Agenzia sanitaria e sociale regionale

Sanificazione e disinfezione nelle strutture sanitarie

Bologna, 24 giugno 2019

Le nuove tecnologie: uno sguardo di insieme e indicazioni della letteratura

Beatrice Casini

Professore associato, Dipartimento di Ricerca Traslazionale, N.T.M.C., Università di Pisa
U.O. Igiene ed Epidemiologia, Azienda Ospedaliero-Universitaria Pisana

Di cosa parleremo oggi?

LA NUOVA PROGETTAZIONE DELLE SUPERFICI AMBIENTALI:

- **La progettazione integrata degli ambienti**
- **Le superfici auto-sanificanti**
- **La nanostrutturazione e i nanorivestimenti**

LA DISINFEZIONE TERMINATE AUTOMATIZZATA:

- **Le tecnologie no-touch**

Non sostituiscono, ma integrano i protocolli di pulizia e disinfezione

Come implementare la pulizia e disinfezione delle superfici ad alta frequenza di contatto

American Journal of Infection Control 41 (2013) S12-S19

Contents lists available at ScienceDirect

American Journal of Infection Control

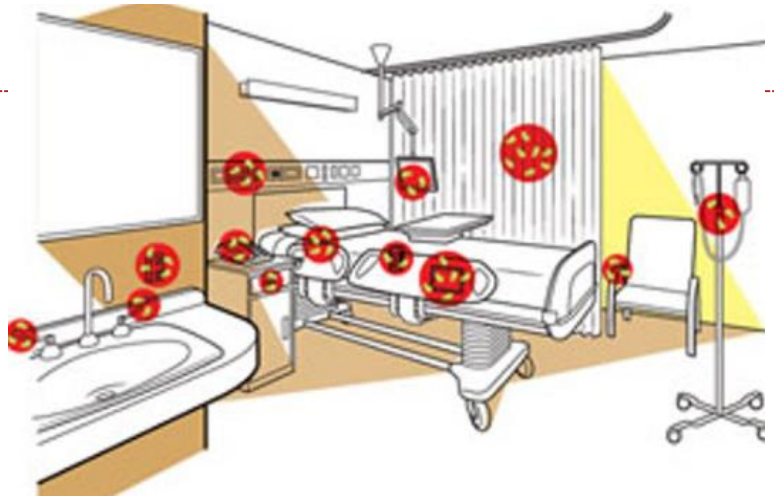
journal homepage: www.ajicjournal.org

Original research article

Does improving surface cleaning and disinfection reduce health care-associated infections?

Curtis J. Donskey MD [a,b,*]

[a] Geriatric Research, Education, and Clinical Center, Cleveland Veterans Affairs Medical Center, Cleveland, OH
[b] Case Western Reserve University School of Medicine, Cleveland, OH



Migliorare non solo la **disinfezione terminale**, ma anche la disinfezione **giornaliera delle superfici ad alta frequenza di contatto** e dei **dispositivi medici fissi e portatili**.

Per migliorare la pulizia e disinfezione si può agire:

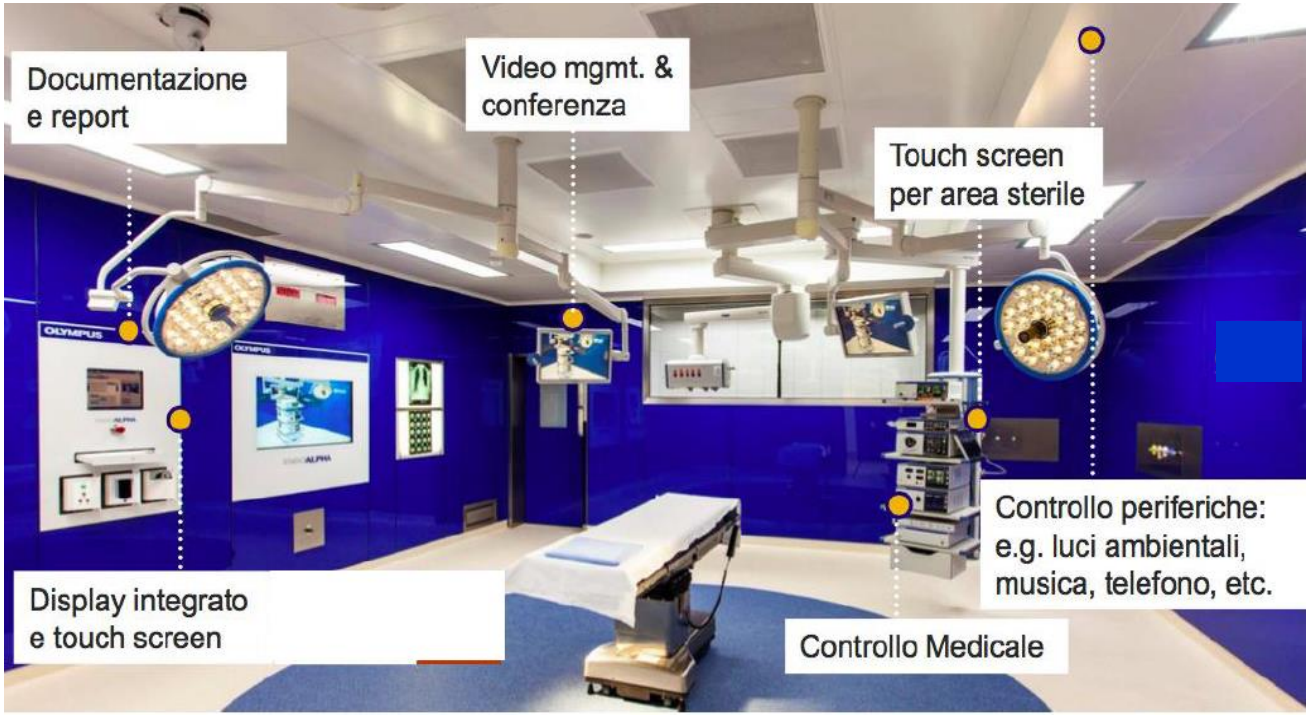
1) Sostituendo i **prodotti in uso**, ad esempio microfibre *vs* cotone,
2) Cambiando il **disinfettante** e/o i parametri del suo **impiego**,
3) Migliorando l'efficienza operativa con **attività educative, monitoraggio**, **audit e feed-back**, o **aumentando il personale**.
4) Impiegando **tecnologie automatizzate**.

Migliorare le procedure esistenti

Utilizzare nuove tecnologie

La progettazione integrata degli ambienti

BLOCCO OPERATORIO INTEGRATO E MULTIMEDIALE

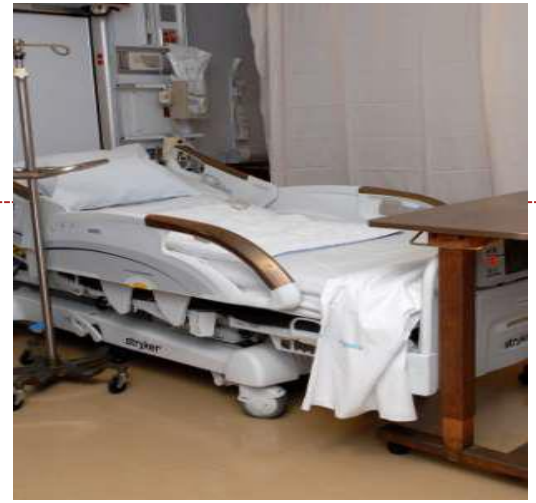


Blocco operatorio degli Istituti Fisioterapici Ospitalieri (IFO), Roma.

