

Bad news about hospital care in America

CDC estimates that \$45 billion is added to the annual healthcare costs to treat HAI's. The Leapfrog Group, an advocacy group representing large employers, reports that an infection can add \$42,000 to a patient's bill in the intensive care unit.

Starting in 2012 - Medicare mandates hospitals to report HAI's or pay a penalty. Medicare will reduce payments to hospitals with poor ICU infection rates.

An estimated 1.7 million patients contract an HAI every year which results in 99,000 deaths!

Hospital Acquired Infections (HAI) are the 4th major cause of death in the United States

Annual cancer deaths	565,000
Annual tobacco deaths	440,000
Annual obesity deaths	400,000
Annual HAI deaths	99,000

Infection Control Today, Aug 2010



HAI's represent 4.5 infections out of every 100 hospital admissions. The average length of stay for infected patients increased from 9 to 25 days.

PR Newswire 9/10/2008

Changes in the regulatory environment, reimbursement practices and legal standards create a 'perfect storm' of liability and financial risk resulting from HAI's.

The Department of Health and Human Services

Most prevalent nosocomial pathogens

(Source: Dr. Wladyslaw J. Kowalski)

- Influenza
- Measles
- Streptococcus pneumoniae
- Streptococcus pyogenes
- Respiratory Syncytial virus (RSV)
- Varicella Zoster virus (VZV)
- Parainfluenza virus
- Mycobacterium tuberculosis (TB)
- Bordetella pertussis
- Rubella virus
- Staphylococcus aureus (MRSA)
- Clostridium difficile

Most deadly nosocomial pathogens

(Source: Dr. Wladyslaw J. Kowalski)

- Streptococcus pyogenes
- Streptococcus pneumoniae
- Neisseria meningitidis
- Measles virus
- Corynebacterium diphtheriae
- Influenza
- Mycobacterium tuberculosis
- Respiratory Syncytial Virus
- Bordetella pertussis
- Pseudomonas aeruginosa
- Clostridium difficile

Bloodstream infections, pneumonia and urinary tract infection account for 64% of HAI

(Source: Medscape, April, 2011)

In a survey done on 110,709 pediatric ICU patients, 6,290 HAI's were noted.

Top 3 pathogens for bloodstream infections:

- Coagulase-negative staphylococci (38%)
- Enterococcus (11%)
- Staphylococcus aureus (9%)

Top 3 pathogens for Pneumonia

- Pseudomonas aeruginosa (22%)
- Saureus (17%)
- Haemophilus influenzae (10%)

Top 3 pathogens for urinary tract infections:

- Escherichia coli (19%)
- Candida albicans (14%)
- Aeruginosa (13%)

Total Ceiling Solutions Health Risk Management System

Managing your clinical risks while improving administrative, operational and patient outcomes



- Utilizes the patented and award winning SmartFixture™ as a platform, this standalone and **easy to install delivery system** **optimally targets micro-organisms** (including MRSA, VRE, *Acinetobacter*, *Streptococcus species*, Influenza, VZV, *Clostridium difficile*, *Pseudomonas* and other causative agents of HAIs), **quietly removing 99% of fungal and bacterial spores**.
- Simple retrofit utilizing the existing electrical system with no structural, HVAC or duct modifications.
- Achieves 99% destruction on all three cross-sections of biological contaminants.
- Most practical and best lifecycle economics that blends the power of dilution, filtration and purification.
- Facilitates irradiation with optimal zonal ventilation to re-circulate air at every corner of the room.
- Employs CDC's recommended hierarchy of controls to eliminate agents at the source.



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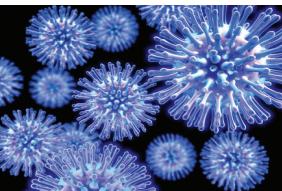
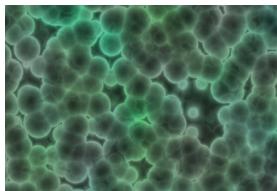


Total Ceiling Solutions LLC® SmartFixture™ (United States Patent Office No. 7,922,351)

Hospital Acquired Infections

A Special Report:

How to increase patient outcome and simultaneously cut administrative, clinical and operating costs for your healthcare facility



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4 main methods to reduce HAI risks

