



creating healthier environments

Preventing the spread of Airborne Pathogens in Enclosed Environments

Sustainable Solutions for Healthier Buildings

Why should we be concerned about airborne pathogens?

Outdoors & indoors

How are Infections spread?

What can be done to minimise their spread and threat?

Is there a cost to business something we can quantify?

What are the benefits of reducing pathogens in indoor environments?

Summary of Issues

Air Quality – health & wellbeing



BBC NEWS HEALTH

12 June 2012 Last updated at 22:08

Diesel exhausts do cause cancer, says WHO

By James Gallagher
Health and science reporter, BBC News

Exhaust fumes from diesel engines do cause cancer, a panel of experts working for the World Health Organization says.

It concluded that the exhausts **were definitely a cause of lung cancer** and may also cause tumours in the bladder.

It based the findings on research in high-risk workers such as miners, railway workers and truck drivers.

However, the panel said everyone should try to reduce their exposure to diesel exhaust fumes.

The World Health Organization previously labelled diesel exhausts as probably carcinogenic

Top Stories

- MPs to probe Tucker over Barclays
- Tory MPs' warning over Lords plan
- Racism very hurtful - Ferdinand
- Egypt parliament closure 'final'
- Mladic's war crimes trial resumes

Features & Analysis

- Murray column**
"I'm more determined than ever," writes the British number one
BBC SPORT
- Dear mugger...**
My phone's GPS tracking is on. So you're ricked
Iron lark



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Air pollution in the UK 'killing 50,000 people a year', warn MPs

By DAILY MAIL REPORTER
Last updated at 12:32 PM on 22nd March 2010
Comments (138) | Add to My Stories

Britain's filthy air kills 50,000 people a year – more than obesity, passive smoking or traffic accidents, a damning report by MPs has said.

Ministers have been rebuked for failing to tackle the lethal problem, risking millions of pounds in fines for failing to meet EU quality standards.

MPs on the Environmental Audit Committee warned that climate-change targets were even exacerbating air pollution.

The Telegraph

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Britons 'most unhygienic nation' in the face of major flu outbreak

Britons were half as likely as other nations to cover their hands and mouth more frequently when coughing or sneezing during the swine flu pandemic, a study has suggested.



Few Britons said they covered their mouth and nose more often when coughing and sneezing during the 2009 swine flu pandemic, a study has found.

Outdoor Pollutants

Living Bacteria Are Riding Earth's Air Currents

The high-flying microbes can travel across the globe, spreading disease or even changing climates



Microbes are now known to play many roles in the upper atmosphere: forming clouds, causing rain, and maybe even changing climates. (NOAA on Flickr)

By **Jim Morrison**
SMITHSONIAN.COM
JANUARY 11, 2016

ScienceDaily
Your source for the latest research news

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Breaking News: Iceberg

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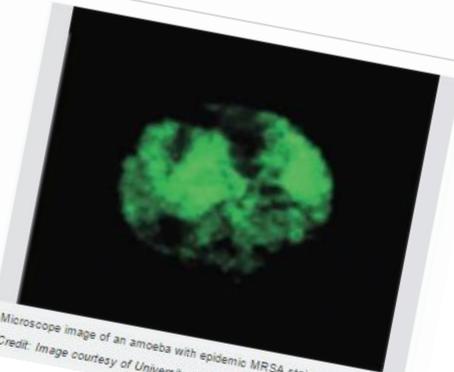
Science News

MRSA Use Amoeba To Spread, New Research Shows

Date: February 28, 2008
Source: University of Bath
Summary: The MRSA 'superbug' evades many of the measures introduced to combat its spread by infecting a common single-celled organism found almost everywhere in hospital wards, according to new research published in the journal *Environmental Microbiology*.
Share: 6 0 0 0 Total shares: 12

A vertical advertisement for British Airways. It features the British Airways logo at the top, followed by the text: "Plus, you'll collect Avios on almost all your everyday purchases." and "See how your receipts really can add up." Below the text is an image of a person holding a large receipt.

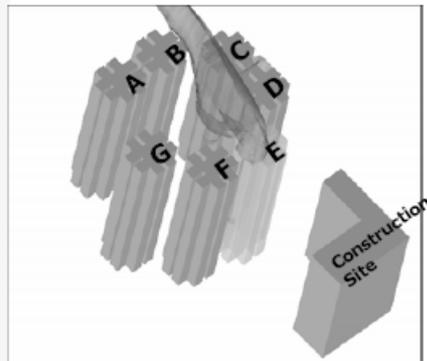
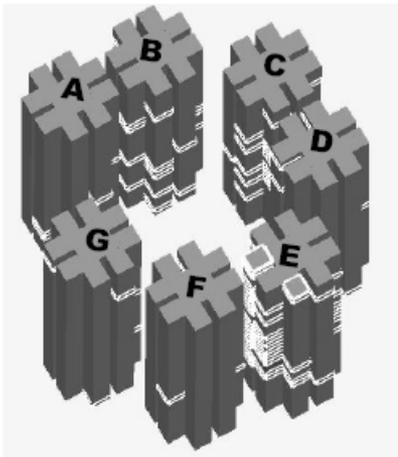
FULL STORY



Microscope image of an amoeba with epidemic MRSA stained green.
Credit: Image courtesy of University of Bath

SARS Transmission at Amoy Gardens Apartments

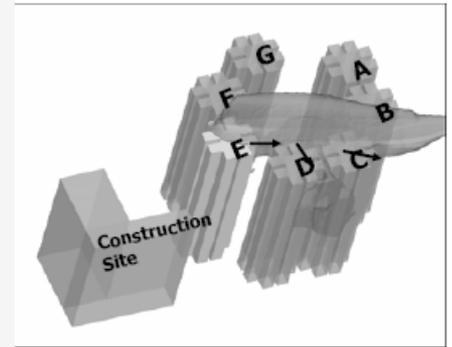
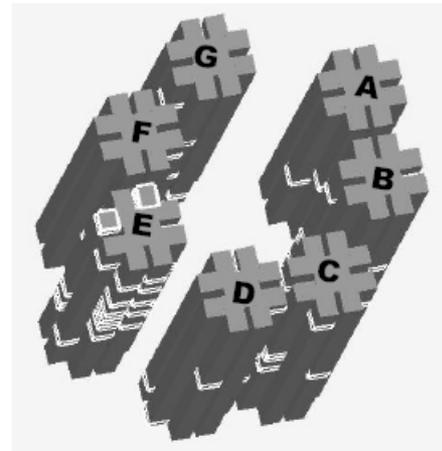
Spread from Block E to other blocks



