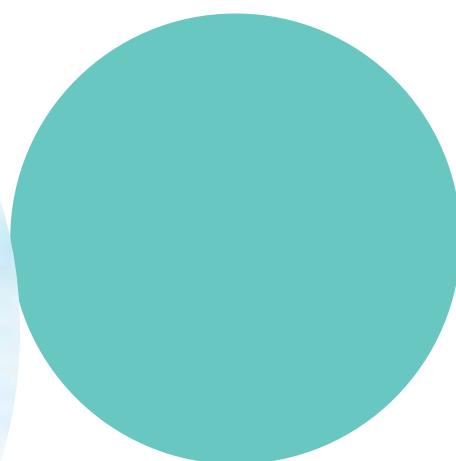
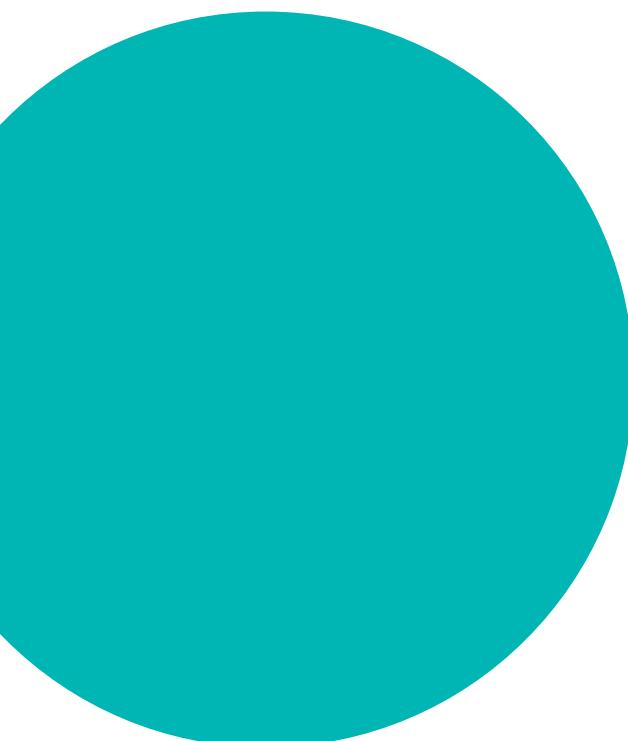




THE FUTURE OF DISINFECTION IN HEALTHCARE



Contamination: Risks to Clinicians, Staff, Patients

Contamination in hospitals, clinics, and other healthcare settings poses significant dangers to clinicians and their staff, and their patients.

There are many sources of infection in the healthcare environment. These result in increases in mortality and morbidity. They place an additional and unnecessary strain on medical systems through increased bed-stays and greater economic costs:

- The estimated economic cost of healthcare associated infections ranges from 3.5 billion euros in the United States to 1.3 billion euros in England, and 2.5 - 5 billion in Italy.¹
- The 2014 HAI Prevalence Survey reported that in 2011 there were an estimated 722,000 HAIs in US acute care hospitals. Additionally, about 75,000 patients with HAIs died during their hospitalization.²
- Reducing the incidence of nosocomial infections has become a primary objective of all healthcare facilities.
- Certain bacteria that cause nosocomial diseases are resistant to treatment by antibiotics (e.g., VRE, MRSA, and Pseudomonas).

20 to 30% of annual contamination would be preventable.

Prevention and disinfection are the main elements in the fight against nosocomial diseases and control the transmissions of multi-resistant bacteria.

The risk of transmission of infectious diseases among healthcare workers is very real. The contamination of these personnel can be caused either by the patient, by another caregiver, or by a contaminated environment.

The transmission of infectious agents in the healthcare system result in a range of infections:

- Surgical site and bloodstream infections together with lower respiratory tract and urinary tract infections are common healthcare associated infections.
- The organisms that cause HAIs originate either from the patient themselves or they can be transmitted via personnel, equipment or medical devices. Some infections are also related to the hospital environment (e.g., air and water).
- By contact with contaminated instruments, equipment, or surfaces.



What do the experts say?