- Un display integrato e touch screen consente il controllo della strumentazione di sala
- Superfici lisce facilitano la pulizia e disinfezione

- Scarsa interazione chirurgo/strumentista con area non sterile
- Riduzione tempi operatori e di preparazione sala

Le superfici auto-sanificanti



American Journal of Infection Control 41 (2013) S31-S35

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Original research article

Self-disinfecting surfaces: Review of current methodologies and future prospects

David J. Weber MD, MPH [a,b,*], William A. Rutala PhD, MPH [a,b]

[a] Department of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC
[b] Department of Hospital Epidemiology, UNC Health Care, Chapel Hill, NC

SUPERFICI RIVESTITE IN RAME

- **Solo alcune superfici** possono essere rivestite
- **Modesta riduzione** della contaminazione (1-2 log)
- **L'efficacia può ridursi nel tempo**
- **Non tossicità** per l'operatore/paziente, ma possibile **sviluppo di resistenze** microbiche.
- **Costo-efficacia?**

Advantages and disadvantages of currently proposed self-disinfecting surfaces in hospital rooms

Advantages
- Provides continuous disinfection of environmental surfaces
- Does not depend on adequacy of cleaning/disinfection by environmental service workers
- Broad-spectrum antimicrobial activity
- Very low or no toxicity to humans

Current limitations
- Impossible to impregnate or coat all possible room surfaces and medical devices used in a hospital room
- Efficacy of self-disinfecting surfaces to decrease health care-associated infections has not been demonstrated in a clinical trial
- Cost of purchasing and installing self-disinfecting surfaces has not been published
- Possible development of resistance by microbes to the self-disinfecting method
- In general, modest reductions in surface contamination (ie, 1- to 2-$\log_{10}$) demonstrated
- Durability with repeated cycles of cleaning and disinfection not yet evaluated

Le superfici auto-sanificanti

Journal of Hospital Infection 92 (2016) 7–13

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Review

Antimicrobial surfaces to prevent healthcare-associated infections: a systematic review

M.P. Muller [a,b,*], C. MacDougall [c], M. Lim [c] and the Ontario Agency for Health Protection and Promotion (Public Health Ontario) the Provincial Infectious Diseases Advisory Committee on Infection Prevention and Control (PIDAC-IPC) [d]

[a] Department of Medicine, St Michael's Hospital, University of Toronto, Toronto, Canada
[b] PIDAC-IPC, Ontario, Canada
[c] Infection Prevention and Control Department, Public Health Ontario, Toronto, Canada

235 articoli full-text revisionati

Non ci sono evidenze sull'efficacia delle superfici in rame nella riduzione dell'incidenza delle infezioni

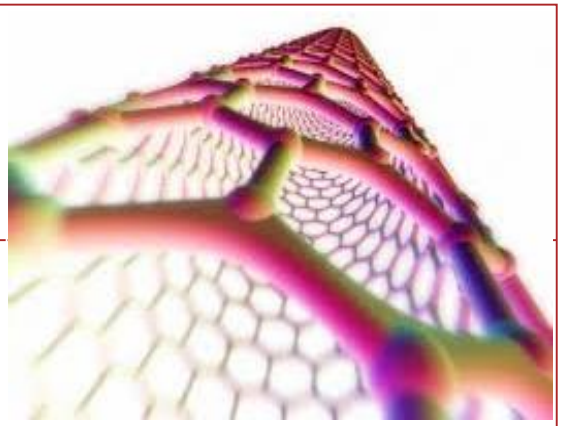
Table II
GRADE evidence profile and summary of findings

Study	Outcome	Control	Copper surfaces	Relative risk	Relative risk reduction	Quality
Salgado *et al.*[19]	HCAIs per patient	26/320	10/294	0.42 ($P = 0.013$)	58%	⊕⊕○○
	ARO per patient	12/320	4/294	0.36 ($P = 0.063$)	64%	⊕○○○
Lazary *et al.*[29]	HCAIs per patient-day	118/4337	82/3940	0.76 ($P = 0.046$)	24%	⊕○○○

⊕⊕○○, low quality of evidence; ⊕○○○, very low quality of evidence.
GRADE, Grading of Recommendations Assessment, Development and Evaluation; HCAI, healthcare-associated infection; ARO, antibiotic-resistant organism.

Copper surfaces harbour fewer bacteria than non-copper surfaces, but **only two study showed a reduction in HCAI incidence** and the quality of this evidence is very low

Nanostrutturazione e nanorivestimento



Journal of Hospital Infection 85 (2013) 87–93

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

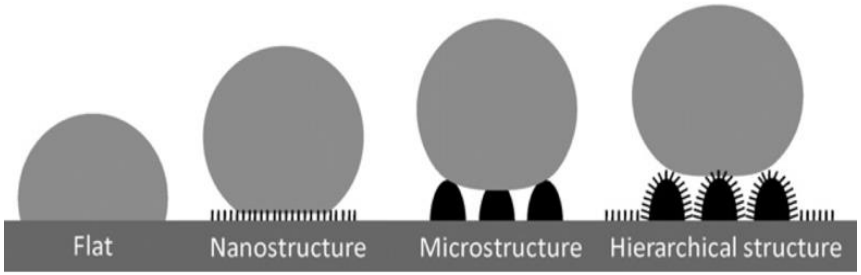
Review

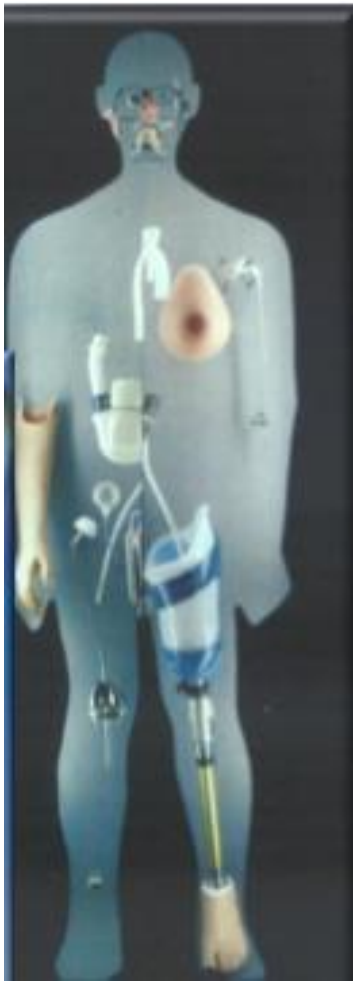
Modification of the surfaces of medical devices to prevent microbial adhesion and biofilm formation

C. Desrousseaux [a,d], V. Sautou [a,b], S. Descamps [a,c], O. Traoré [d,e,*]

[a] Clermont Université, Université d'Auvergne, C-BIOSENSS, Clermont-Ferrand, France
[b] CHU Clermont-Ferrand, Service Pharmacie, Clermont-Ferrand, France
[c] CHU Clermont-Ferrand, Service de Chirurgie Orthopédique, Clermont-Ferrand, France
[d] LMGE «Laboratoire Micro-organismes: Génome et Environnement», Clermont Université, Université Blaise Pascal et Université d'Auvergne, Clermont-Ferrand, France
[e] CHU Clermont-Ferrand, Service d'Hygiène Hospitalière, Clermont-Ferrand, France

Progettazione di materiali funzionali "bioispirati" per ridurre l'adesione microbica alle superfici