Yu et al. NEJM 2004;350:1731-39

22 of 52

Spread from Block E to other blocks



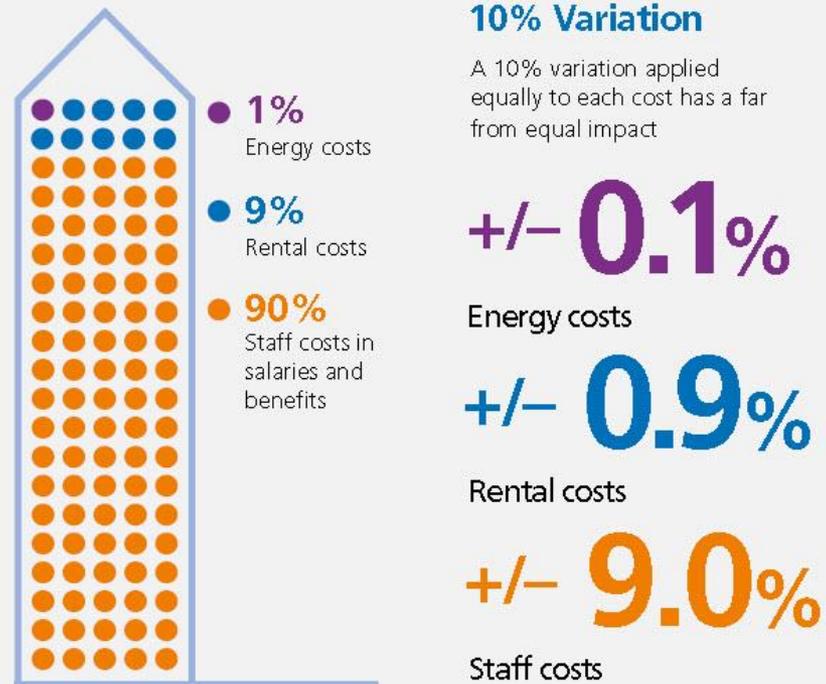
Yu et al. NEJM 2004;350:1731-39

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UVC – Quality Indoor Air



Typical business operating costs¹

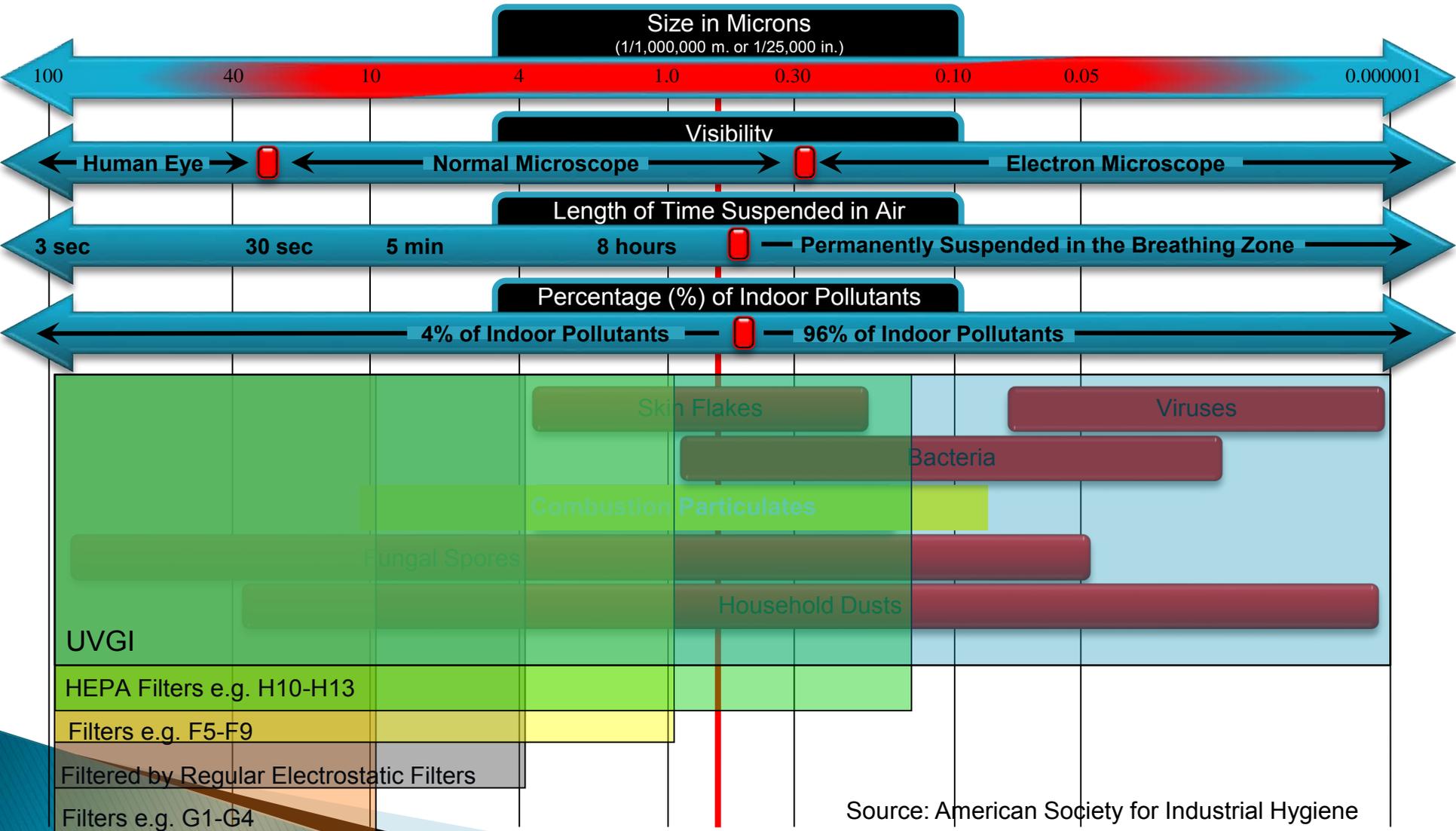


Source: World Green Building Council Health Wellbeing & Productivity in Offices

Summary of evidence

Indoor Air Quality: The health and productivity benefits of good indoor air quality (IAQ) are well established. This can be indicated by low concentrations of CO₂ and pollutants, and high ventilation rates. It would be unwise to suggest that the results of individual studies, even meta-analyses, are automatically replicable for any organisation. However, with this important caveat, a comprehensive body of research can be drawn on to suggest that productivity improvements of 8-11% are not uncommon as a result of better air quality.

Characteristics of Common Air Pollutants



Source: American Society for Industrial Hygiene

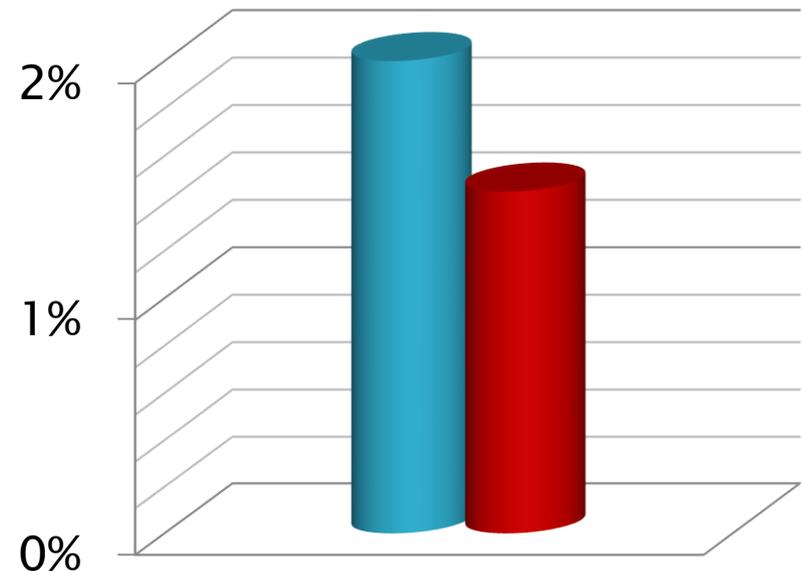
Increased Outside Air = Better Individual Productivity

Polaroid/Milton 2000

In a 4000 employee multiple building study of Polaroid corporation, Milton et al identify **a 35% reduction** in short-term sick leave

Short Term Absence as percent of hours scheduled to work

Short term absence at moderate and high ventilation rates



■ 25CFM/12ls⁻¹ ■ 50CFM/24ls⁻¹

Risk of Sick Leave Associated with Outdoor Air Supply Rate, Humidification, and Occupant Complaints