CDC (2015): On the basis of a 2011 study, the CDC has increased its estimate of the annual burden of *Clostridium difficile* infection in the US, putting it at 453,000 cases per year with 29,300 associated deaths.¹

Dr Michael Bell stressed the need to respond to *c. difficile* by preventing needless use of antibiotics and ensuring rigorous infection control in healthcare settings.

R Douglas Scott said in the publication "The Direct Medical Cost of Healthcare - associated infections in US Hospital and Benefit of Prevention" that the overall annual direct medical cost of HAI to US hospital ranges from 28.4 to 33.8 billion US dollars.²

Non-manual techniques for terminal disinfection of hospital rooms have gained increasing interest in recent years as means to reduce transmission of multidrug-resistant organisms (MDROs). A prospective crossover study by Blazejewski and colleagues in five ICUs of a French academic hospital with a high prevalence of MDRO carriers showed that two different hydrogen peroxide (H_2O_2) - based non-touch disinfection techniques reduced environmental contamination with MDROs after routine cleaning.

This study provides further evidence of the 'in use' bioburden reduction offered by these techniques. Before H_2O_2 - based non-touch disinfection can be recommended for routine clinical use outside specific outbreak situations, further studies need to show whether the environmental contamination reduction provided by these techniques is clinically relevant and results in reduced cross-infections with MDROs.³

Hydrogen peroxide aerial decontamination systems have been shown to be effective in reducing environmental contamination and consequent acquisition of infection.

The prevalence of *c. difficile* may be reduced when hydrogen peroxide is used.

During an outbreak of *c. difficile* infection, hydrogen peroxide decontamination was associated with a reduction of environmental isolation of the organism from 11/ 43 (25%) to 0/37 (0%) cultures. A retrospective analysis of 334 rooms vacated by *c. difficile* patients and decontaminated using hydrogen peroxide or hypochlorite demonstrated that, compared with standard cleaning, hydrogen peroxide decontamination reduced the rate of acquired *c. difficile* (rate ratio 0.65, 95% confidence interval 0.50, 0.79).⁴

1. Agozzino, E., Di Palma, MA, Gimigliano,A. and Piro, A. (2008). Economic impact of healthcare-associated infections. *Ig Sanita Pugli*.64(5): 655-670
2. Magill, SS., Edwards, JR., Bamberg, W., Beldavs, Zg., and ors. (2014). Multistate Point-Prevalence Survey of Health-Care Associated Infections. *The New England Journal of Medicine*. 270:1198-1208

1. Centre for Infectious Disease Research and Policy. (2015). CDC puts *C. difficile* burden at 453,000 cases, 29,000 deaths. *CIDRAP News & Perspective*. www.cidrap.umn.edu/news-perspective/2015/02/cdc-puts-c-difficile-burden-45300-cases-29CDC.
2. Scott, RD. (2009). *The Direct Medical Costs of Healthcare-Associated Infections in US Hospitals and the Benefits of Prevention*. Centers for Disease Control and Prevention: Atlanta, Georgia.
3. Huttner, BD. And Harbath, S. (2015). Hydrogen peroxide room disinfection - ready for prime time? *Critical Care*: 19:216.
4. Ali, S., Muzslay, M., Bruce, M., Jeanes, A., Moore, G., and Wilson, AP. (2016). Efficacy of two hydrogen peroxide vapour aerial decontamination systems for enhanced disinfection of methicillin-resistant *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Clostridium difficile* in single isolation rooms.

How to Manage Contamination in the Healthcare Setting

Airandé – the complete H₂O₂ Disinfection System that allows Clinicians and Healthcare Administrators to:



Eliminate contamination from the healthcare environment and reduce the risk of contamination and illness through bacteria, viruses, spores, yeasts, fungi, and moulds.

Reduce the risks of contamination to clinicians, staff, and patients.

Use an approach to disinfection that is:

- broad spectrum in its action: bactericidal, virucidal, sporicidal, yeasticidal and fungicidal,
- environmentally friendly,
- compatible with most materials found in healthcare settings,
- efficient and cost effective, saving hospital operators the costs of time, labour and consumables in their disinfection routine.

Why H₂O₂?