DISPOSITIVI MEDICI

- Nanotubi di carbonio o nanoparticelle nei **cementi ossei**
- Nanoparticelle di idrossiapatite nei preparati per riempire le **cavità ossee**
- Nanoparticelle di Ag per il rivestimento di **impianti o cateteri**
- Nanoparticelle magnetiche funzionalizzate (ossido di ferro) per il trattamento termico dei **tumori** in risonanza magnetica

Nanostrutturazione delle SUPERFICI AMBIENTALI

Biointerphases 2(2), June 2007

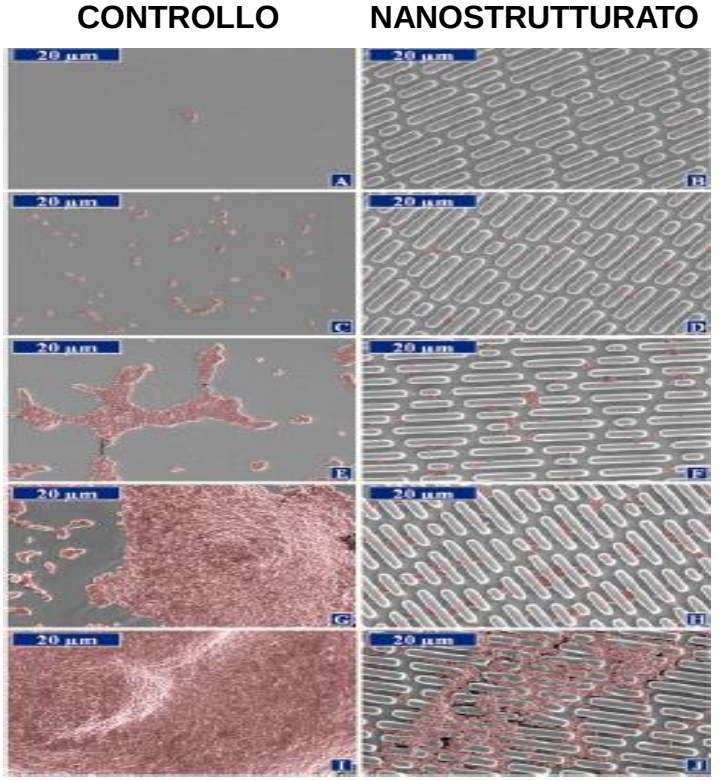
Impact of engineered surface microtopography on biofilm formation of *Staphylococcus aureus*

Kenneth K. Chung
Department of Materials Science and Engineering, University of Florida, Gainesville, Florida 32611

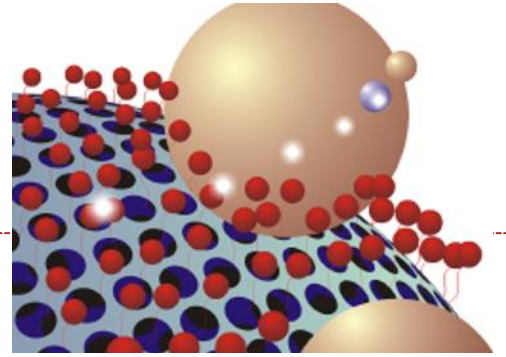
Superfice ingegnerizzata basata sulla microtopografia della pelle dello squalo

Sulla superficie nanostrutturata la prima colonizzazione appare **dopo 21 giorni**, mentre sulla superficie liscia di controllo, le colonie di biofilm di fase iniziale compaiono **dopo 7 giorni** e i biofilm maturi a 14 giorni.

A 14 giorni, la superficie nanostrutturata è ricoperta da ***S. aureus* per il 7% contro il 54%** della superficie di controllo.



Nanorivestimento delle SUPERFICI AMBIENTALI



Journal of Applied Microbiology

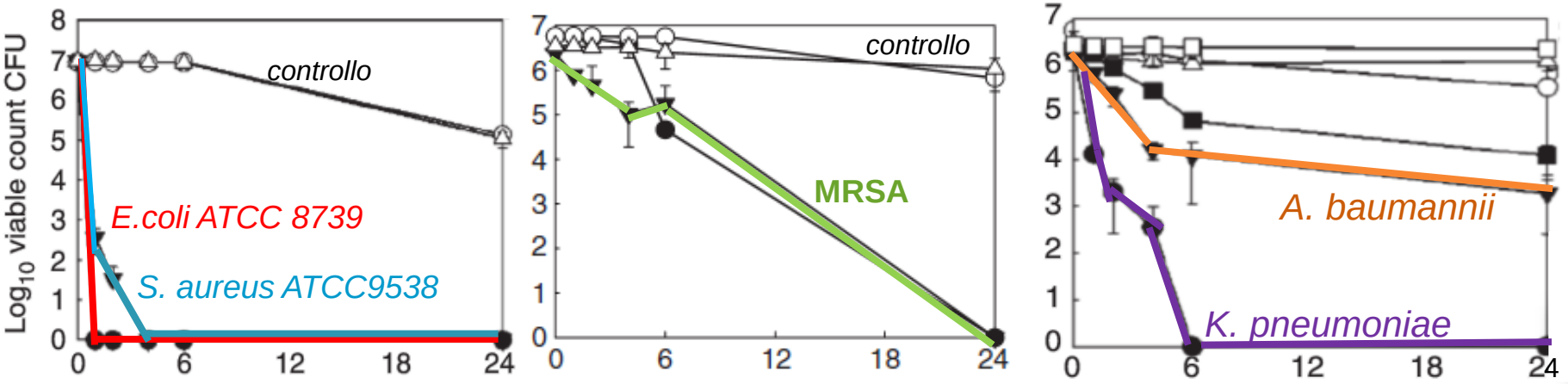
Journal of Applied Microbiology ISSN 1364-5072

Novel antibacterial silver-silica surface coatings prepared by chemical vapour deposition for infection control

S. Varghese[1], S. Elfakhri[1], D.W. Sheel[2,3], P. Sheel[3], F.J. Bolton[4] and H.A. Foster[1]

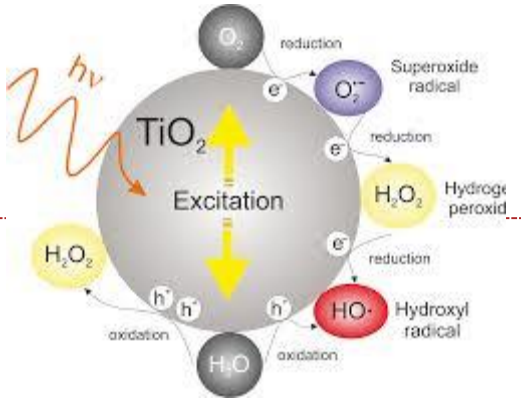
1 Centre for Parasitology and Disease Research, School of Environment and Life Sciences, University of Salford, Salford, UK
2 Materials and Physics Research Centre, University of Salford, Salford, UK
3 CVD Technologies Ltd., Manchester, UK
4 Health Protection Agency, Manchester, UK

Particelle di silicio rivestite di Ag depositate sulle superfici in vetro e ceramica: buona efficacia sui ceppi ATCC, minore sui ceppi clinici



-5 log *E.coli, S.aureus e K.pneumoniae* dopo 1-6h, **MRSA dopo 24h**.
-3 log per ***A.baumannii*** **dopo 24h**.

