

99Technologies

**Advanced and Innovative Technologies
for Tangible Progress In Disinfection**

The Problem of the Healthcare Acquired Infections (HAI)

The Healthcare Industry's needs to combat HAI

The disinfection solutions currently present on the market

The 99T system and how they works

Evidence of their efficacy

Examples of efficacy in a clinical settings

Advantages of the 99T system and why they should be used in the fight against HAIs

Certifications

THE PROBLEM OF THE HEALTHCARE ACQUIRED INFECTIONS (HAI)

A problem for healthcare facilities present globally

Hundreds of millions of patients affected worldwide by Healthcare Acquired Infections (HAI) yearly

(source: World Health Organization - HAI Fact Sheet 2012)

The impact of HAI is stronger in the developing countries and in the emerging economies.

Western world, about 8% of patients admitted to hospitals acquire an infection

In the United States 99,000 deaths from nosocomial infections, roughly \$30 billions the costs associated with HAIs

(Fonti: World Health Organization - HAI Fact Sheet 2012 / Center for Disease Control - www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf)

More than 4.1 million people in the EU are affected by a nosocomial infection each year

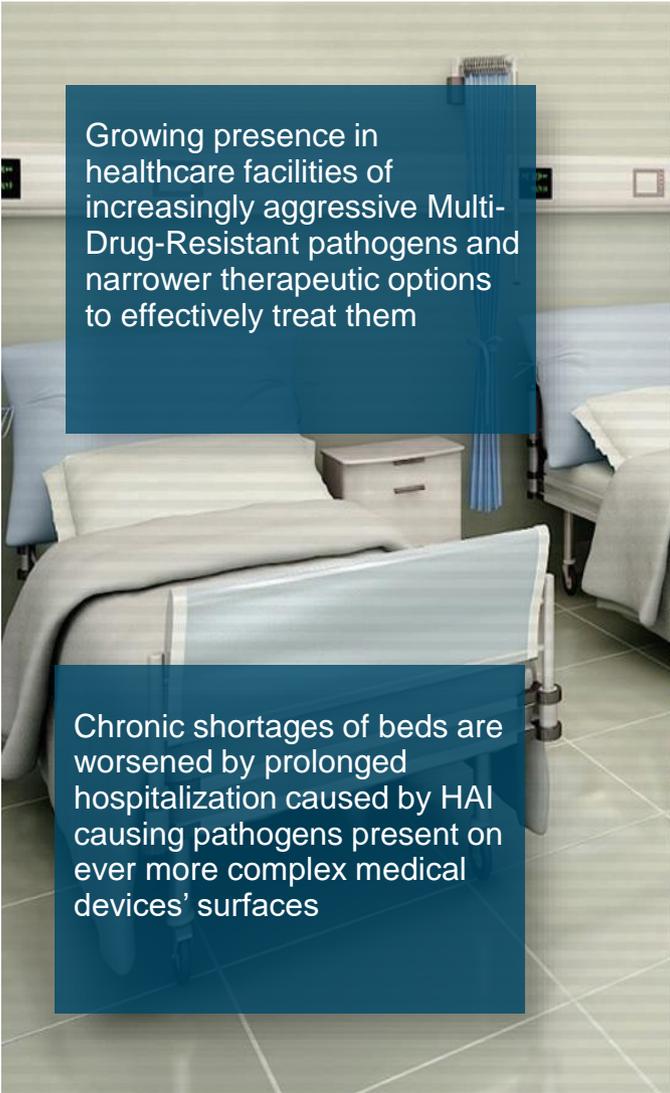
37,000 deaths, 16 million extra hospitalization days, € 7 billion additional costs yearly

(source: European Center for Disease Control - www.ecdc.europa.eu/en/healthtopics/Healthcare-associated_infections/Pages/index.aspx)

Disinfections of surfaces becomes an absolutely critical component to prevent bacteria's contamination and the spread of infections