- ✓ Efficient (researched, developed, innovated, and validated by scientific tests and data).
- ✓ A full spectrum of disinfection activity and unlike many other disinfectants does not encourage the growth of antibiotic resistant bacteria.
- ✓ Eco-friendly, biodegradable: H₂O₂ decomposes into water and oxygen after use.
- ✓ Odourless.
- ✓ Not dangerous to users when used according to instructions.
- ✓ No residue effect.



H₂O₂ is More Effective Than Existing Disinfection Modalities

Summary of Disinfection Modalities:

	BACTERIA	YEASTS	FUNGUS	ENVELOPED VIRUSES	VIRUS	MYCOBACTERIA	BACTERIAL SPORES
ALDEHYDES*	●	●	●	●	●	●	●
ALCOHOLS	●	●		●			
PHENOLIC DERIVATIVES	●	●	●	●			
CHLORINE DERIVATIVES	●	●	●	●	●	●	
QUATERNARY AMMONIUM CATIONS	●	●		●			
BIGUANIDES	●						
PERACETIC ACID*	●	●	●	●	●	●	●
HYDROGEN PEROXIDE	●	●	●	●	●	●	●

*Aldehydes, Peracetic Acid, and H₂O₂ are the only full spectrum disinfection substances. But, not all full spectrum disinfection substances are safe:

- **Aldehydes** are highly toxic and irritating
- **Peracetic Acid** is corrosive, explosive at high concentration, malodorous, and must be handled with great caution.

Full Spectrum and Safe:

	BACTERIA	YEASTS	FUNGUS	ENVELOPED VIRUSES	VIRUS	MYCOBACTERIA	BACTERIAL SPORES
HYDROGEN PEROXIDE	●	●	●	●	●	●	●

This means H₂O₂ is the best alternative solution for disinfection

The Airandé Disinfection System

3 Objectives:

1

High-volume disinfection through airborne circulation of dry-fog of 5–15 microns in particle size (using the Airandé DF-1 or Hygien'air and 7.9% H₂O₂ solution).

2

Manual disinfection between patients or between high-volume disinfection cycles (using Airandé 3.25% H₂O₂ solution).

3

Disinfection and removal of contamination of the air by photo-catalysis (using the CASPR air and surface purification system).

Innovation, Engineering, Science, Manufacturing and Distribution

The Airandé Disinfection System is the result of innovation in clinical and scientific settings. This has drawn on the expertise of the very best thinkers and practitioners in the worlds of disinfection and sanitisation.

Airandé's Principal Scientific Adviser is located in Australia. Its global V-P Research and Development is located in Belgium.

The Design and Engineering of the System has been done across three continents: Australia, China, and Europe.

Manufacturing of different elements of the system is done in Germany, Australia, China, and the USA. All of our manufacturers and suppliers are accredited to ISO 9001:2015. Some are also accredited to ISO 13485:2016.



Airandé's Quality Management System is continuously reviewed and audited annually to allow the company to retain its certification as a Medical Devices Manufacturer under ISO 13485:2016 (Certificate MD 726599).

Product development has also benefited from collaboration with universities worldwide. Airandé's focus on innovation, research, and development in the disinfection field is extremely important in achieving its goal of providing leadership in the science and management of disinfection. This means that Airandé will continue to work in collaboration with the leading microbiologists and disinfection scientists globally.



The Airandé Disinfection System

The Airandé DF-1



Ensures optimal surface disinfection after manual cleaning

Extended spectrum of activity to remove contamination from a wide range of sources including bacteria, viruses, spores, and moulds

Disinfects spaces between 5m³ and 285m³

Limited down-time of treatment rooms, operating theatre, dental surgeries, wards and other healthcare settings.

Rapid diffusion: 11 min to 45 min

No volatile organic compounds

No residue

Ergonomic

The Airandé Hygien'air

Similar operating functions to DF-1

Rapid diffusion: cycle time 13.6 minutes per 50m³

Portable

Economical: 7ml/m³

Easy to use

- Reaches all surface areas
- Dry – not wet
- Captures and kills all sources of surface contamination – including bacteria, viruses, spores, and moulds

Traceability of use, date, operator, room ID, reason for disinfection: all downloadable through USB

Portable printer

The DF-1 comes with a easy-to-manage trolley. The DF-1 can be simply removed from the trolley and carried in a specially designed bag. This enables the operator to take the DF-1 into small spaces.