Nanorivestimento delle SUPERFICI AMBIENTALI



Nanotechnology, Science and Applications
Dovepress
open access to scientific and medical research
Open Access Full Text Article
ORIGINAL RESEARCH

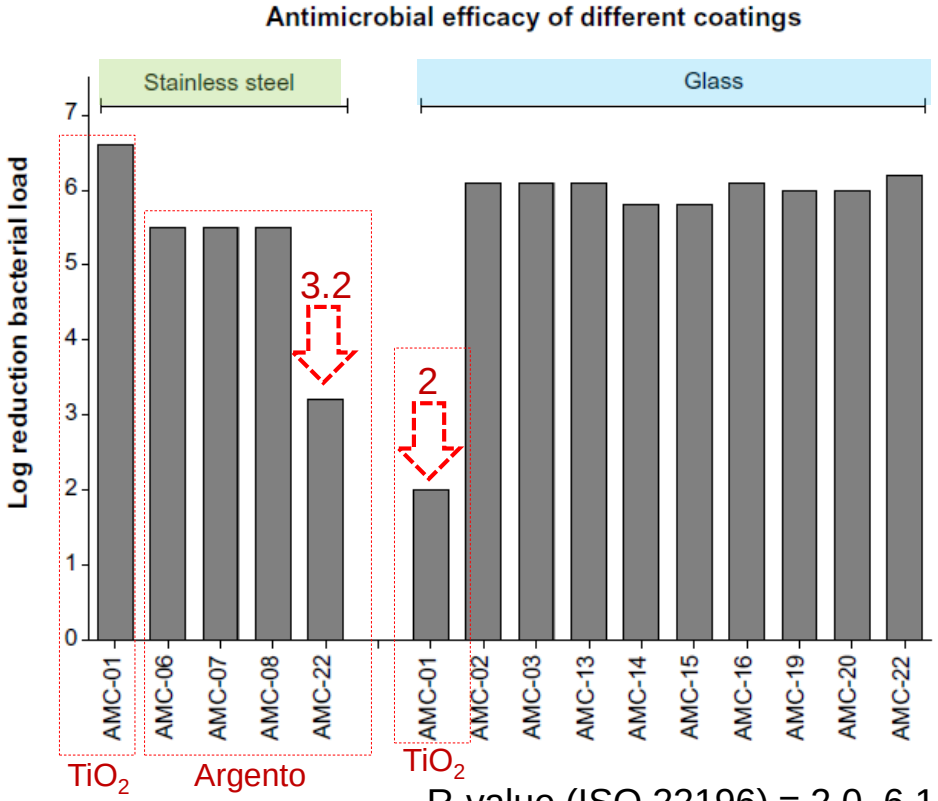
Comparative performance of a panel of commercially available antimicrobial nanocoatings in Europe

Johan W Molling
Jacques W Seezink
Birgit EJ Teunissen
Inhua Muijrers-Chen
Paul JA Borm

Zuyd University of Applied Sciences, Heerlen, the Netherlands

Nanorivestimenti in Ag o TiO2 attivato da UVA per la produzione specie reattive dell'ossigeno

L'efficacia dipende dal substrato sul quale viene applicato il rivestimento (acciaio vs vetro)



R-value (ISO 22196) = 2.0–6.1

I rivestimenti addizionati di biocidi

American Journal of Infection Control 42 (2014) 1178-81

Contents lists available at ScienceDirect

American Journal of Infection Control

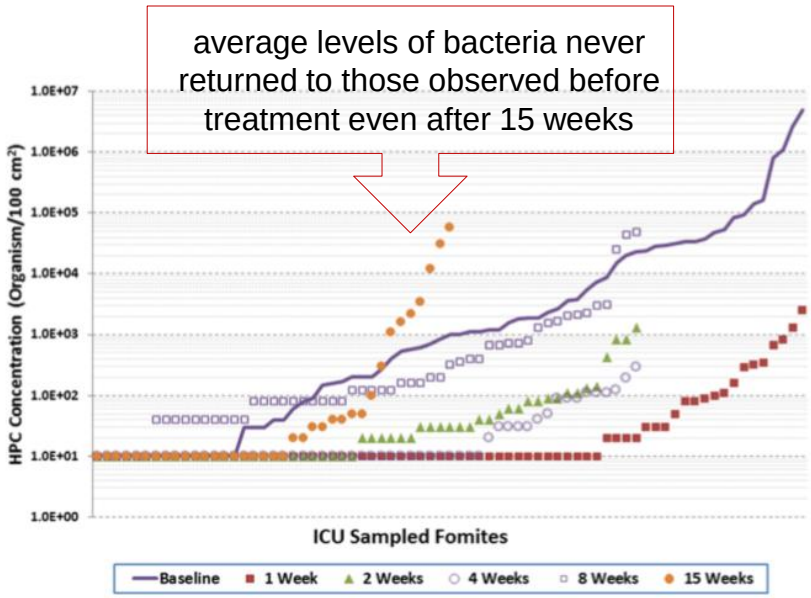
journal homepage: www.ajicjournal.org

Major article

Long-term efficacy of a self-disinfecting coating in an intensive care unit

Akrum H. Tamimi PhD, Sheri Carlino BS, Charles P. Gerba PhD*

Department of Soil, Water, and Environmental Science, University of Arizona, Tucson, AZ



Composti dell'ammonio quaternario addizionati all'organosilano, si legano alle superfici e **mantengono un'attività disinfettante residuale efficace**

The average bacterial count on all treated surfaces was **reduced by >99% (2 logs) for at least 8 weeks** after treatment.
MDRO were isolated at only 1 site during the 15 weeks after treatment.

Table 4
Isolation of antibiotic-resistant bacteria (percent of positive sites)

		Weeks after treatment				
Variable	Baseline*	1	2	4	8	15
Number of samples	95	81	64	64	64	45
VRE	14	0	0	0	1	0
MRSA	7	0	0	0	0	0
CRE	3	0	0	0	0	0
C difficile	0	0	0	0	0	0
Overall percentage	25	0	0	0	1.5	0

*Before treatment.

Nanorivestimento dei tessuti

Journal of Hospital Infection 95 (2017) 243e244

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Commentary

Antimicrobial coating innovations to prevent healthcare-associated infection

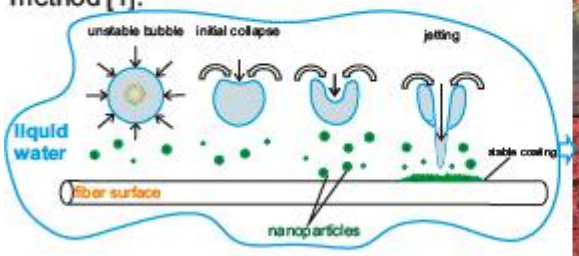
cost

Innovative coating solutions to prevent infectious diseases

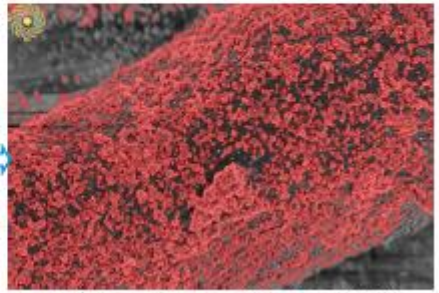
Cooperation in Science and Technology programme, European Commission

Sonocoating technology

High power ultrasounds, when acting on a liquid, cause formation of high number cavitation vaopur bubbles. After achieving a critical size, they collapse, leading to very high local pressures reaching several 100MPa. If the liquid is a colloidal suspensions of NPs, NPs close to implosion centre are violently pushed towards the surface, and strongly embedded on it (Pic. below). It is called „throwing stone" method [1].