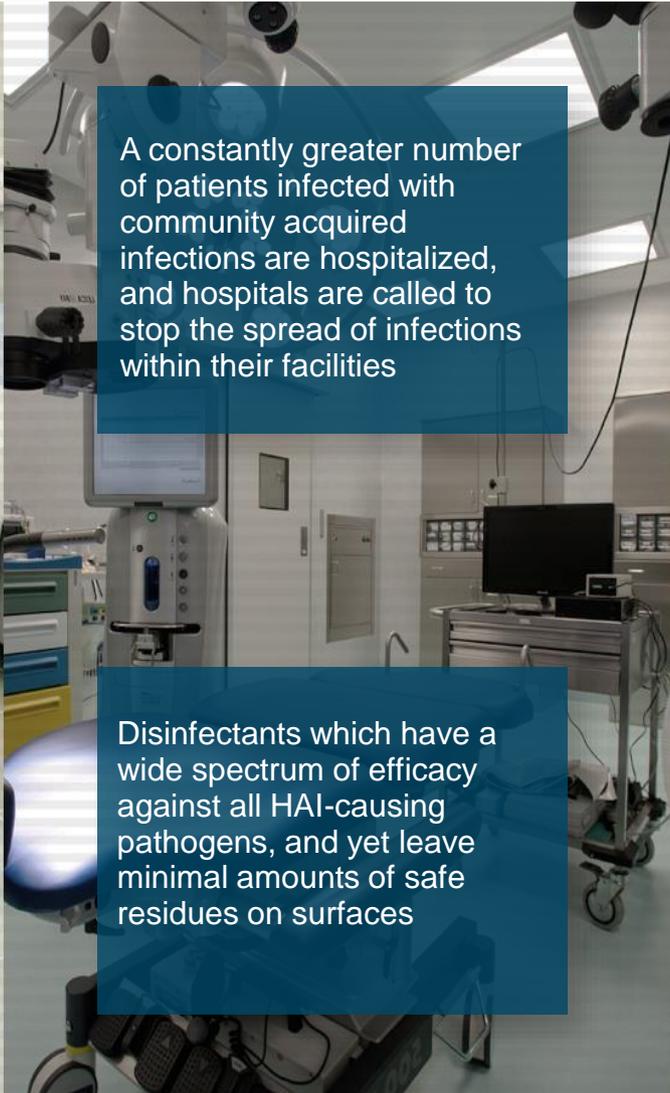
THE HEALTHCARE PROVIDERS AND THEIR SPECIFIC NEEDS

What are the actual issues faced by healthcare facilities in combating HAIs



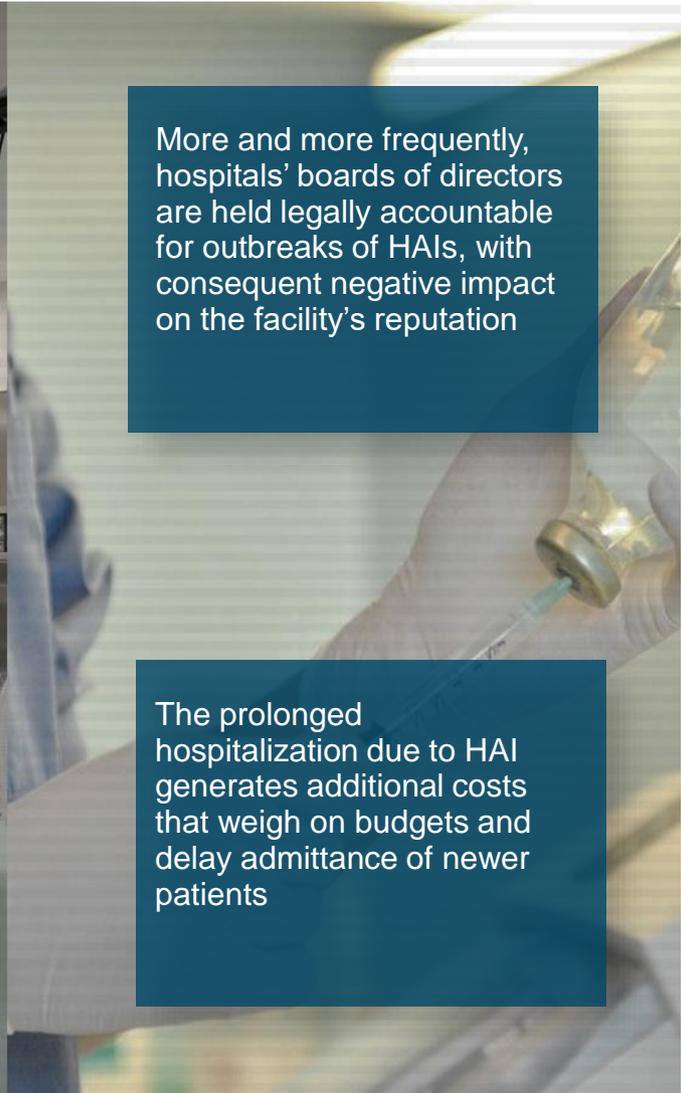
Growing presence in healthcare facilities of increasingly aggressive Multi-Drug-Resistant pathogens and narrower therapeutic options to effectively treat them

Chronic shortages of beds are worsened by prolonged hospitalization caused by HAI causing pathogens present on ever more complex medical devices' surfaces



A constantly greater number of patients infected with community acquired infections are hospitalized, and hospitals are called to stop the spread of infections within their facilities

Disinfectants which have a wide spectrum of efficacy against all HAI-causing pathogens, and yet leave minimal amounts of safe residues on surfaces

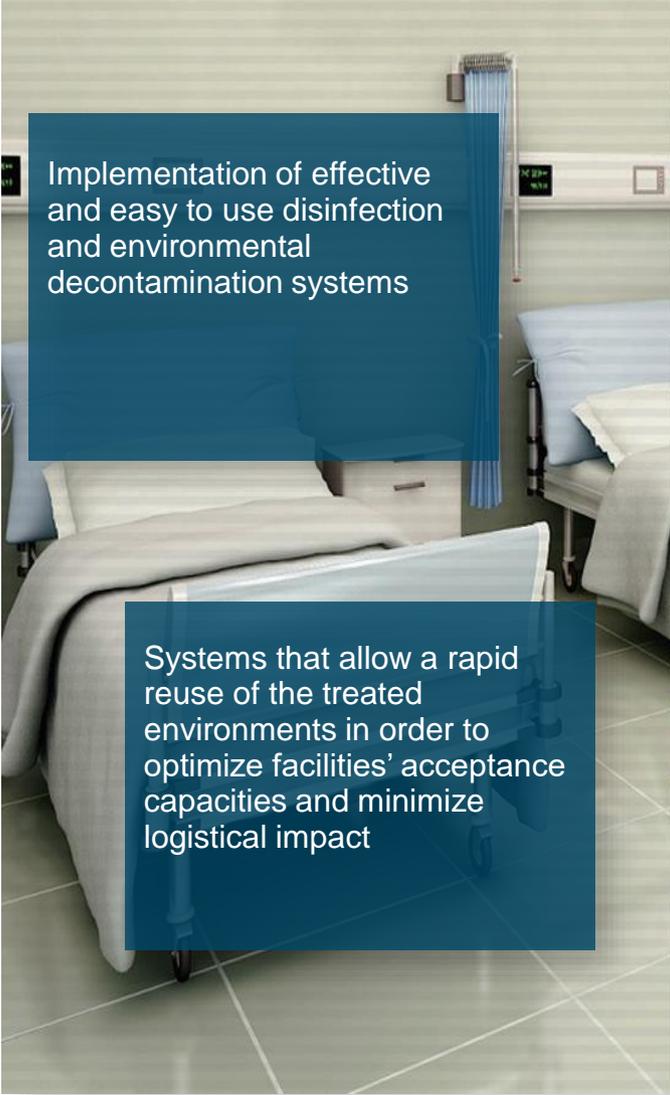


More and more frequently, hospitals' boards of directors are held legally accountable for outbreaks of HAIs, with consequent negative impact on the facility's reputation

The prolonged hospitalization due to HAI generates additional costs that weigh on budgets and delay admittance of newer patients