DONALD K. MILTON^{1*}, P. MARK GLENCROSS^{1,2} AND MICHAEL D. WALTERS²

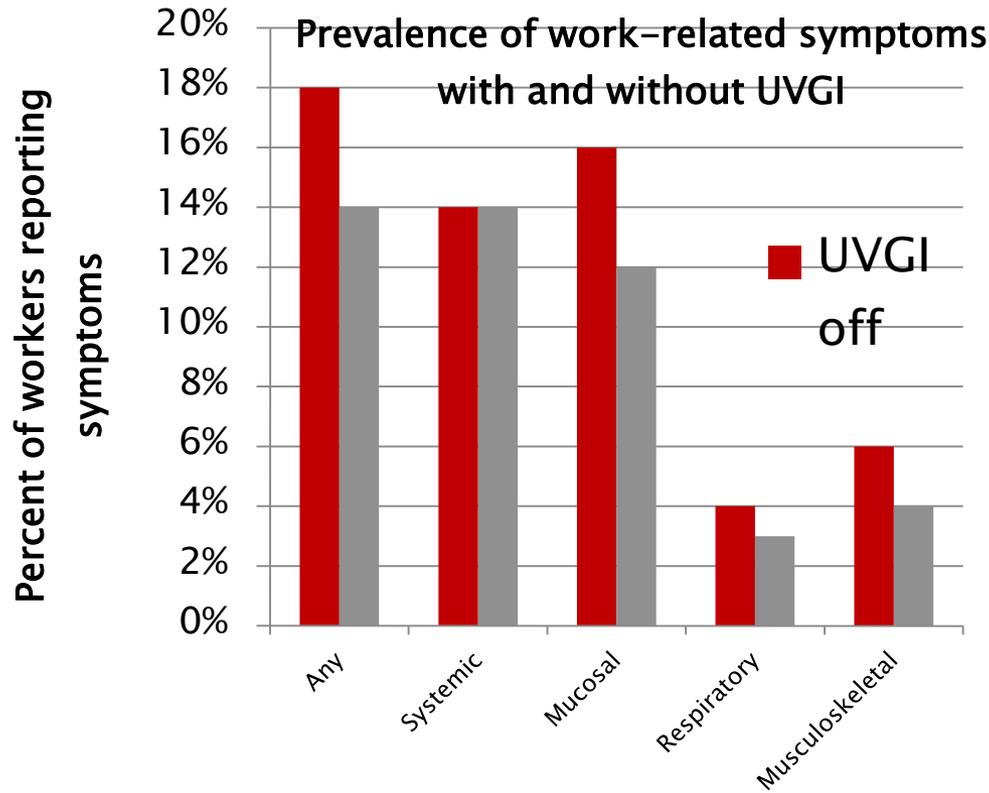
Abstract We analysed 1994 sick leave for 3,720 hourly employees of a large Massachusetts manufacturer in 40 buildings with 115 independently ventilated work areas. Computer records identified building, characteristics and HQ complaints. We used ventilation as moderate (~25 cm³/person, 12 l/s) or high (~50 cm³/person, 24 l/s) outdoor air supply based on knowledge of ventilation systems and CO₂ measurements on a subset of work areas, and used Poisson regression to analyse sick leave controlled for latent variables and CO₂ measurements on a subset of work areas, gender, seasons, hours of non-shift absence, shift, office, gender, seasons, hours of non-shift absence, or manufacturing (working and type of job (office, technical, or manufacturing worker). We found consistent associations of increased sick leave with lower levels of outdoor air supply and HQ complaints. Among office workers, the relative risk for short-term sick leave was 1.53 (95% confidence 1.22-1.92) with lower vent-

of ventilation rates compared moderate with approximately 12 and high with approximately 24 l/s per person air at the upper end of rates seen in these facilities. That indicates that benefits continue to accrue when ventilation is increased above 10 l/s per person, and that experimental studies to validate and to determine mechanisms for these observational findings should be a priority for indoor air research.

Received for review 20 October 1999. Accepted for publication 3 January 2000.
© Indoor Air 2000.

Introduction

UVGI = Health improvements



Menzies et Al 2003 (Office)

Source: Center for Building Performance and Diagnostics, a NSF/IUCRC, and ABSIC at Carnegie Mellon
Reference: Menzies, D, Jopa, J Hanley, T Rand, D Milton (2003) Effect of ultraviolet germicidal lights installed in office ventilation systems on workers' health and wellbeing: double-blind multiple crossover trial. The Lancet, 362, pp.1785-1791

Sources on infection HVAC- absenteeism study



European Respiratory Society's annual congress in Berlin - Study of 770 office staff

Airborne Transmission depends on people to launch viruses into the air?

		Aerosolised Bacteria Count
1. Coughing		3,000+
2. Sneezing		3,000+
3. Breathing	Nose: None / Mouth: Varies	
4. Talking/Singing		1,000+
5. Vomiting		1,000+
6. Flushing the toilet	<i>without the lid down</i> *	20,000+

**As a Result of Toilet Water Aerosolisation*

How far can Airborne Viruses Travel?

	<u>Large/Small Droplets</u>	<u>Droplet Nuclei</u>
1. Coughing	1-5 feet	160+ feet
2. Sneezing	8-15 feet	160+ feet
3. Singing, Talking	1-3 feet	160+ feet
4. Mouth Breathing	1-3 feet	160+ feet
5. Faecal Matter*	5 feet+	160+ feet

**As a Result of Toilet Water Aerosolisation and Mechanical Fan Dispersion into outdoor air (2003 Hong Kong SARS Virus Epidemic)*

Why is there a Flu Season??

Does Flu take a holiday each summer?

Are there Flu epidemics in Summer?

What changes in late Spring & Summer to reduce flu morbidity and mortality?

Indoor Humidity goes Up!

Sources of infections Airborne - MRSA

Significance of Airborne Transmission of Methicillin-Resistant *Staphylococcus aureus* in an Otolaryngology–Head and Neck Surgery Unit

Significance of Airborne Transmission of Methicillin-Resistant *Staphylococcus aureus* in an Otolaryngology–Head and Neck Surgery Unit FREE

Teruo Shiomori, MD, PhD; Hiroshi Miyamoto, MD, PhD; Kazumi Makishima, MD, PhD

[\[+\] Author Affiliations](#)

Arch Otolaryngol Head Neck Surg. 2001;127(6):644-648. doi:10.1001/archotol.127.6.644. Text Size: [A](#) [A](#) [A](#)

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ABSTRACT

[ABSTRACT](#) | [PATIENTS AND METHODS](#) | [RESULTS](#) | [COMMENT](#) | [ARTICLE INFORMATION](#) | [REFERENCES](#)

Objectives To quantitatively investigate the existence of airborne methicillin-resistant *Staphylococcus aureus* (MRSA) in a hospital environment and to perform phenotyping and genotyping of MRSA isolates to study MRSA epidemiology.

Sources of infection – Toilets

J Appl Microbiol, 2005;99(2):339-47.

The potential spread of infection caused by aerosol contamination of surfaces after flushing a domestic toilet.

Barker J, Jones MV.

Department of Pharmaceutical and Biological Sciences, School of Life and Health Sciences, Aston University, Aston Triangle, Birmingham, UK. j.e.barker@aston.ac.uk

Abstract

AIMS: To determine the level of aerosol formation and fallout within a toilet cubicle after flushing a toilet contaminated with indicator organisms at levels required to mimic pathogen shedding during infectious diarrhoea.

METHODS AND RESULTS: A semisolid agar carrier containing either *Serratia marcescens* or MS2 bacteriophage was used to contaminate the sidewalls and bowl water of a domestic toilet to mimic the effects of soiling after an episode of acute diarrhoea. Viable counts were used to compare the numbers of *Serratia* adhering to the porcelain surfaces and those present in the bowl water before and after flushing the toilet. Air sampling and settle plates were used to determine the presence of bacteria or virus-laden aerosols within the toilet cubicle. After seeding there was a high level of contamination on the porcelain surfaces both under the rim and on the sides of the bowl. After a single flush there was a reduction of 2.0-3.0 log cycles cm^{-2} for surface attached organisms. The number of micro-organisms in the bowl water was reduced by 2.0-3.0 log cycles ml^{-1} after the first flush and following a second flush, a further reduction of c. 2.0 log cycles ml^{-1} was achieved. Micro-organisms in the air were at the highest level immediately after the first flush (mean values, 1370 CFU m^{-3}) for *Serratia* and 2420 PFU m^{-3} for MS2 phage). Sequential flushing resulted in further distribution of micro-organisms into the air although the numbers declined after each flush. *Serratia* adhering to the sidewalls, as well as free-floating organisms in the toilet water, were responsible for the formation of bacterial aerosols.