Short explanation of sonocoating process



Stable coating on cotton fiber (SEM)

Utilizzo degli **ultrasuoni e delle microonde** per rendere il rivestimento (nanoparticelle di ZnO-Ag) resistente ai lavaggi

Le tecnologie no-touch

Due tipologie:

1. Utilizzo di **prodotti biocidi** (es. perossido di idrogeno)
2. Utilizzo di **onde elettromagnetiche** (es. radiazioni ultraviolette)

VANTAGGI

a) Alta **ripetibilità**, non dipendente dall'accuratezza dell'operatore
b) Personale non richiesto dopo l'attivazione del trattamento
c) Dispersione dell'agente attivo anche sui siti difficilmente raggiungibili
d) Decontaminazione **delle superfici e dell'aria**
e) Efficacia su microrganismi dotati di persistenza ambientale
f) Tracciabilità delle operazioni

SVANTAGGI

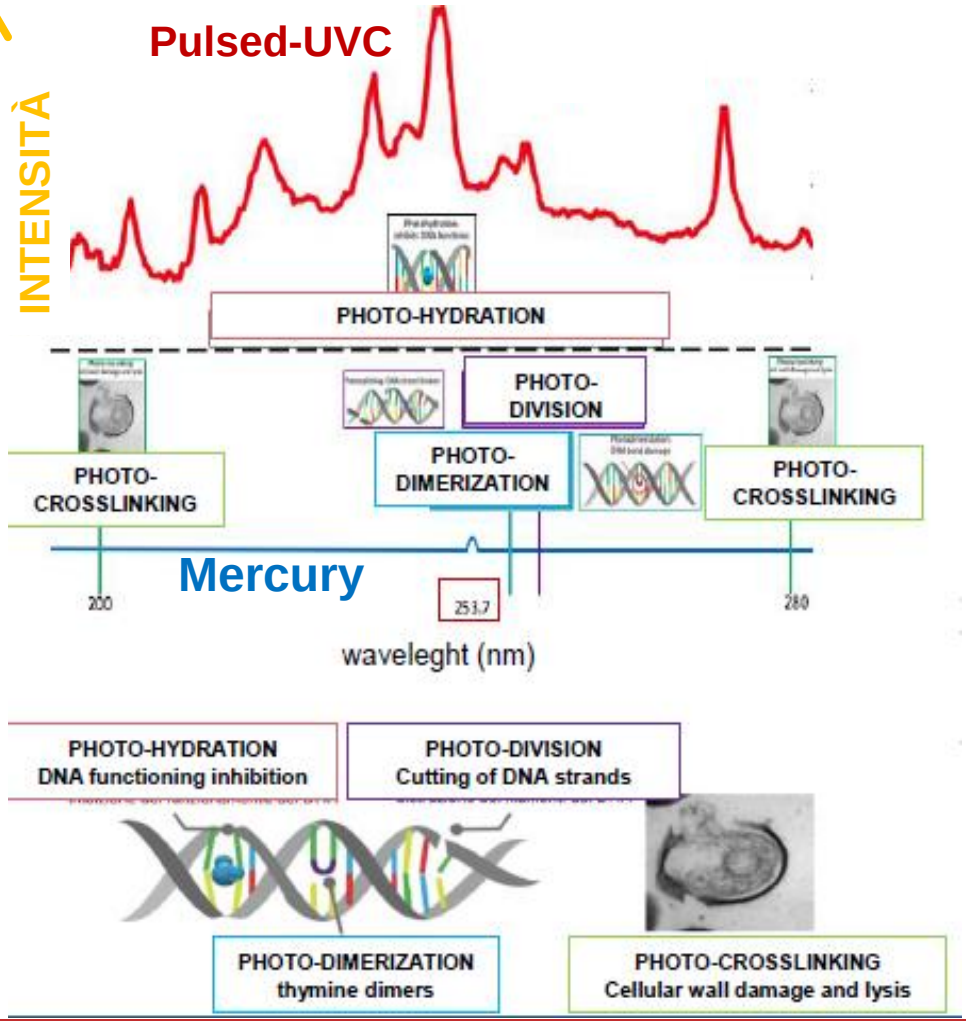
a) Ancora **scarse le evidenze** sull'efficacia antimicrobica e sulla riduzione delle ICA
b) Necessità di operare in **assenza di pazienti/operatori**
c) Necessità di **confinare l'ambiente** per i sistemi che utilizzano biocidi e di rispettare i tempi per l'accesso al locale (sicurezza per gli operatori)
d) Necessario verificare la **compatibilità** con i materiali
e) Necessaria la **formazione** specifica per il personale
f) Acquisire o noleggiare apparecchiature dedicate (aspetti organizzativi ed economici, con particolare riferimento al rapporto costo/efficacia).

Modificato da: C. Curtis, GIMPIOS Vol. 6, n. 3, luglio-settembre 2016

Le radiazioni elettromagnetiche UV-C

Ultraviolet radiation (UVC)

Pulsed-xenon UV (PX-UV)



- **LAMPADE IN QUARZO, CONTENENTI MERCURIO ELEMENTARE** e un gas inerte (argon): **UV-C 254 nm**, emissione **continua**.
  Riduzione 4 $\log_{10}$ di *C. difficile* in forma vegetativa, in **35-100 min** (Boyce JM, 2011; Rutala WA, 2010)

- **LAMPADE A GAS XENON (PX-UV):** ampio spettro di radiazioni UV-C (**100-280 nm**) e radiazioni dello spettro visibile (**380-700 nm**), emissione **pulsata** ad **elevata intensità.**
  Riduzione 4 $\log_{10}$ delle spore di *C. difficile,* **in 5 min** *(Boyce JM, 2011)*

Le radiazioni elettromagnetiche UV-C

Ultraviolet radiation (UVC)

Pulsed-xenon UV (PX-UV)

SENSORE DI MOVIMENTO
PER EVITARE L'INGRESSO

VANTAGGI

- Sistemi **automatizzati mobili** di facile collocazione
- **Non richiedono modifiche** alla ventilazione del locale
- **Non lasciano residui** dopo il trattamento
- Hanno **ampio spettro d'azione** e **tempi di esposizione rapidi** (dose in funzione della **dimensione** della stanza)
- **Non inducono resistenza**
- **Tracciabilità delle operazioni in wi-fi**

SVANTAGGI

- **Non penetrano plastica, vetro**, **superfici porose** (es. lenzuola, tende). **Minore efficacia nelle zone d'ombra.**
- L'esposizione deve essere **diretta o riflessa** (più cicli in luoghi diversi del locale)
- L'efficacia decade con il quadrato della **distanza**
- La **compatibilità** con i materiali deve essere valutata
- Variazioni di temperatura e umidità e **l'età del bulbo** influenzano la dose emessa e aumentano il tempo di esposizione richiesto
- **Rischio esposizione**
- Possono emettere **OZONO** (0,1ppm/8h, OSHA)

Le radiazioni elettromagnetiche UV-C

Radiazione UVC continua a 254 nm

Infect Control Hosp Epidemiol. 2017 Sep;38(9):1116-1117.

INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY

The Effect of Ultraviolet Light on *Clostridium difficile* Spore Recovery Versus Bleach Alone

Christina Liscynesky, MD;[1,2]
Lisa P. Hines, MACPR, BS, RN, CIC;[2]
Justin Smyer, MPH, MLS(ASCP)CM, CIC;[2]
Megan Hanrahan, MBOE, CLSSGB;[3]

TABLE 1. *Clostridium difficile* Culture Results: Effectiveness of Manual Cleaning Versus UV-C

	Post Bleach CFUs		Post UV-C CFUs	
Site	≥10 CFUs	<10 CFUs	≥10 CFUs	<10 CFUs
Over-bed table	13	41	0	54
Toilet seat	9	65	0	74
Computer keyboard	3	19	1	43
Bathroom doorknob	2	20	0	22
Faucet handles	2	39	0	41
Bed side rails	1	3	0	4
Bedside commode	1	11	0	12
Recliner chair table	1	6	0	7
Call light	0	2	0	2

NOTE. CFU, colony-forming units; UV-C, ultraviolet light at 254 nanometers.