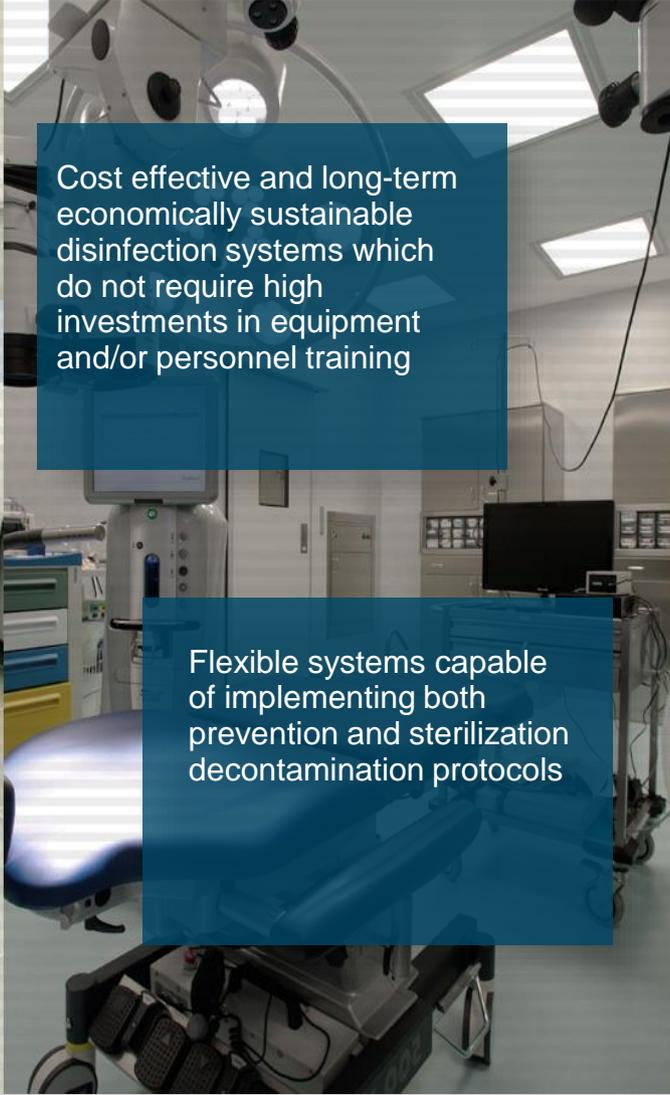
THE HEALTHCARE INDUSTRY AND ITS SPECIFIC NEEDS

The actual operational needs in the realm of disinfection systems from the part of healthcare facilities



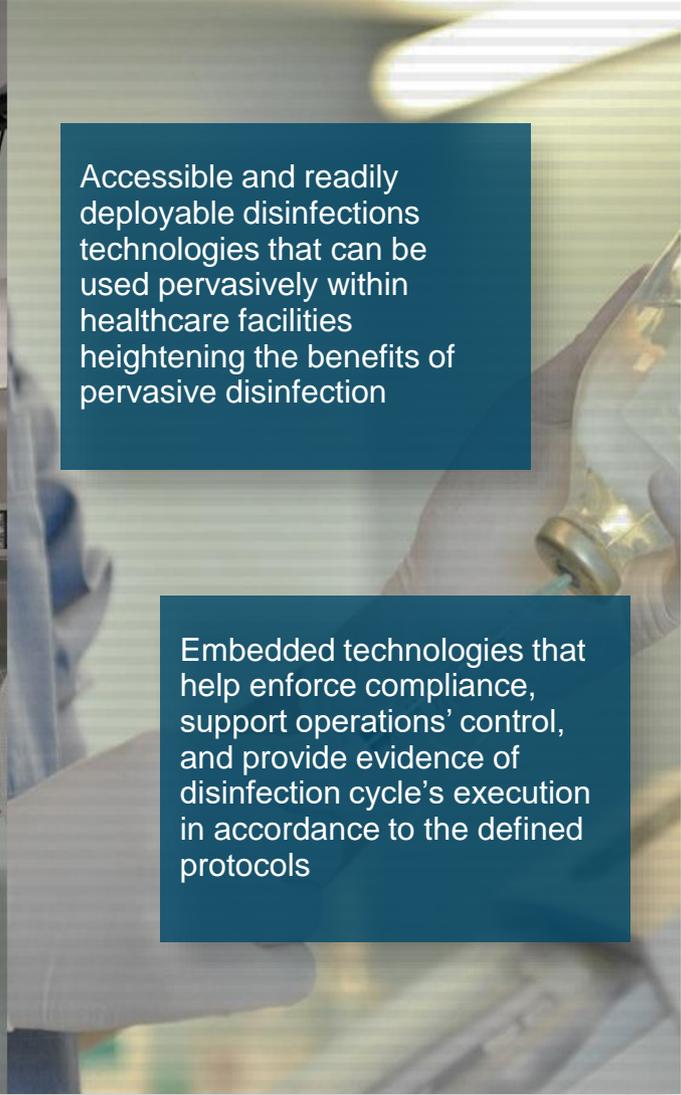
Implementation of effective and easy to use disinfection and environmental decontamination systems

Systems that allow a rapid reuse of the treated environments in order to optimize facilities' acceptance capacities and minimize logistical impact



Cost effective and long-term economically sustainable disinfection systems which do not require high investments in equipment and/or personnel training

Flexible systems capable of implementing both prevention and sterilization decontamination protocols