- **Pressure** – Using differential pressure to create directional airflow to isolate contaminants in an area
- **Dilution** – Minimum 6 Air change per hour (ACH) and 12 ACH for new facilities via ventilation
- **Filtration** – Using a Minimum Efficiency Reporting Value (MERV) rated filter
- **Purification** – Using a wavelength of 253.7 nm for optimal ultraviolet germicidal irradiation (UVGI)



Tips when using UVGI to manage HAI

- The use of a common single portable in-duct UV lamp plus a filter offers only minimal infection control benefits over those provided by using a filter alone.
- Duct systems with UVGI are not recommended as a substitute for MERV rated filters when the air from isolation rooms must be re-circulated to other areas of the facility.
- Regular maintenance of UVGI systems, involving keeping the lamps free of dust and replacing old lamps as necessary, is crucial.

Memarzadeh, Olmsted & Bartley
(American Journal of Infection Control)

Integrated HAI Health Risk Management System has 3 lines of defense

1st line of defense: Filtration at the source

The National Institute for Occupational Safety and Health (NIOSH), a subsidiary of the CDC, in its "Hierarchy of Controls" definition, strongly encourages the elimination of hazardous agents at the source of exposure to minimize the risk of failure of preventive measures. Incorporation of a MERV6 rated filter with adequate airflow is the mandatory first line of defense.



2nd line of defense: Purification with sufficient exposure to UVC



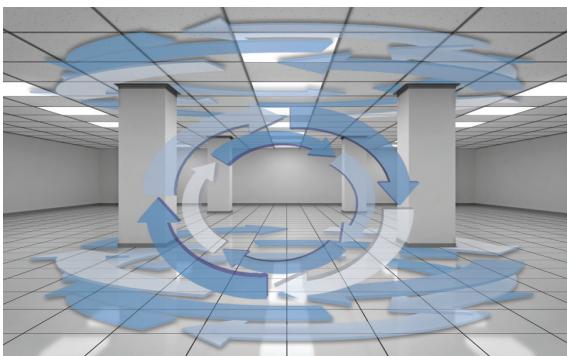
Two factors affecting UVGI's efficacy:

Time/Duration. Pick a system with an airflow pattern that maximizes the length of time the bacteria and viruses are exposed to the radiation to optimize the kill rate.



Intensity. The distance from the UVC lamp to the airborne infectious agents determines the first pass irradiance level of the bacteria and virus and efficacy of the protocol. Pick a system with an irradiation chamber to envelop infectious agents with irradiation from UVC lamps to maximize first pass kill rate.

3rd line of defense: Sufficient movement of air



Mixing air in the room/area. Placement of **unobtrusive structures** to guarantee that air in the room/area is sufficiently mixed when using UVGI lamps in the room/area is of vital importance. This provides a UV energy field, in an occupied zone and ensures that all airborne particles containing microbes are properly exposed to the UV irradiation. Studies by Riley and Permutt reported that a **wider distribution of lower irradiance UV lamps were more efficient compared with the use of one centrally located high-irradiance UV lamp**.

Energy efficiency to play a role

- Does your facility have a mandate to improve energy efficiency, reduce maintenance costs and maximize return on investments?
- What is the quality, effectiveness, efficiency or age, of your lighting and HVAC systems, AND is there an opportunity for an upgrade to decrease lifecycle costs while managing the health risk of HAI's?
- If all else is equal, do you prefer a solution that involves an involved modification to the infrastructure of your air conditioning system or a standalone system that works with the existing infrastructure?

Pick a solution with team buy-in

- **Leaders in epidemiology and disease prevention** - manage health risk and improve patient outcome.
- **Financial leaders** - minimize the financial risk and legal liabilities in corporate, clinical, administrative and operating outcomes.
- **Facility management leaders** - satisfy energy reduction mandates and take advantage of energy efficiency incentives with ease of execution and maintenance with minimal disruption to the infrastructure of the HVAC system.



Things to consider when evaluating your specific risk management systems for HAI's

- Targeted micro-organisms and their characteristics
- Methods of irradiation and best practices
- Effectiveness/Efficacy
- Existing airflow pattern
- Placement of irradiation devices
- Costs and ease of installation, including minimizing unnecessary structural and/or mechanical HVAC or duct modifications
- Tolerable noise levels
- Visibility of Disinfection Devices
- Additional Energy Consumption