One emitter runs for **10 min in the bathroom**, then **3 connected emitters** run for **45 min in the patient room**.

A laser measures the space and **calculate the required disinfection cycle time**

32 of 238 (**13%) were positive after bleach cleaning** for *C. difficile*. **After UV-C treatment, only 1 of 238 high-touch surfaces (0.4%)** was positive: 1 computer **keyboard**

Le radiazioni elettromagnetiche UV-C

American Journal of Infection Control 44 (2016) 416-20

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Postdischarge decontamination of MRSA, VRE, and *Clostridium difficile* isolation rooms using 2 commercially available automated ultraviolet-C–emitting devices

Titus Wong MD, MHSc, FRCPC [a,b,1], Tracey Woznow BSc, BEd(Sec) [a], Mike Petrie [c], Elena Murzello BScN, MBA [d], Allison Muniak MASc [d], Amin Kadora MBA [e], Elizabeth Bryce MD, FRCPC [a,b,*,1]

Adjusted odds of bacterial growth obtained from multivariable model of growth of MRSA or VRE in protein broth after UVC disinfection on stainless steel carriers

Variables	OR	95% Confidence interval
Machine		
1	Reference	–
2	6.96	3.79-13.35
Organism		
MRSA	Reference	
VRE	1.40	0.79-2.50
Surface		
Bed	Reference	–
Closet	2.04	1.06-4.00
Sink	20.50	9.19-49.54
Concentration	3.52	2.49-5.13

Abbreviations: *MRSA*, methicillin-resistant *Staphylococcus aureus*; *OR*, odds ratio; *UVC*, ultraviolet-C; *VRE*, vancomycin-resistant enterococci.

Their ability to disinfect high concentrations of organisms **vary in the presence of proteins**

Radiazione UVC continua a 254 nm

After Standard Protocol:
MRSA 27.9%, VRE 29.5% e CD 22.7%
After UVC-disinfection:
MRSA 3.3%, VRE 4.9% e CD 0%
(P = .0003)

Machine 1: 14 minutes at 46,000 uWs/cm^2
(one device, 1 cycle, 4 dose detectors)

Machine 2: 35 minutes at 12,000 uWs/cm^2
for a regular setting and **57 minutes at 22,000 uWs/cm^2** for the sporicidal cycle.
(one device, 1 cycle)

Le radiazioni elettromagnetiche UV-C

Journal of Hospital Infection 97 (2017) 180–184

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Comparison of two whole-room ultraviolet irradiation systems for enhanced disinfection of contaminated hospital patient rooms☆

S. Ali[a], S. Yui[a], M. Muzslay[a], A.P.R. Wilson[b,*]

[a] Environmental Microbiology Research Laboratory, University College London Hospitals, London, UK
[b] Department of Microbiology, University College London Hospitals, London, UK

Radiazione UVC continua a 254 nm

Efficacia condizionata dalla presenza di residui organici

Turnaround and duration of individual decontamination processes during terminal cleaning and ultraviolet (UV) disinfection using alternative systems

Phase of decontamination episode	Time required (min), mean (±SD)	
	Surfacide® Helios™	Ultra-V™
Duration for domestic team to attend	59 (±33)	48 (±32)
Terminal clean cycle	95 (±35)	81 (±34)
Time to set up UV device[a]	20 (±6)	28 (±6)
UV disinfection cycle	42 (±11)	36 (±6)
Time to vacate (post-UV cycle)[b]	7 (±5)	5 (±3)
Total: decontamination without UV	154 (±33)	120 (±12)
Total: decontamination including UV disinfection	215 (±33)	199 (±17)

[a] Includes transport of equipment to the site and set-up/arrangement of the UV system.
[b] Time required for removing all UV equipment and returning room to original state for patient accommodation.

Tempo di trattamento: 42±11; 36±6 min

Both systems:

- Reduction of contamination in 8/14 (**57%**) and 11/14 (**79%**) sites.
- **4-5 $\log_{10}$ reductions in MRSA and K. pneumoniae at low soiling**.
- Lower and more variable $\log_{10}$ reductions when heavy soiling was present.
- **Between 0.1 and 4.8 $\log_{10}$ reductions in *C. difficile* spores with low but not heavy soil challenge.**

Le radiazioni elettromagnetiche UV-C

Pulsed-xenon UV (PX-UV)

American Journal of Infection Control 44 (2016) e157-e161

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major Article

Evaluation of a pulsed xenon ultraviolet light device for isolation room disinfection in a United Kingdom hospital

Ian Hosein MD, MBA [a,*], Rosie Madeloso MSc [a], Wijayaratnam Nagaratnam BMS [a], Frank Villamaria MPH [b], Eileen Stock PhD [c,d], Chetan Jinadatha MD, MPH [b,d]

[a] Barking, Havering and Redbridge University Hospitals National Health Service Trust, London, UK
[b] Central Texas Veterans Health Care System, Temple, TX
[c] Center for Applied Health Research, Temple, TX
[d] College of Medicine, Texas A&M University Health Science Center, Bryan, TX

Proportion of samples with CFU present at baseline, after terminal cleaning, and after PX-UV disinfection, overall and by surface location (39 rooms)

Surface location	No. of pairs	Baseline, n (%)	Terminal clean, n (%), *P* value*	PX-UV, n (%), *P* value*
Bedrail	28	26 (92.9)	10 (35.7), <.01	2 (7.1), .01
Tray table	39	29 (74.4)	17 (43.6), <.01	3 (7.7), <.01
Bathroom handrail	39	32 (82.1)	23 (59.0), .02	7 (18.0), <.01
Toilet Seat	39	35 (89.7)	26 (66.7), .01	12 (30.8), <.01
Bathroom faucet	39	36 (92.3)	27 (69.2), .01	6 (15.4), <.01
Combined	184	158 (85.9)	103 (56.0), <.01	30 (16.3), <.01

CFU, colony forming units; *PX-UV*, pulsed xenon ultraviolet.
*Change in presence assessed with McNemar test, assuming a type I error of $\alpha = 0.05$.

Radiazione UVC pulsata

5-log reduction of MRSA, VRE, *Acinetobacter* spp. and CRE **after 20 min treatment increased reduction of 17%** (one device, 2 cycle)

Time for PX-UV device deployment (31 rooms)

Process	Mean ± SD (min)	Median (min-max) (min)
Transport to room time	24.8 ± 17.9	20 (10-100)
Retrieval time	7.1 ± 3.2	5 (0-15)
Waiting time for use	17.7 ± 17.6	10 (5-90)
In-room use time	21.4 ± 15.4	20 (5-86)
Return to storage time	13.2 ± 16.8	6 (0-70)
Total time	59.4 ± 27.7	50 (35-135)

max, maximum; *min*, minimum; *PX-UV*, pulsed xenon ultraviolet.