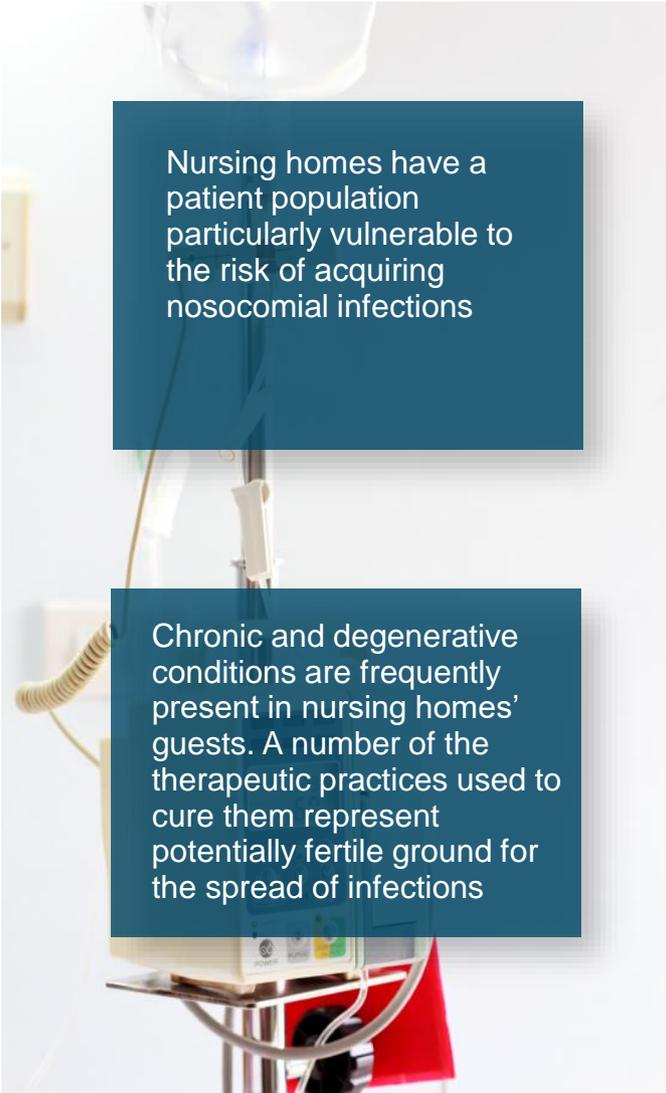


Accessible and readily deployable disinfections technologies that can be used pervasively within healthcare facilities heightening the benefits of pervasive disinfection

Embedded technologies that help enforce compliance, support operations' control, and provide evidence of disinfection cycle's execution in accordance to the defined protocols

THE NEEDS OF NURSING HOMES

What are the actual problem of nursing homes when facing HAI's



Nursing homes have a patient population particularly vulnerable to the risk of acquiring nosocomial infections

Chronic and degenerative conditions are frequently present in nursing homes' guests. A number of the therapeutic practices used to cure them represent potentially fertile ground for the spread of infections



Guests are often in need of acute or specialized care provided by external healthcare facilities where pathogens can potentially be acquired and brought back into nursing homes via unaware carriers

Healthcare personnel and relatives can inadvertently carry pathogens that are sources of nosocomial infections into nursing homes and from guest to guest



The sharing of common spaces and medical devices in recreational or care areas represents an increased hazard for the spreading of healthcare acquired infections in nursing homes

STILL TODAY, THE MARKET IS DOMINATED BY MANUAL DISINFECTION SYSTEMS

Innovation in disinfection systems has been characterized by modest improvements even in some specific applications where it is of crucial importance to keep the microbial load under control, as it is the case for the healthcare sector.

The disinfection market is still dominated by manual disinfection solutions. This method has evident limits, such as heavy reliance on the operator 's own abilities and motivation, toxicity of some disinfectants, impossibility of guaranteeing consistency in the uniformity of application and continuity as far as the quality of the disinfection process is concerned.

More recently, newer disinfection methods have appeared on the market, such as overheated steam units, vaporizers of hydrogen peroxide or other no-touch disinfection technologies. However, these systems have experienced limited market penetration due to issues related to elevated operational costs, long disinfection cycles and extensive downtime, complex set up and operational activities, and, in some instances, limited efficacy.



THE 99 TECHNOLOGIES' SOLUTION

Providing solid answers to healthcare facilities' needs for environmental disinfection



Can rapidly execute preventive disinfection cycles to eradicate microbial loads commonly found in healthcare facilities

Allows to flexibly adjust treatments' intensity up to 6-log decontaminations

From its start, the 99T project has aimed to accelerate innovation in the no-touch disinfection market by developing a technology based on aerosolized hydrogen peroxide that:

Provides to infection prevention practitioners a tool that requires no complex set up, extreme ease of use, and elevated portability

Is cost effective, consistent in its performance, inherently safe

Leaves residues with a negligible environmental impact

ENVIRONMENTAL DISINFECTION SYSTEM MODULATOR MICRO-NEBULIZER DISINFECTANT SOLUTION

The 99MB Modulator Micro-Nebulizer

Dimensions: 25W x 42L x 50H

Weight: 10.5 Kg – 11.5 Kg (empty-full)

Bottle capacity: 1 L

Stainless steel structure

Adjustable, possibility of delayed start

USB connection (2.0 and 3.0 compatible)

Reports' software

Disinfectant solution 99S

Proprietary innovative disinfectant solution based on hydrogen peroxide and positive silver ions.

The synergistic action of the two components of the system rely on the HyperDRYMist® proprietary technology, that allows to nebulize into the environment a hyper dry mist of high biocidal efficacy. It's gas-like physical properties allow it to uniformly reach all the surfaces present in the environment.



MRI FRIENDLY MODULATOR MICRO-NEBULIZER 99MB WAVES-SHIELDER

The 99MB Modulator Wave - Shielder

Modulator equipped with a specific shield against magnetic waves

To be used to disinfect environments where metallic objects are off limit, such as MRI

Totally safe for use when positioned outside the 250 Gauss perimeter



THE ALL NEW 99MC MODULATOR MICRO-NEBULIZER

Increased accuracy and ease of use

Single Input Operations

- Nebulized volumes' high precision gauging
- Electronic recognition of solution's type
- Total retraceability of disinfection operations
- Executed cycle's type automatic identification
- Treatment's environment recognition
- Treatments' parameters automated data feed and upload control process
- Extended operational capabilities
- Programmable disinfection operations' start
- Single bottle recharge operations
- Maximum treatable volume* 2000 m³
- Individual bottle load system

Dimensions: 25W x 45L x 58H

Weight: 12.5 Kg – 14.5 Kg (empty-full)

Bottle capacity: 2x1 L

Adjustable, possibility of delayed start

USB connection (2.0 and 3.0 compatible)

Reports' software



THE TRAICE® TECHNOLOGICAL ECOSYSTEM EXTENDS EFFECTIVENESS AND EFFICIENCY

TRAICE Treatment Reporting And Interactive Compliance Execution

Enhances the effectiveness and the efficiency of the disinfection cycles carried out with the 99MC Micro-Nebulizer

TRAICE Room Identification Active Plaque: allow the Micro-Nebulizer to autonomously identify the room where it is placed and interacts with the 99MC Micro-Nebulizer to dynamically exchange data and launch disinfection cycles with Single Input Operation