CONCLUSION: Although a single flush reduced the level of micro-organisms in the toilet bowl water when contaminated at concentrations reflecting pathogen shedding, large numbers of micro-organisms persisted on the toilet bowl surface and in the bowl water which were disseminated into the air by further flushes.

SIGNIFICANCE AND IMPACT OF THE STUDY: Many individuals may be unaware of the risk of air-borne dissemination of microbes when flushing the toilet and the consequent surface contamination that may spread infection within the household, via direct surface-to-hand-to-mouth contact. Some enteric viruses could persist in the air after toilet flushing and infection may be acquired after inhalation and swallowing.

“Many individuals may be unaware of the risk of air-borne dissemination of microbes when flushing the toilet”

“Some viruses persist in the air after toilet flushing and infection may be acquired after inhalation and swallowing”

Warning: Flushing the toilet with the lid up can spread bugs



Prof Mark Wilcox.

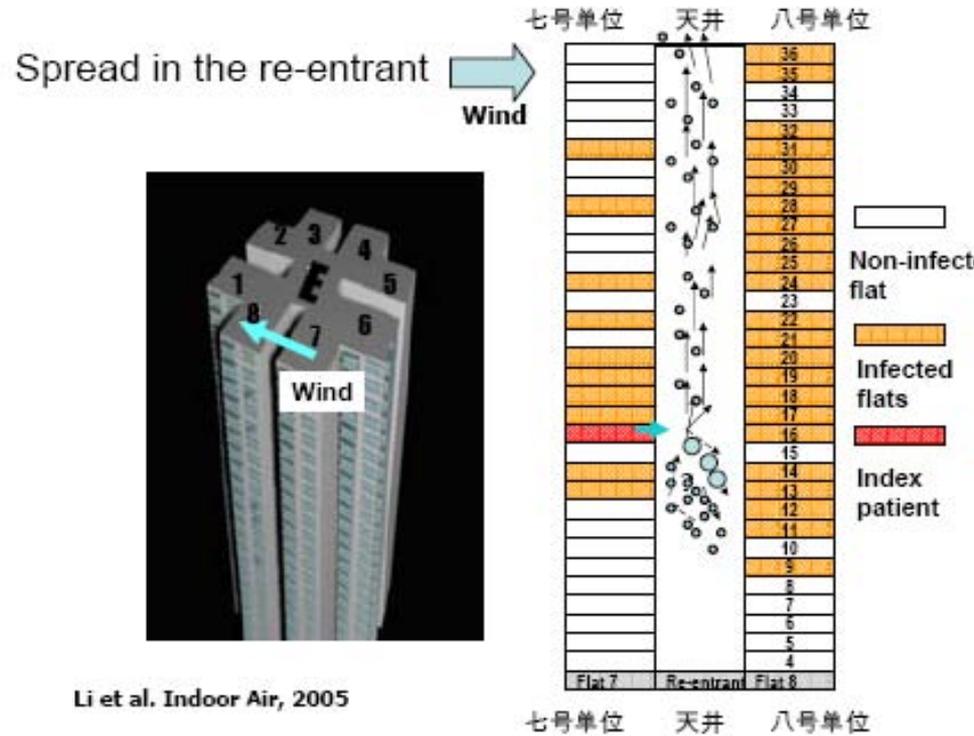
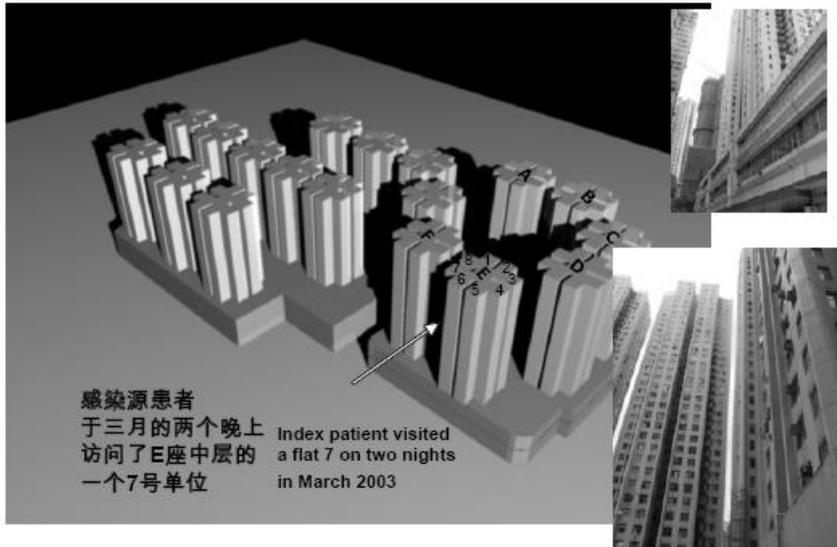
By Katie Baldwin
Published on Friday 6 January 2012 06:00

*“Many hospital toilets **don't have lids** - ironically in an attempt to stop cross-contamination from handling a lid”*

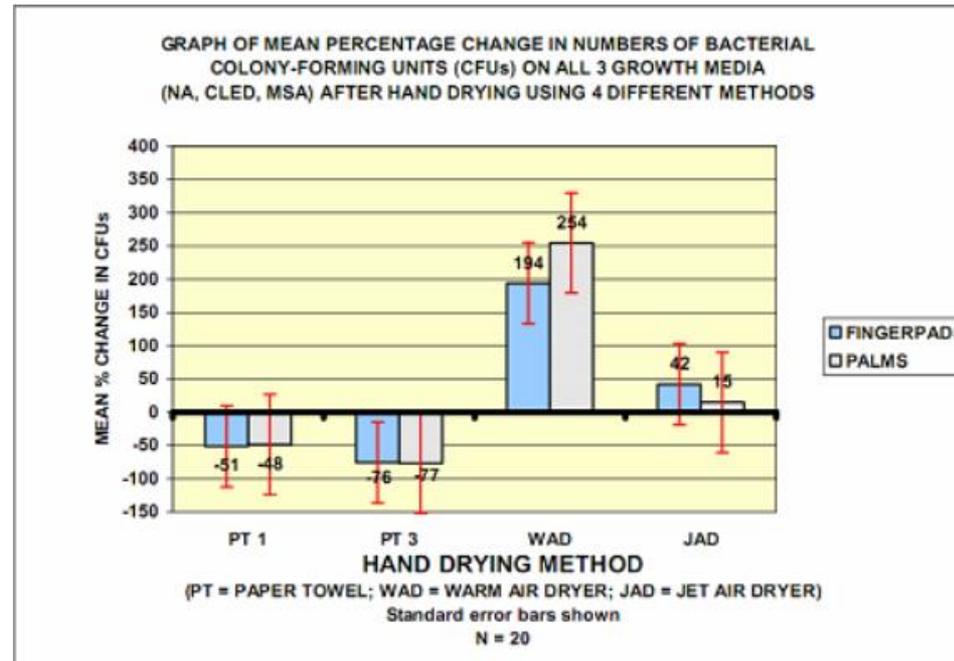
Sources of infection – Toilet Water Aerosolisation

Airborne SARS Transmission Amoy Gardens Apartments

The Amoy Gardens SARS outbreak



Sources of infection Hand Dryers v Paper



	Fingerpads	Palms
Paper Towels	- 76%	-77%
Dyson Airblade	+42%	+15%
Warm Air Dryers	+194%	+254%