Le radiazioni elettromagnetiche UV-C

Pulsed-xenon UV (PX-UV)

Radiazione UV-C pulsata

El Haddad *et al. BMC Infectious Diseases* (2017) 17:672
DOI 10.1186/s12879-017-2792-z

BMC Infectious Diseases

RESEARCH ARTICLE Open Access

Evaluation of a pulsed xenon ultraviolet disinfection system to decrease bacterial contamination in operating rooms

Lynn El Haddad[1], Shashank S. Ghantoji[1], Mark Stibich[1,2], Jason B. Fleming[3], Cindy Segal[4], Kathy M. Ware[1] and Roy F. Chemaly[1*]

Sufficienti **2 minuti** per ottenere un **ulteriore riduzione del 70%** della contaminazione microbica dopo l'applicazione del Protocollo Standard

RAPIDO TOURN OVER DELLA SALA OPERATORIA

Table 2 Efficacy of 1-, 2-, and 8-min PX-UV disinfection cycle times in reducing operating room contamination

Timing of sampling	Samples taken (*n*)	Colony count (c.f.u.)				Reduction[a] (%)	*P*-value
		Mean	Min	Max	IQR		
Pre PX-UV (all cycles combined)	147	3.19	0	55	3	–	–
Post 1-min PX-UV	50	1.70	0	14	2	46.7	0.5940
Post 2-min PX-UV	49	0.88	0	9	1	72.5	0.0328
Post 8-min PX-UV	49	0.86	0	7	1	73.1	0.0075

[a]Reduction of mean colony count after PX-UV in comparison with pre-PX-UV mean colony count. PX-UV, pulsed xenon ultraviolet; IQR, Interquartile range; c.f.u., Colony-forming units; min, minimum; max, maximum

L'efficacia della disinfezione Pulsed UV (PX-UVC)

Pulsed-xenon UV (PX-UV)

American Journal of Infection Control 43 (2015) 415-7

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Brief report

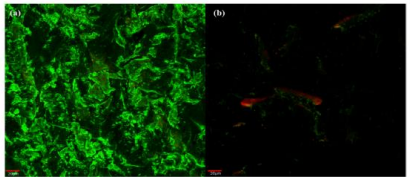
Can pulsed xenon ultraviolet light systems disinfect aerobic bacteria in the absence of manual disinfection?

Chetan Jinadatha MD, MPH[a,b,*], Frank C. Villamaria MPH[a,c], Nagaraja Ganachari-Mallappa PhD[a], Donna S. Brown RN[a], I-Chia Liao BS[a,c], Eileen M. Stock PhD[b,d], Laurel A. Copeland PhD[a,b,c,d], John E. Zeber PhD[a,b,c,d]

[a] Department of Medicine, Central Texas Veterans Healthcare System, Temple, TX
[b] Department of Medicine, College of Medicine, Texas A&M Health Science Center, Bryan, TX
[c] Health Promotion & Community Health Science and Department of Epidemiology and Biostatistics, School of Public Health, Texas A&M University, College Station, TX
[d] Department of Internal Medicine, Center for Applied Health Research, Temple, TX

Radiazione UV-C pulsata

Efficace anche in
assenza di preliminare detersione



EFFICACE ANCHE SUI BIOFILM SECCHI?
Almatroudi A., JHI 216

Mean aerobic bacterial colony (ABC) counts from high-touch surfaces before and after application of pulsed xenon-based ultraviolet light (PX-UV) disinfection systems in the absence of manual cleaning

Location	No. of samples	ABC before PX-UV	ABC after PX-UV	ABC reduction	*P* value[a]
Call button	38	88.5 ± 68.7 76 (5, 200) (21-122)	16.1 ± 33.0 4 (0, 161) (1-12)	72.4 ± 64.8 66 (−52, 199) (19-108)	<.01
Bedrail	38	84.0 ± 70.3 42 (7, 200) (32-125)	13.0 ± 17.2 5.5 (0, 70) (2-18)	71.0 ± 66.6 35 (−6, 200) (20-112)	<.01
Tray table	38	54.5 ± 62.9 23 (1, 200) (12-67)	13.3 ± 17.0 7.5 (0, 79) (1-22)	41.2 ± 61.8 15.5 (−24, 200) (8-45)	<.01
Bathroom handrail	38	60.7 ± 56.3 35 (0, 200) (16-95)	16.1 ± 32.9 6.5 (0, 200) (3-16)	44.6 ± 62.1 30.5 (−171, 194) (9-79)	<.01
Toilet seat	38	80.2 ± 81.0 46 (0, 200) (11-200)	40.6 ± 59.3 13 (0, 200) (2-45)	39.6 ± 69.7 14 (−70, 199) (1-61)	<.01
Overall	190	73.6 ± 69.0 47 (0, 200) (19-113)	19.8 ± 36.6 6 (0, 200) (2-20)	53.8 ± 66.1 28.5 (−171, 200) (10-90)	<.01

NOTE. Values are presented as mean ± SD (top values) and median (minimum, maximum; interquartile range) (bottom values).
[a]Wilcoxon signed-rank tests were employed, assuming a significance level of $\alpha = 0.05$.

L’efficacia della disinfezione Pulsed UV (PX-UVC)

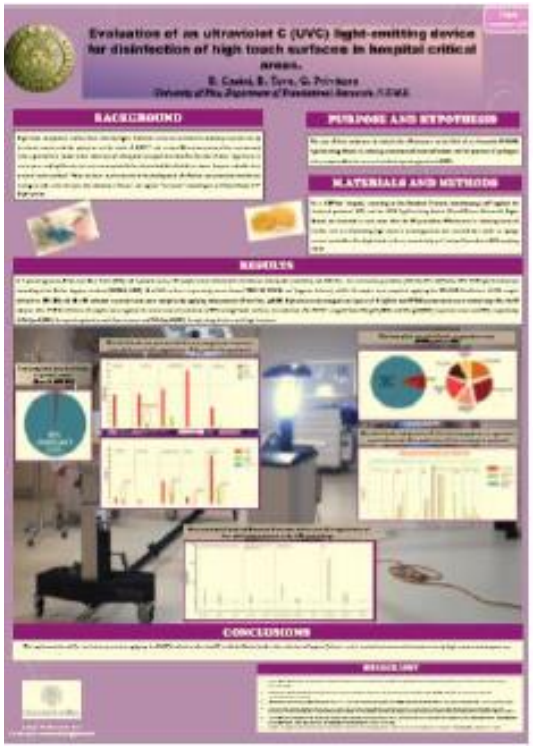
Pulsed-xenon UV (PX-UV)

The 11th Healthcare Infection Society International Conference

Liverpool, 26-28 November 2018

Healthcare Infection Society

Radiazione UV-C pulsata



104: Evaluation of an ultraviolet C (UVC) light-emitting device for disinfection of high touch surfaces in hospital critical areas

Casini B[1], Tuvo B[1], Privitera G[1]

[1]*University of Pisa, Department Of Translational Research And New Technologies In Medicine And Surgery*

Poster Talk 2 (Mon 26 Nov 17:15 - 18:15), Exhibition Hall

PROTOCOLLO

Protocollo di sanificazione

Protocollo Operativo Standard: Servizio in appalto e personale OSS, Soluzione detergente-disinfettante (cloro attivo 2,8%, tensioattivi 0,5 gr) e disinfettante (cloro attivo 2,8%).