Works without batteries eliminating the need to verify and substitute them

Highly suitable for complex facilities with numerous environments

Smartphone application for immediate retrieval and consultation of the executed treatments

Records last executed treatments

Traice Activation Kit for distributors



PROPRIETARY DISINFECTANT SOLUTIONS: GREATLY ENHANCING THE BIOCIDAL ACTION OF HYDROGEN PEROXIDE

Ready to use hydrogen-peroxide-based solutions at less than 8% concentrations

Addition of co-formulants which:

- Contribute to stabilize hydrogen peroxide allowing it to maintain intact its biocidal capabilities
- Work in synergy with each other and with hydrogen peroxide to generate optimized wettability of the surfaces
- Increase the interaction between microorganisms external membranes and the disinfectant formula, thus increasing the biocidal action of the solution
- Help disaggregate microorganism' membranes





Phase I

Solution 99S transformed into a gas like Hyper DRY Mist



Hundreds of millions of sub-micron droplets ($<1 \mu$ and about $75\% < 0.5 \mu$) loaded with hydrogen peroxide molecules and positive silver ions uniformly distributed all over the environment



Sub-micron coating with a great biocidal efficiency generated



Phase II

Instantly, the hydrogen peroxide attacks all organic substances which it comes in contact with



Positive silver ions complete the biocidal action



Inactivation of viruses, bacteria, spores, fungi and bio-film present in the air and on surfaces ensuring a prolonged biocidal effect



Phase III

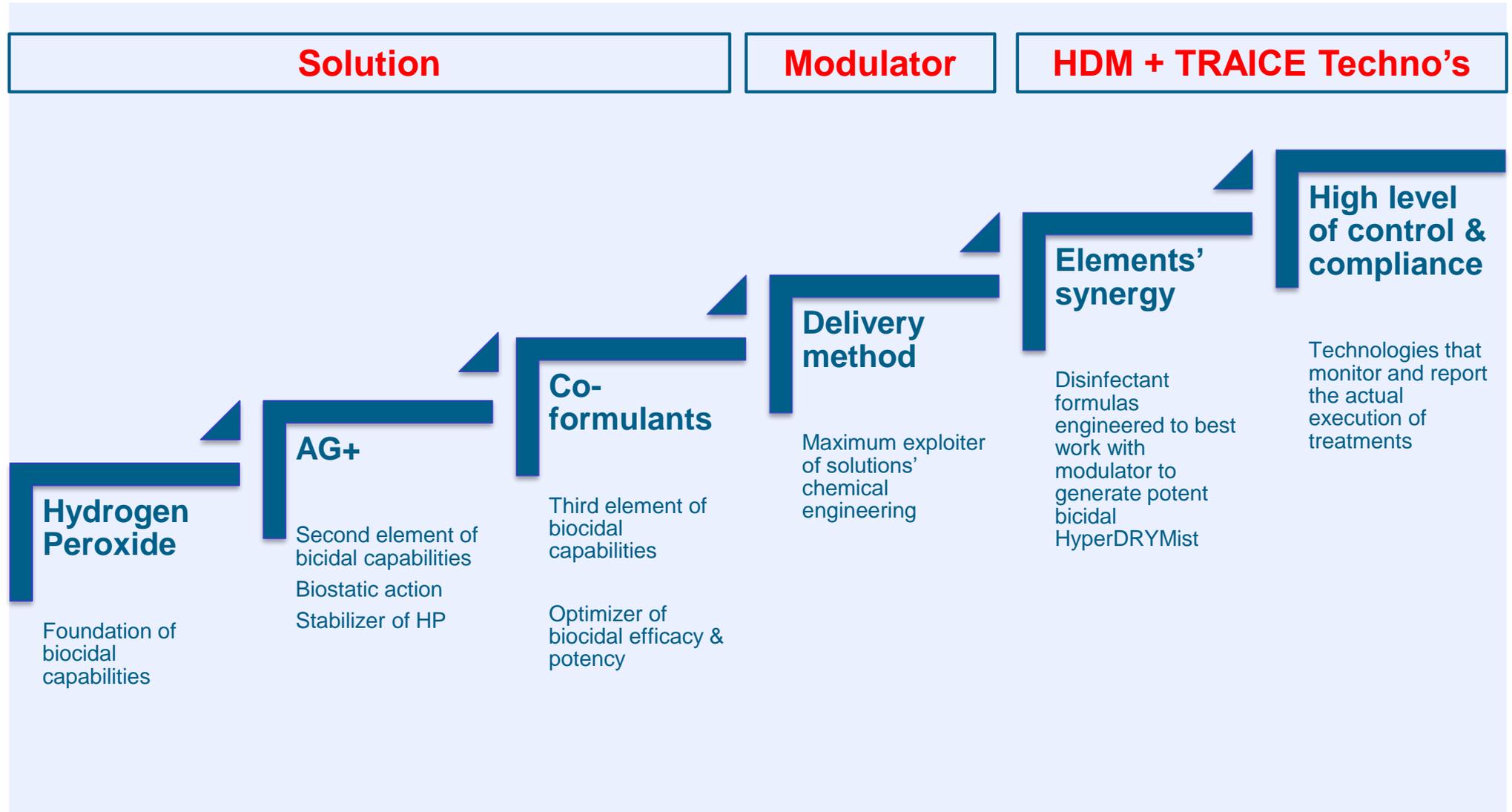
Free radicals formed by the hydrogen peroxide quickly transform into oxygen



No harmful residue left in the air



After a shortened period of time, it is possible to set up for reuse the treated areas



**HIGH PERVASIVENESS,
UNIFORM MICRO-COATING ON
ALL OF THE SURFACES
THANKS TO THE PARTICULAR
NEBULIZATION AND
THE DIMENSION
OF THE DROPLETS**

Security system avoids the
emission of toxic particles
in the air

Absolute dry mist:
No humidity residues

**THE DROPLETS DIMENSION
ALLOWS A MORE
WIDESPREAD
COVERAGE OF THE
SURFACE,
GREATER EFFICACY
THANKS TO NO
DROP-OFF**

Room temperature nebulization,
applicable in a wide range of
environmental conditions

