABLE DISPENSING UNITS

To eliminate the need for staff to measure or dilute any products, an automatic dilution unit was provided with each product. The unit is inserted into the half-gallon and gallon size bottles in which the products are normally provided for industrial, commercial and institutional users.





These evaluations studies highlight the need for us to constantly evaluate current and proposed methodologies and technologies for the good of our patients

- End -