Sources of Infection - HVAC Heat Exchangers

Fungal Pathogens	Found of HVAC Cooling Coils & Final Filters
Candida spp. *	*
Aspergillus spp.	*
Aspergillus niger	*
Aspergillus wentii	*
Penicillium spp.	*
Fusarium spp.	*
Cladosporium spp.	*
Alternaria spp.	*
Epicoccum spp.	*
Epicoccum nigrum	*
Cryptococcus spp.	*
Aureobasidium spp.	*
Aureobasidium pullulans	*
Basidiomycetes spp.	*
Acremonium spp.	*
Rhodotorula spp.	*
Chaetomium spp.	*
Strachbotrys spp.	*
Strachbotrys chartarum	*
Ulocladium	*
Verticillium	*

Microorganisms	Found of HVAC Cooling Coils & Final Filters
GRAM-NEGATIVE	*
Pseudomonas spp*	*
Pseudomonas aeruginosa	*
Stenotrophomonas spp.	*
Acintobacter spp.	*
Klebsiella spp.	*
Serratia spp.	*
Enterobacter spp.	*
Enterobacter cloace	*
Escherichia coli	*
Cornynbacterium spp.	*
Comamonas spp.	*
GRAM-POSITIVE	*
Enterococcus spp.	*
Staphylococcus aureus	*
CONS*	*
Micrococcus spp.	*
Streptococcus spp.	*

Source: Steril-Aire

UK Air Quality Standards

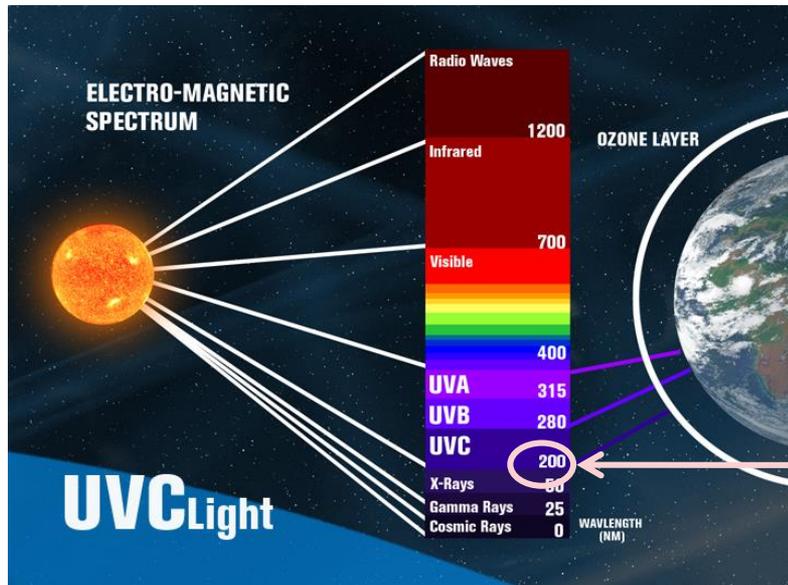
- **The UK is Failing to meet European Air Quality Standards**
- **Building Filtration systems are not able to filter all pollutants**
- **Current ventilation rates are too low**

Solution 1

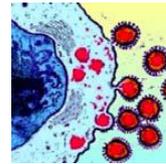
High Intensity Germicidal UVC

UVC Characteristics

AKA: UVGI *Ultra Violet Germicidal Irradiation*



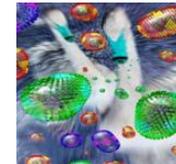
Effective Against Many Pathogens



e.Coli



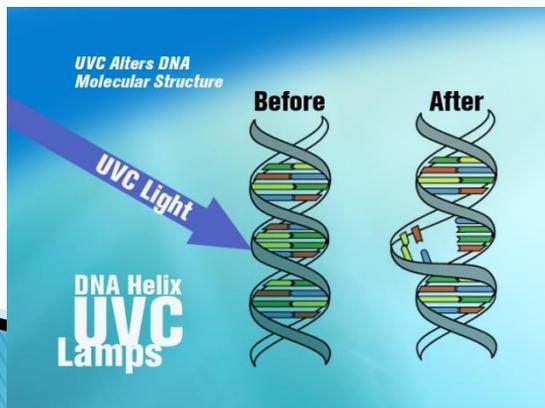
Cold Virus



Influenza



Norovirus

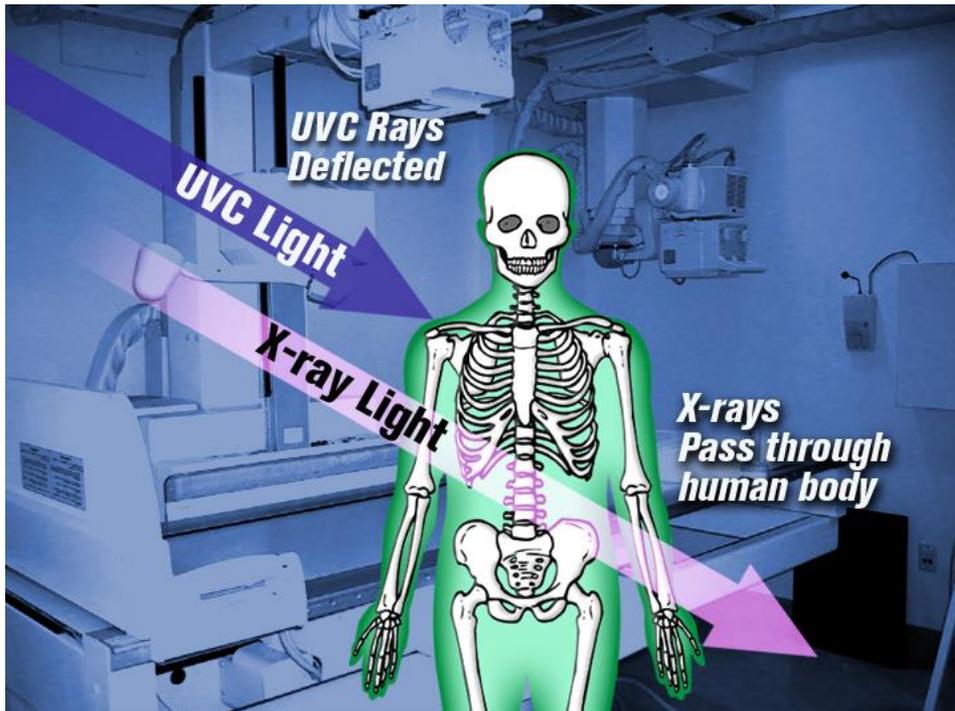


MRSA



C.Difficile

UVC – (AKA – UVGI – *ultra violet germicidal irradiation*)