**HYPER DRY MIST:
GENERATED FROM
A PROPRIETARY
DISINFECTANT FORMULA
THAT FURTHER ENHANCES
THE PRVEN BIOCIDAL
CAPABILITIES OF
HYDROGEN PEROXIDE**

Very easy to program
and use

Engineered for maximum
compactness, lightness and
transportability

No specialized personnel
required

**DISINFECTS ENVIRONMENTS
AND THE SURFACES OF NON
INVASIVE MEDICAL DEVICES
ELIMINATING VIRUSES,
BACTERIA, FUNGI,
MYCOBACTERIA,
SPORES, AND VIRUSES**

The efficacy of the treatment does not rely on
the operator; the results are consistent (if the
set nebulization times are respected)

Technological advances bring concrete benefits

**ELEVATED
EFFICACY
ALREADY AT THE
LOW DOSAGES
OF PREVENTIVE
CYCLES**

No intervention is needed during the treatment and the nebulization of the product

In addition to hydrogen peroxide, 99T's disinfectant formulas feature the synergic effect of additional co-formulants that enhance biocidal power

**COMPRESSED
TREATMENT
CYCLE
TIME***

Two in-lab validated preventive protocols which last respectively 30 and 60 minutes

**LOWER
COSTS**

Limited training costs, optimized use of disinfectant's quantities, full no-touch operation contribute to active cost containment

Fast turnaround for cleaning crews

**EASIER
TO USE**

All equipment stays in the treated room during treatment easing logistics

* Applicable for preventive regimens

When executing preventive schemes, minimal preparation of the treated environment are necessary

The efficacy of the disinfectant certified via a rigorous certification process. The EN norms tested

The EN Norms applied for In Vitro testing

In vitro tests were conducted according to the EN norms. The aim of the tests is to evaluate the capability of a chemical disinfectant formulation to produce in vitro a reduction in the number of viable vegetative bacteria of various types.

The 99S disinfectant solution has in all cases exceeded the efficacy limits defined by the EN norms.

EN 1040

Basic bactericidal activity

EN 1276

Bactericidal activity with interfering Substances

EN 13623

Bactericidal activity on legionella pneumophila

EN 13697

Bactericidal and fungicidal activity on surfaces

EN 1275

Basic bactericidal activity

EN 14348

Mycobactericidal activity

EN 1650

Bactericidal activity with interfering substances

EN 13704

Sporicidal activity

EN 14476

Virucidal activity

The true benchmark for the efficacy of aerosolized disinfection systems

The efficacy of the 99S solution has been tested **in vivo** according to the following norms:

The efficacy of the 99S solution has been tested **in vivo** according to the following norms:

AFNOR NF T72-281

Testing method to evaluate the bactericidal, virucidal, and fungicidal activity with interfering substances, using the airborne method for surfaces' disinfection.

For testing the bactericidal/ fungicidal/ sporicidal activity according to the criteria defined by:

USP-2007-Chapter <1072> pag. 3792-3795 (United States Pharmacopeial Convention)

Why is the AFNOR NF T72-281 so important?

It measures the capability of a disinfection system to actually disinfect environments via aerosolization, thus simulating real life conditions

How is it carried out?

Bacterial strains are disseminated in different places of the treated room to verify that the disinfectant is truly evenly distributed and has actual high efficacy everywhere

The 99 technology's performance?

The 99S solution dispersed with the 99M Nebulizer surpassed the requirements set by the NF T72-281 Norm

TESTED MICRO-ORGANISMS

acinetobacter baumannii

adenovirus 5

aspergillus niger

bacillus subtilis

candida albicans

candida glabrata

clostridium difficile

enterococcus faecium VRE

enterococcus hirae

escherichia coli

klebsiella pneumoniae (CRKP)

legionella pneumophila

listeria monocytogenes

mycobacterium avium

mycobacterium terrae

poliovirus 1Isc-2ab

pseudomonas aeruginosa

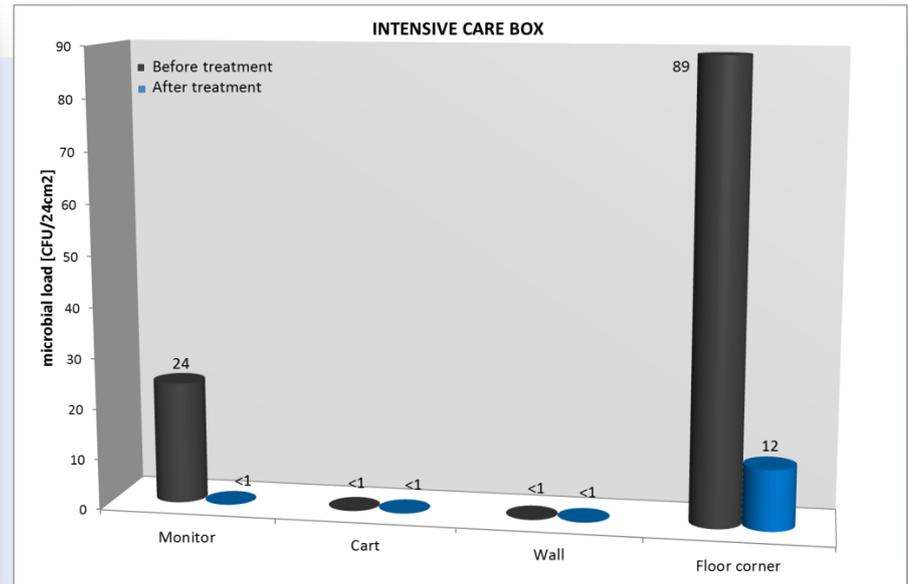
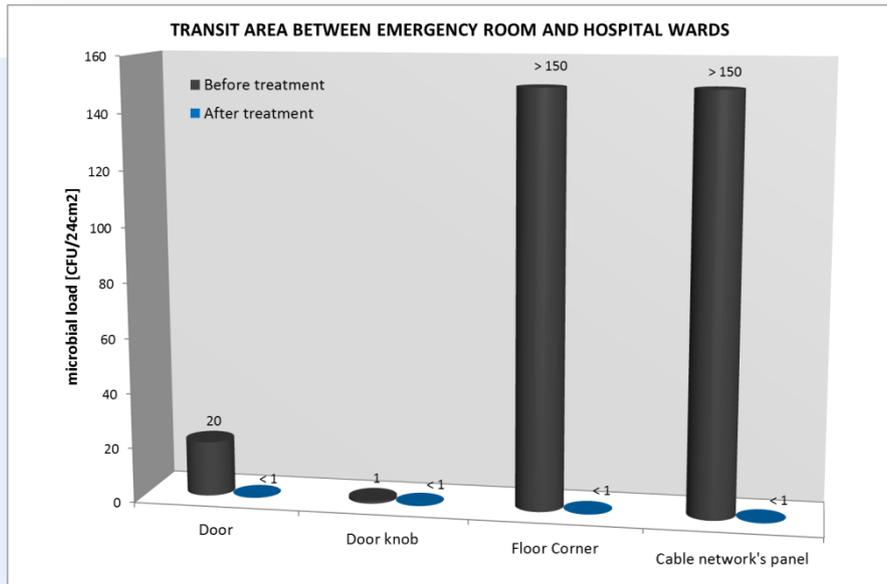
salmonella typhimurium