Airandé Solution 8

7.9% SOLUTION OF H₂O₂



Used in conjunction with the DF-1

Ready-to-use solution: no mixing or onsite dilution required

Single-use ensuring purity of product

No surface residue

No residual humidity

Biodegradable

No corrosion on most materials

Airandé H2O₂ Impregnated Wipes



H₂O₂ impregnated wipes that enhance the manual cleaning of contaminated surfaces

The H₂O₂ penetrates deep into the surface materials of dental treatment units and ensures that contamination is eliminated even from areas that are not visible to the naked eye

Airandé Solution 3

3.25% SOLUTION OF H₂O₂



Used for manual cleaning of surfaces in between scheduled use of the DF-1

Ready-to-use solution: no mixing or onsite dilution required

No surface residue

Biodegradable

No corrosion on most materials

No trace of NH₄⁺, phenol, chlorine, biguanide, aldehyde, alcohol and VOC



CASPR Compact



CASPR HVAC



CASPR™ Air & Surface Purification Technologies

The CASPR air and surface purification technologies target and kill pathogens in the air and on surfaces using a process of 3rd generation photocatalytic oxidation by employing advanced Natural Catalytic Conversion™ technology.

Proven in independent laboratories, in field-testing, and in critical "real-life" environments such as hospitals and clinics, the CASPR technologies eliminate 99.99% of pathogens using continuous flows of Hydrogen Peroxide at a level of 0.03ppm. Way below the global occupational health and safety standard of 0.05ppm - but strong enough to remove contamination and reduce Hospital Acquired Infections by more than 53%, and staff absenteeism by 42%.

The CASPR can be installed in a HVAC system or used as a benchtop unit. It can safely be used in the presence of staff and patients during treatment sessions.

The CASPR Compact comes pre-installed with a Compact HEPA Filter 13 (rated MERV 16). Our HVAC design team will recommend the use of an appropriate HEPA filter for use in your HVAC system. The CASPR HVAC system will remove pathogens from the HEPA Filter and enhance its performance.

*The catalytic reactor in the Compact has a warranty of 60 days. Otherwise the Compact and the HVAC have a warranty of 2 years.



Airandé Internal Environmental Monitoring

The Airandé Internal Environmental Monitoring System helps you stay alert to and manage the risks of viral transmission by recognizing key factors that influence the propagation of viral populations.

Real-time monitoring and a visual display of a range of critical environmental factors can be displayed to practice staff and patients alike.

In addition, the Airande IEMS through its unique Pod 2 technology can recognize and prompt remediation against volatile organic compounds and gases, odors, noise and light.

Its sensors provide warnings about environmental factors that are likely to impact negatively on the productivity and well-being of employees.

The Airande IAMS also helps you save costs on cleaning and the use of chemicals in your practice environment. It can read the amount of chemicals and disinfectants required, balance that against actual consumption, and make recommendations about future quantities.

Internal environmental quality is more than just air quality. Having the right internal environmental quality depends on air and surface cleanliness and the right comfort factors of lighting, temperature, humidity, odors, and noise.

Its capabilities makes the Airande IEMS an ideal capstone to its portfolio designed to ensure the safest possible healthy workplace.



Airandé IAQ-ASE Certification

IAQ-ASE is a certification provided to users whose air and surface purification systems meet the standards set by Bureau Veritas - one of the world's leading certification and standards bodies.

The IAQ-ASE certification ensures that Airande's distributors, sales staff, consultants, designers, and installers each hold a key level of certification that attests to their knowledge and competence in relation to continuous air and surface sanitisation technologies.

A IAQ-ASE certification is issued to qualifying customers upon proof being provided by a Bureau Veritas supervised laboratory.

To ensure that a customer's certification is retained once awarded, Airandé actively monitors the performance of every machine that it deploys to every one of its customer sites wherever they are in the world. Importantly, these customers also have a real-time view of the performance of their continuous air and surface purification system.





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