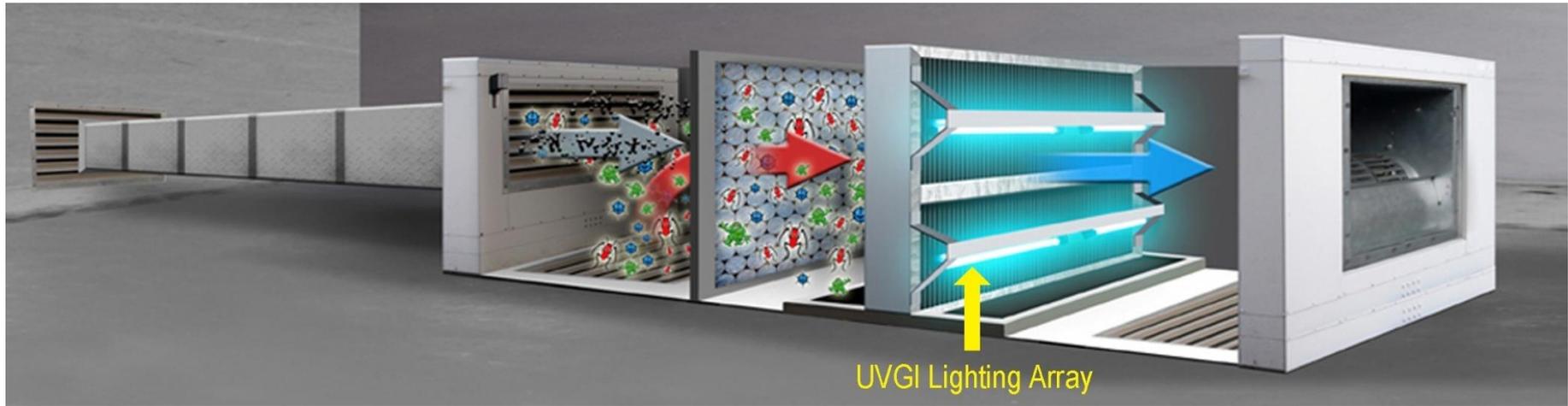


Facts

- 40 times less powerful than UVA or B
- UVC will not pass through glass, (*or most plastics*).
- Non Carcinogenic

Passive UVC

Typical Installation

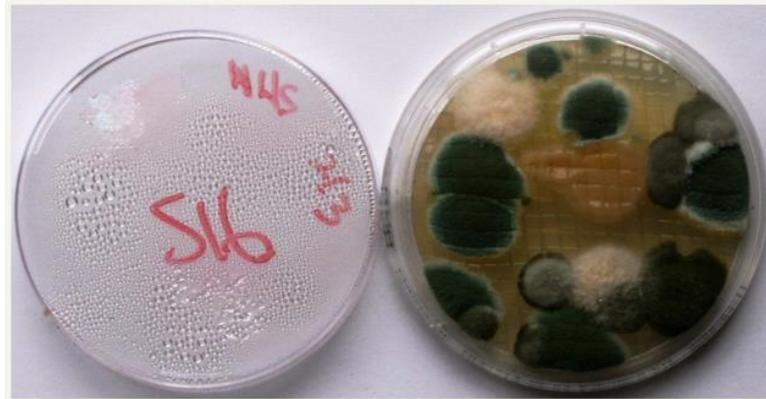


Proof of Mould removal from Cooling Coil Surface

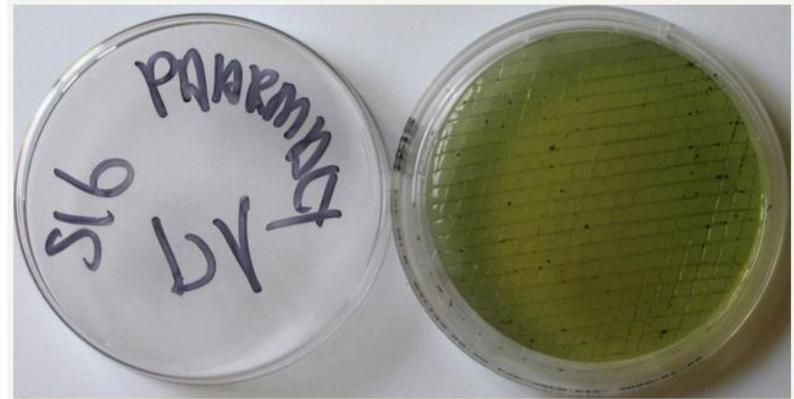
NHS University Hospital Location

Pharmacy

Before UVC



After UVC (30 days)

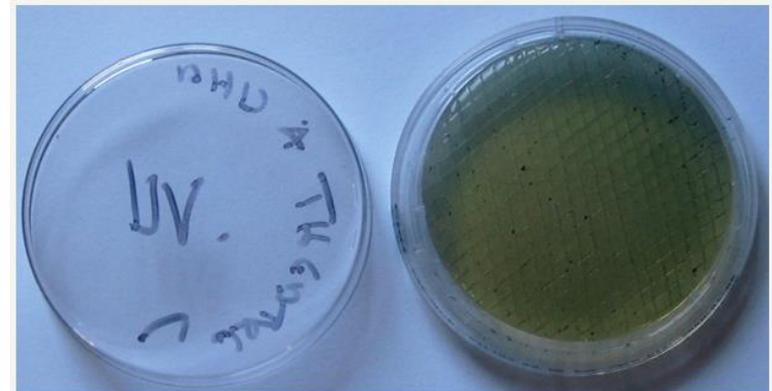


Operating Theatres

Before UVC



After UVC (30 days)



Health – Case Studies

Livermore Veterans - Administration Hospital during the 1957–58 Influenza pandemic

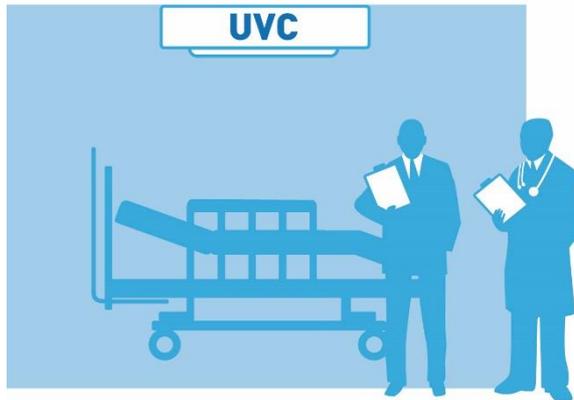
The study group

209 patients in wards with UVC protection installed

The control group

396 patients were hospitalised in wards without UVC protection

Both groups were isolated from each other



Both groups were attended by the same personnel, and there were no restrictions on visits from the community

Result:

UVC Study group - 2%

Result:

Control group
Influenza A (H2N2) - 19%.
Personnel - 18%

Review of Aerosol Transmission of Influenza A Virus

Raymond Tauxe

Influenza viruses can be transmitted through aerosols, large droplets, or direct contact with secretions. However, there is evidence that aerosol transmission is the most important route for the spread of influenza. This review examines the evidence for aerosol transmission of influenza A virus in a hospital ward during the 1957-58 influenza pandemic. The study found that aerosol transmission was the most important route for the spread of influenza in this ward. The results of this study suggest that aerosol transmission of influenza A virus in hospital wards is an important route of infection, and that the use of UVC protection in hospital wards may be an effective means of preventing the spread of influenza.

Influenza Virus Aerosols

The review examines the evidence for aerosol transmission of influenza A virus in a hospital ward during the 1957-58 influenza pandemic. The study found that aerosol transmission was the most important route for the spread of influenza in this ward. The results of this study suggest that aerosol transmission of influenza A virus in hospital wards is an important route of infection, and that the use of UVC protection in hospital wards may be an effective means of preventing the spread of influenza. The study also found that aerosol transmission of influenza A virus in hospital wards is an important route of infection, and that the use of UVC protection in hospital wards may be an effective means of preventing the spread of influenza.

Health – Case Studies

BBC sirhillary News Sport Weather iPlayer TV Radio

NEWS **LIVE BBC NEWS CHANNEL**

Page last updated at 06:28 GMT, Wednesday, 25 July 2007 07:28 UK

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Air cleansing unit to combat MRSA

By Adam Brimelow
BBC News, Health correspondent

Figures out today on MRSA and Clostridium difficile show there is a long way to go in the battle against hospital infections. And a report by the Healthcare Commission suggests that a lot of trusts have to do much more to adopt best practice.



The unit looks like an air conditioner

This issue has been a key priority in the health service for several years.

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Also in the news

During the trial nearly half these tests on patients in the "control room" were positive.

None was in the room with the UV cleaner.

Dr Peder Nielsen

"We have never believed that airborne transmission had such an importance in this issue."