staphylococcus aureus

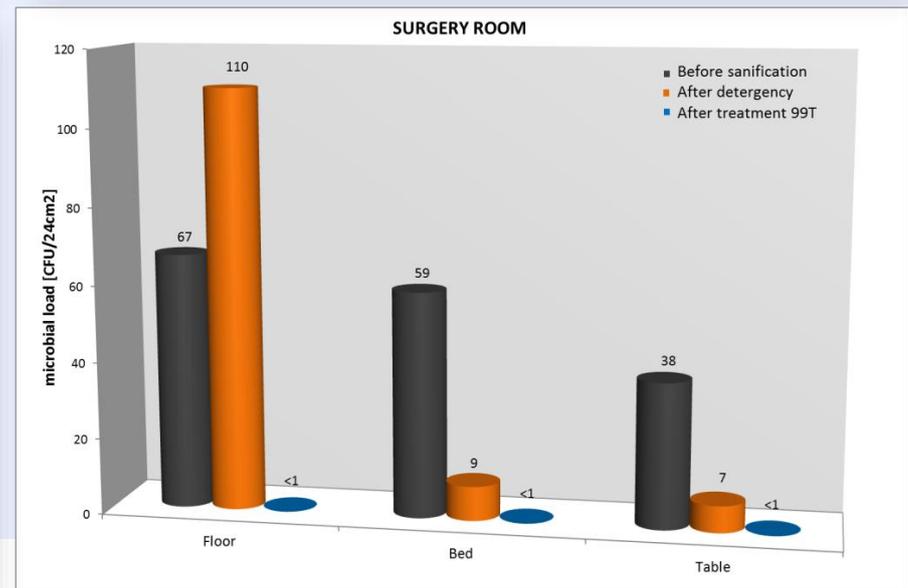
staphylococcus aureus MRSA

EFFECTIVENESS THOROUGHLY TESTED

In vivo tests - Healthcare sector - Some examples



The charts show that, after treatment with 99T, contamination reaches minimum levels



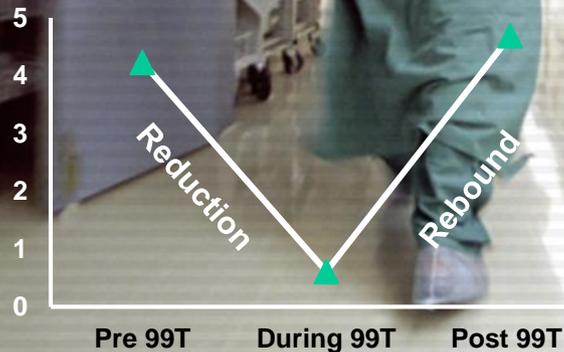
International study at the Lodi Hospital complex (Italy)

Incidence reduction *Clostridium difficile**

4,23%



0,61%



Pre 99T

The facility had already implemented and exhausted all the possible measures offered by traditional disinfection. Consequently, disinfection with the 99 Technologies' system was introduced

During 99T

While using the 99T system, the incidence of *Clostridium difficile* was drastically reduced in the departments where the system was tested, whereas the situation did not vary in the hospital

Post 99T

In the months following to the conclusion of the clinical study, the incidence of *Clostridium* rebounded to 4.69% in the two departments where the trial with the 99T system had been carried out.

* Study presented at the 2014 European Congress of Clinical Microbiology and Infectious Diseases

Additional efficacy evaluations conducted in clinical settings or healthcare setting



Emergency Response Services: systemic and consistent removal of outliers in vehicles

Presented at the ECCMID 2015



Dialysis center: better hygiene in hard to reach surfaces on medical devices eliminated variability of results of disinfection process

Presented at ECCMID & WCN 2015



MDR Persistence: infection chain's interruption caused by the use of 99T in areas contaminated with MDR

Presented at ICPIC 2015

ECCMID: European Congress of Clinical Microbiology and Infectious Diseases

WCN: World Congress on Nephrology

ICPIC: International Conference on Prevention & Infection Control

HPH: International Network of Health Promoting Hospitals & Health Services (HPH)

Workers safety: excellent results in a frequently overlook aspect of HAI fighting that is workers' safety

Presented at HPH 2015

Klebsiella eradication hygiene strategy: 99T perfect fitting into MDR reduction scheme

Presented at ECCMID 2015

Head to head comparison with chlorine: 99T's manifest superiority to manual cleaning

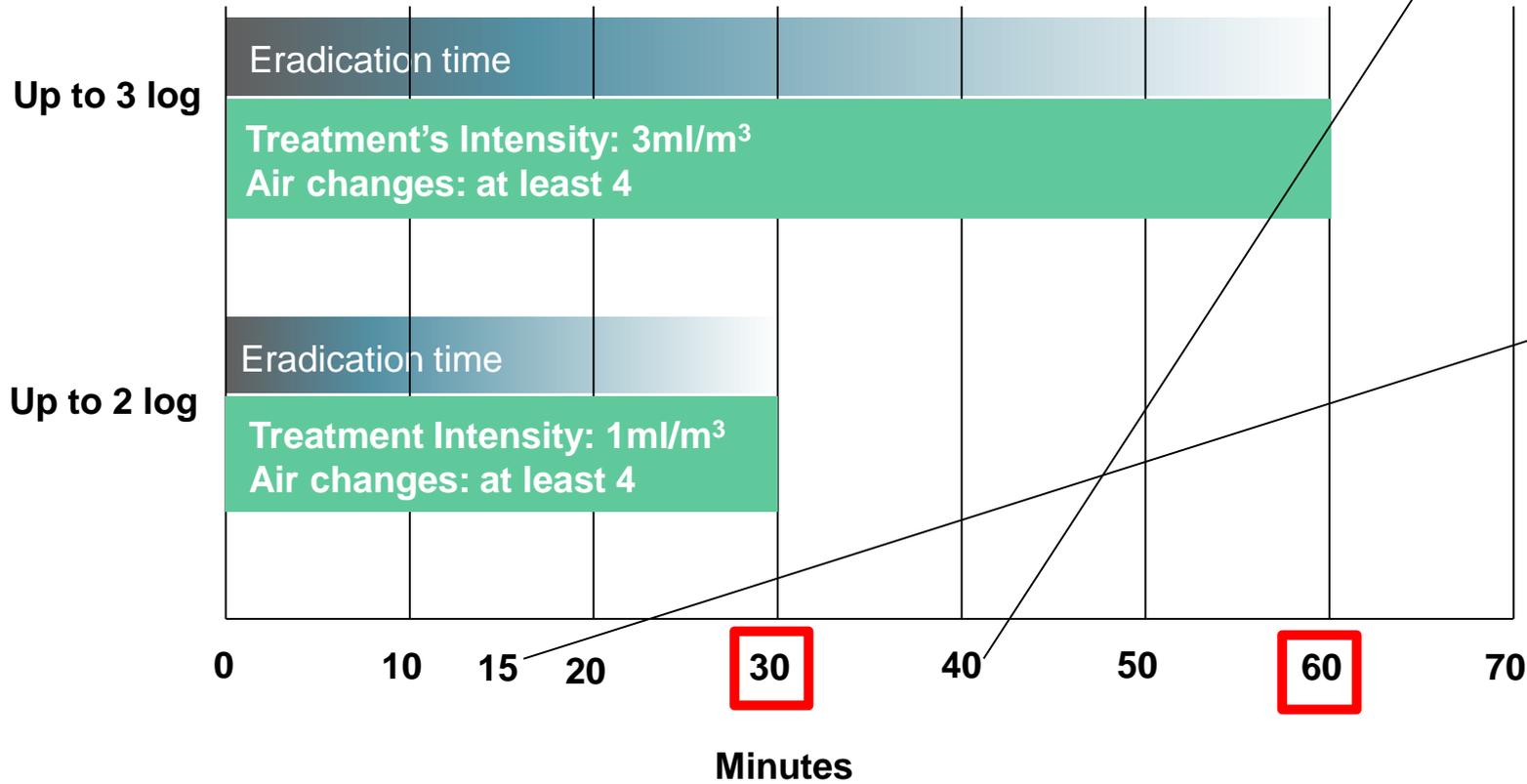
Presented at ICPIC 2015

THE EFFICACY IN TIMES FOR REUSE

Shorter times to set treated environment for reuse, some examples of actual protocols ¹

Waiting times before full reuse of treated areas ¹

Microbial load reduction needs



After 40 minutes from nebulization's end
Enter with PPE



To open windows or reactivate aeration



After 15 minutes from nebulization's end
Enter with PPE



To open windows or reactivate aeration



1. Time before extended reuse of treated spaces starts from the end of the micro-nebulization process

Costs pre 99T

Cleaners/Disinfectants

High temperature vapor

Labor for cleaning & disinfection / 1H

€ 23

Costs post 99T

Cleaners/Disinfectants

99 Technologies

Labor for cleaning only
30 minutes

€ 18

Indirect savings

NO extra detergency /disinfection costs

Optimization of facilities usage

Average extra costs per single HAI

€ 3'500 spared

THE ADVANTAGES IN ADOPTING 99 TECHNOLOGIES

Truly implementable technology to fight against HAIs

Infection prevention, but also decontamination, high system's flexibility

Change of paradigm: meet needs before they rise, global preventive instead of corrective after outbreak only

Ubiquity of use: ideally suited for all areas of healthcare facilities, not just surgical theater

Speed: greater efficacy with lower use of disinfectant solution

Costs: direct and indirect savings, operational, legal, reputational

Easiness of use: rapid activation and implementation of the system with very limited training costs

THE ADVANTAGES OF 99 TECHNOLOGIES

Truly implementable technology to fight against HAIs

99 is highly efficacious against an extremely wide spectrum of pathogenic agents found in healthcare facilities

99 has been widely tested with outstanding results even when high qualitative standards, as for surgery rooms, were needed

Pervasive and efficient disinfection even on the hard-to-reach surfaces

Disinfection is accurate and consistent, overcomes the limits of traditional manual disinfection and improves on no-touch

Works at room temperature, no humidity residues, no corrosion, and no worries for healthcare facility administrators

Excellent quality-price ratio, definitively convenient. One HAI episode avoided, more than pays for equipment and disinfectant

The 99S solution is certified as:
Medical Device Class IIA (EU Directive 93/42/EEC)

The Modulator Micro-Nebulizer 99M series complies with the following relevant directives :
Low Voltage Directive 2014/35/UE
Electromagnetic Compatibility Directive 2014/30/UE
RoHS Directive 2011/65/EU

The 99S Solution is manufactured according to the standards:
ISO 13485
ISO 9001

The Modulator Micro-Nebulizer 99M series is manufactured according to the standard :
ISO 9001

99 Technologies has achieved the ISO 13485 standard for Manufacture and After-sale service of disinfectants for non-invasive medical devices and the ISO 9001 standard as Manufacture and Trading of disinfectants for non-invasive medical devices and biocidal products.



DISCLAIMER

This publication is distributed in the strictest confidentiality for information purposes only.

Although all information and opinions expressed in this document have been obtained from sources believed to be reliable and in good faith, no warranty, express or implied, is made for any lack of accuracy or completeness.

This document may not be copied and distributed without explicit permission from 99Technologies S.A..

99Technologies S.A.

Via al Chioso 8
6900 Lugano
Switzerland

email: info@99technologies.ch

99T_Itel_11/05/2017