Ingham Regional Medical Centre

Average levels (organisms / m³) of total bacteria found in the air

UVGI – HVAC Installation

SUMMARY REPORT
Background levels of viable bacteria and fungi in the indoor air and on surfaces in Ingham Regional Medical Center "before and after" the UVGI-HVAC installation

FEBRUARY 2, 2009

Prepared for:
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Department of Fisheries and Wildlife
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Michigan State University

<i>Greenlawn Campus</i>	<i>Ingham Orthopaedic</i>
<i>Before UVC – 45.5</i>	<i>Before UVC – 8.67</i>
<i>After UVC 25.5</i>	<i>After UVC – 0.41</i>

The bacterial concentrations found on all surfaces (*commonly and non touched surfaces*)

<i>Greenlawn Campus</i>	<i>Ingham Orthopaedic</i>
<i>Before UVC – 17.9</i>	<i>Before UVC – 6.1</i>
<i>After UVC – 1.75</i>	<i>After UVC – 0.85</i>

Ultraviolet Lighting During Orthopaedic Surgery and the Rate of Infection

THE JOURNAL OF BONE & JOINT SURGERY
JB&JS

*This is an enhanced PDF from The Journal of Bone and Joint Surgery
The PDF of the article you requested follows this cover page.*

Ultraviolet Lighting During Orthopaedic Surgery and the Rate of Infection

Merrill A. Ritter, Emily M. Olberding and Robert A. Malinzak
J Bone Joint Surg Am. 2007;89:1935-1940. doi:10.2106/JBJS.F.01037

TABLE III Rate of Infection for Primary and Revision Knee Replacements with and without Ultraviolet Lighting

	Rate of Infection		P Value
	No Ultraviolet Lighting	Ultraviolet Lighting	
All	2.2% (15 of 681)	0.5% (17 of 3390)	<0.0001
Primary	1.9% (12 of 638)	0.5% (17 of 3227)	0.0003
Revision	7.0% (3 of 43)	0% (0 of 163)	0.0086

Ventilator-Associated Pneumonia

British Journal of Medical Practitioners, June 2009, Volume 2, Number 2

BJMP 2009;2(2) 16-19

Ventilator Associated Pneumonia – an Overview

Harshal Wagh and Devaraja Acharya

Journal of Perinatology (2011), 1–8
© 2011 Nature America, Inc. All rights reserved. 0743-8346/11
www.nature.com/jp



ORIGINAL ARTICLE

Effect of enhanced ultraviolet germicidal irradiation in the heating ventilation and air conditioning system on ventilator-associated pneumonia in a neonatal intensive care unit

RM Ryan^{1,2,3}, GE Wilding⁴, RJ Wynn¹, RC Welliver⁵, BA Holm^{1,2,6} and CL Leach¹

- ✓ 27% reduction in VAP
- ✓ Reduced hospital costs £350k v £180k
- ✓ Yearly savings - £170k
- ✓ UVC System Cost - £35,000

In Vitro Fertilisation Clinic

7 year study



Culture Environment: A Delicate Balance

IVF Laboratories and UVC Ionizing Radiation

By Kathryn C. Worrlow, Ph.D.

Increased CPR rates of 18.2%
Direct Correlation to UVC
Activation



Solution 2

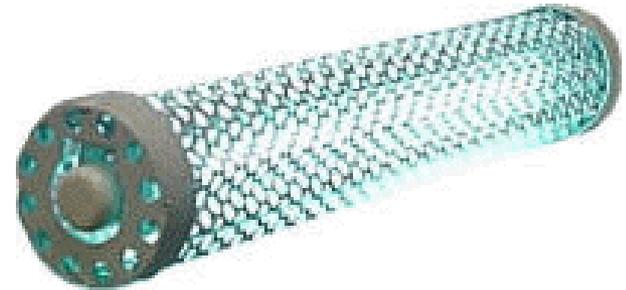
Active UV
Broad Spectrum UV with
Quad Metallic Core

Active UV

REME



PHI



The cells generate a group of “Friendly Oxidisers” known as Hydro-peroxides



Sneeze Test – 99% inactivation

Active UV – MRSA / C.Diff Testing



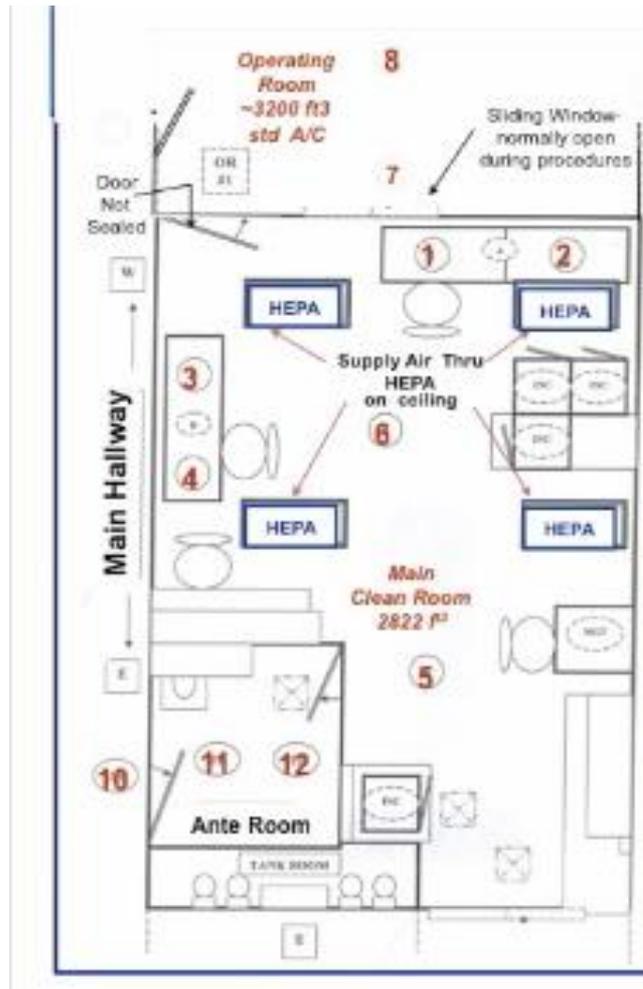
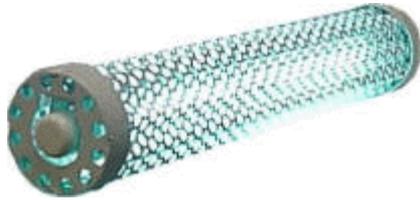
Evaluation of the Efficacy of a Reflective Electromagnetic Energy System (REME™
RGF Environmental) at Reducing Populations of Methicillin Resistant
Staphylococcus aureus on Stainless Steel Surfaces

Dr. James Marsden

Kansas State University

Sample – hours	Treated Samples MRSA Log CFU / cm ³	Control samples MRSA Log CFU / cm ³
0	6.7	6.9
2	4.4	6.7
4	4.2	6.5
8	3.8	6.5
24	2.0	6.45

Active UV – Class 5 Facility?



Hospital – Clean Room

- Particulate count/m³ measured @ 0.5 um
- Typical office 2 -3 million/m³ @ 0.5 um
- Before and After 2- 9" PCO Units in A/C ducts

Loc	Class	Before/m ³	After/m ³	Imp %
01	5	1391.4	77.7	94%
02	5	692.2	21.2	97%
03	5	621.5	7.1	99%
04	5	374.3	7.1	98%
05	6	11,569.1	2,366.1	80%
06	6	22,236.5	332.0	99%
07	7	337,161.9	165,484.6	51%
08	7	249,121.4	153,887.2	38%
09	8	1,614,245.0	334,401.6	79%
10	8	1,304,842.0	373,078.3	71%
11	7	247,614.7	53,614.7	78%
12	7	203,518.4	50,302.2	75%

All particle counts were taken in accordance with ISO 14644-1 standards

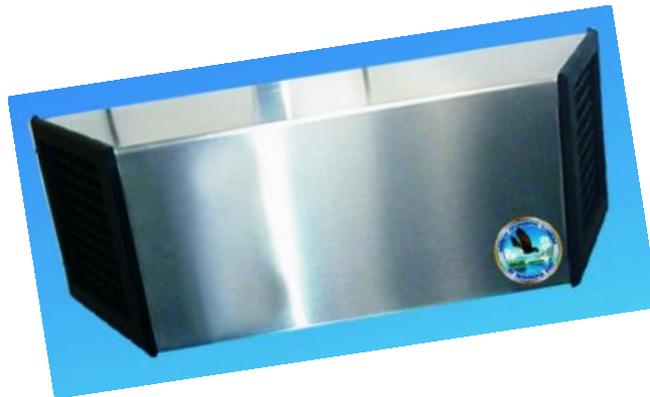
Microbial Colonies - Before & After PHI

Location	Before	After
1- 2 Horizontal Flow Clean Bench	0	0
3- 4 Horizontal Flow Clean Bench	0	0
5- 6 Main Clean Room	14	0
7- 8 Operating Room	9	0
9- 10 Hallway	27	8
11-12 Ante Room	23	15

A/C or no A/C?



- ▶ Works in any type of air conditioning
- ▶ Works even when you don't have air conditioning
- ▶ Plug-in-the-wall devices



Compliance

Standards Authorities Recognise UVC



ASHRAE Position Document on

Airborne Infectious Diseases

Approved by ASHRAE Board of Directors
June 24, 2009

*“Airborne infectious disease transmission
can be reduced using UVC”*

U.S. Government Mandated



HVAC Systems – *after 911*

(U) Potential Terrorist Attack Methods

Joint Special Assessment

23 April 2008



**Homeland
Security**

Office of Intelligence and Analysis



**Federal Bureau
of Investigation**

“jihadist pamphlet specifically mentions targeting enclosed areas and HVAC systems”



Large Buildings and Arenas

Beyond the physical protection of large buildings, air intake systems of many major buildings and other infrastructure are an Achilles' heel for this nation. Many are accessible and exposed, so a terrorist armed with a modest amount of biological or chemical agent could readily disperse that agent throughout a building. Moreover, most buildings lack the types of filters that could clean up contamination that does get into the system, either from deliberate attack or from an agent released on a street or from a nearby structure. Few buildings and other large structures are equipped to keep out dangerous air particles that may be in the vicinity.

UVC – Steril–Aire testing carried out by the US EPA

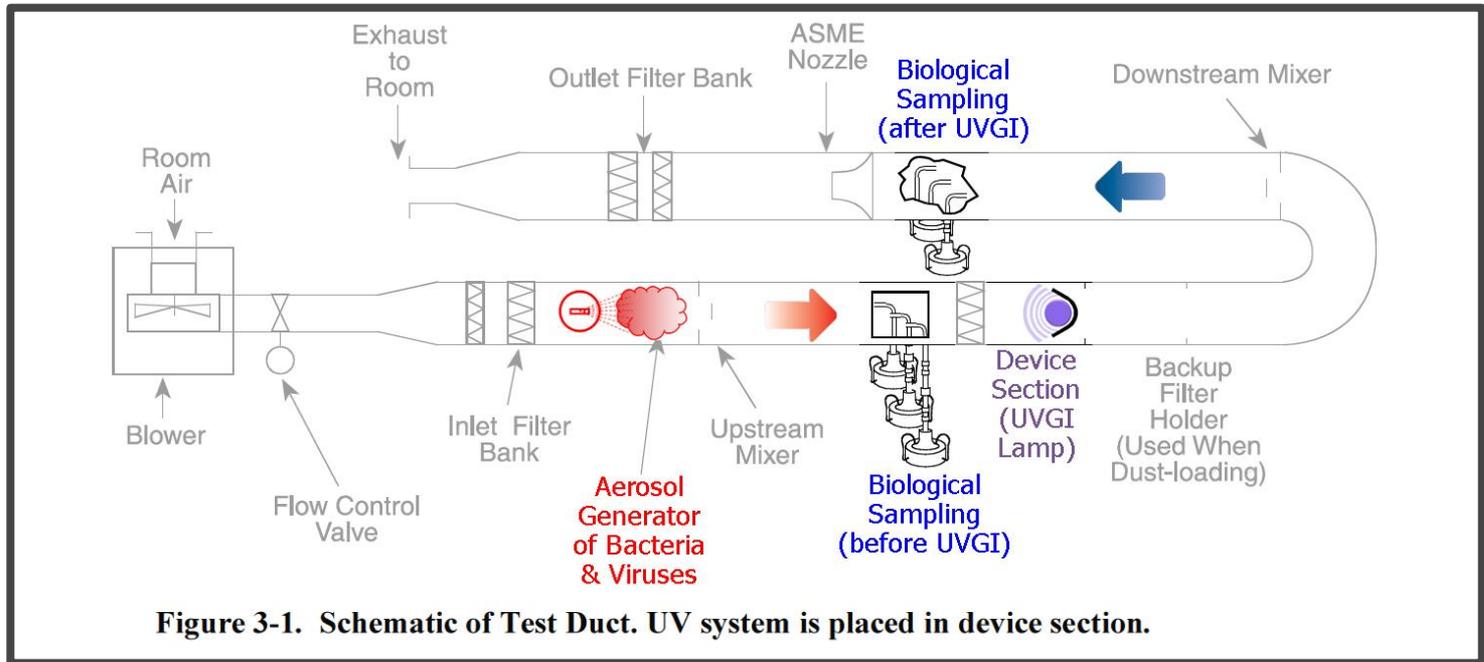


Table 5-1. Inactivation Efficiency

	Test organism		
	Spore form of bacteria (<i>B. atrophaeus</i>)	Vegetative bacteria (<i>S. marcescens</i>)	Bacterial virus (MS2 bacteriophage)
Inactivation efficiency, (UV light on) %	96	99.96 ^a	99

a – the value 99.96% is based on the upper 95% confidence limit for the mean downstream count of *S. marcescens*. There were no downstream counts measured.

Absenteeism case studies

Health - Commercial Trials



- ▶ 38% Absentee Reductions

- 25% Absentee Reductions



Calculate the Cost of Absence

PLEASE COMPLETE THIS FORM AND CLICK THE CALCULATE BUTTON BELOW

Company Name:

No Of Employees:

Average Annual Salary:

Average No of Days per Year Absence per Employee:

Annual Overtime cost directly related to absence cover:

Do you replace absent staff with backfill at extra cost?

Industry:

No of Working Days per Annum:

Calculate



Cost of Absenteeism Calculation

Average Salary	£28,000
No of Working Days	230
Cost / person / day	£121.74
Cost per person per annum (CIPD figure of 6.6 days absence per person)	£803.48
Total Benefit Loss per Annum (900 personnel) (does not include profitability loss)	£723k +

Locations to consider



Other possible applications



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Summary of Benefits

- All
 - Biosecurity
 - Reductions in Absenteeism
 - Increased productivity
- Healthcare Environments
 - Reductions in all infections including HCAs
 - Reductions in bed days
 - Reductions in medicines / manpower required to treat HCAs
 - Reductions in post operative infections
 - Reductions in Norovirus outbreaks
 - Breaking the “*superbug*” mutation cycle

Summary of Issues

1. Acknowledgement of airborne infection route
2. Outdoor air is not *“fresh air”*
3. Filtration technology is inadequate to deal with the range of outdoor pollutants & covert threats
4. Ventilation plays vital role in the spread of infections
5. Greater emphasis should be placed on keeping humans healthier
6. UVC / UVGI should be seriously considered in any health & safety strategy

Thanks for taking the time to listen to me



creating healthier environments

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Questions Please?