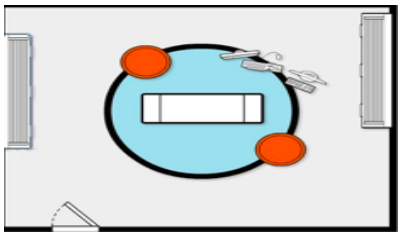
Protocollo Pulsed UV (PX-UVC)

UTI - Stanze di degenza

➢Due esposizioni da 5 min, ai lati del letto del paziente

Sale operatorie

➢Due esposizioni da 10 min, ai lati del tavolo operatorio



DOVE:

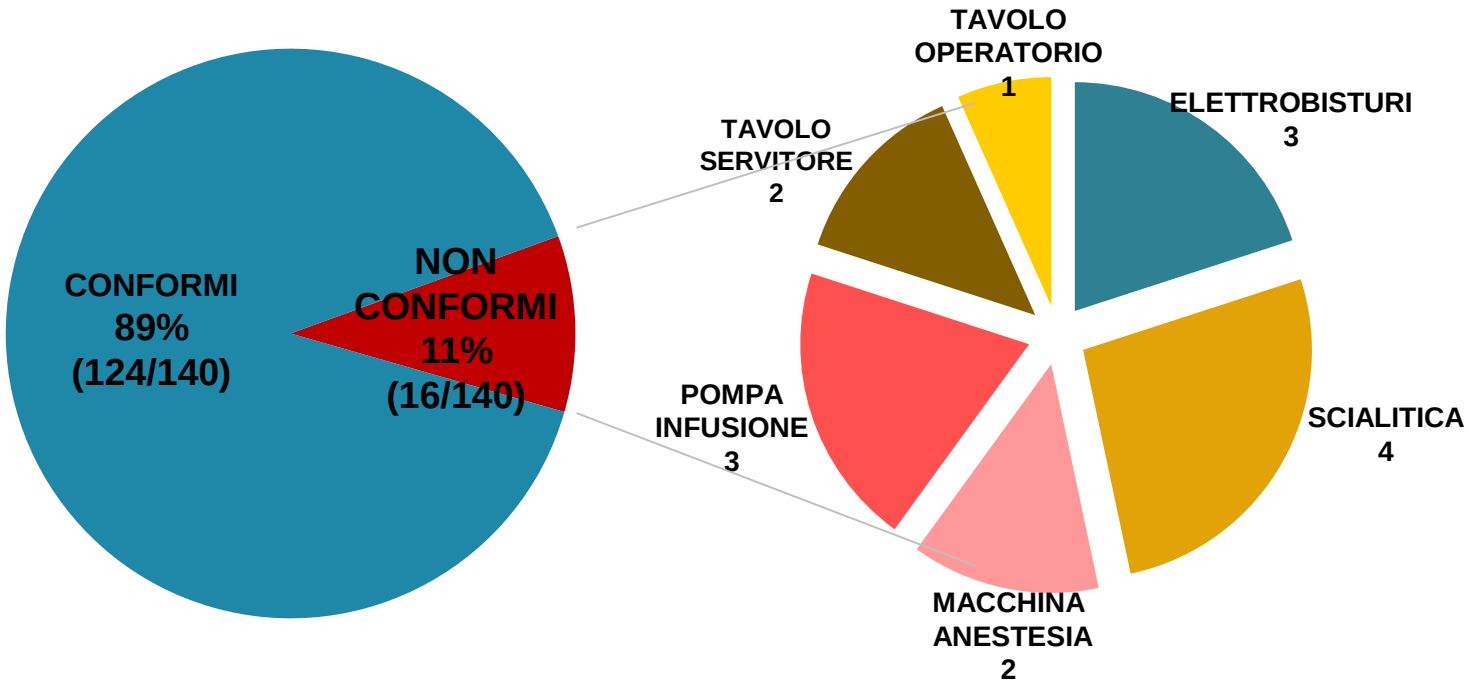
9 SALE OPERATORIE

2 TERAPIE INTENSIVE

5 DEGENZE
- 2 *C. difficile*
- 3 KPC Producing-*Klebsiella pneumoniae*
- 1 ESBL *Klebsiella pneumoniae*

L’efficacia della disinfezione Pulsed UV (PX-UVC)

RISULTATI: SALE OPERATORIE

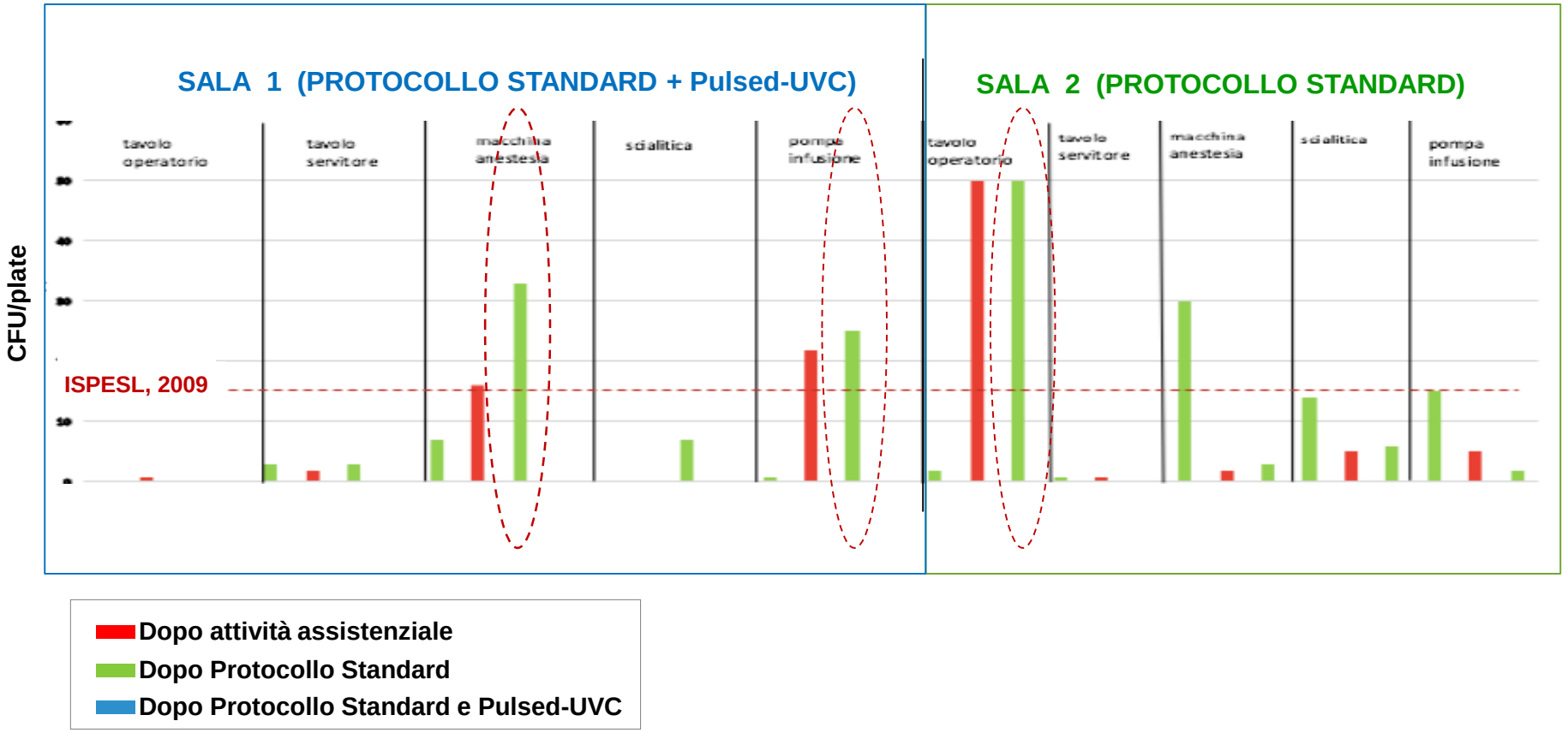


Tutte le non-conformità sono state rilevate dopo Protocollo Standard

Non conformità rispetto ai limiti delle Linee guida ISPESL, ”Linee guida sugli standard di sicurezza e di igiene del lavoro nel reparto operatorio“, 2009.

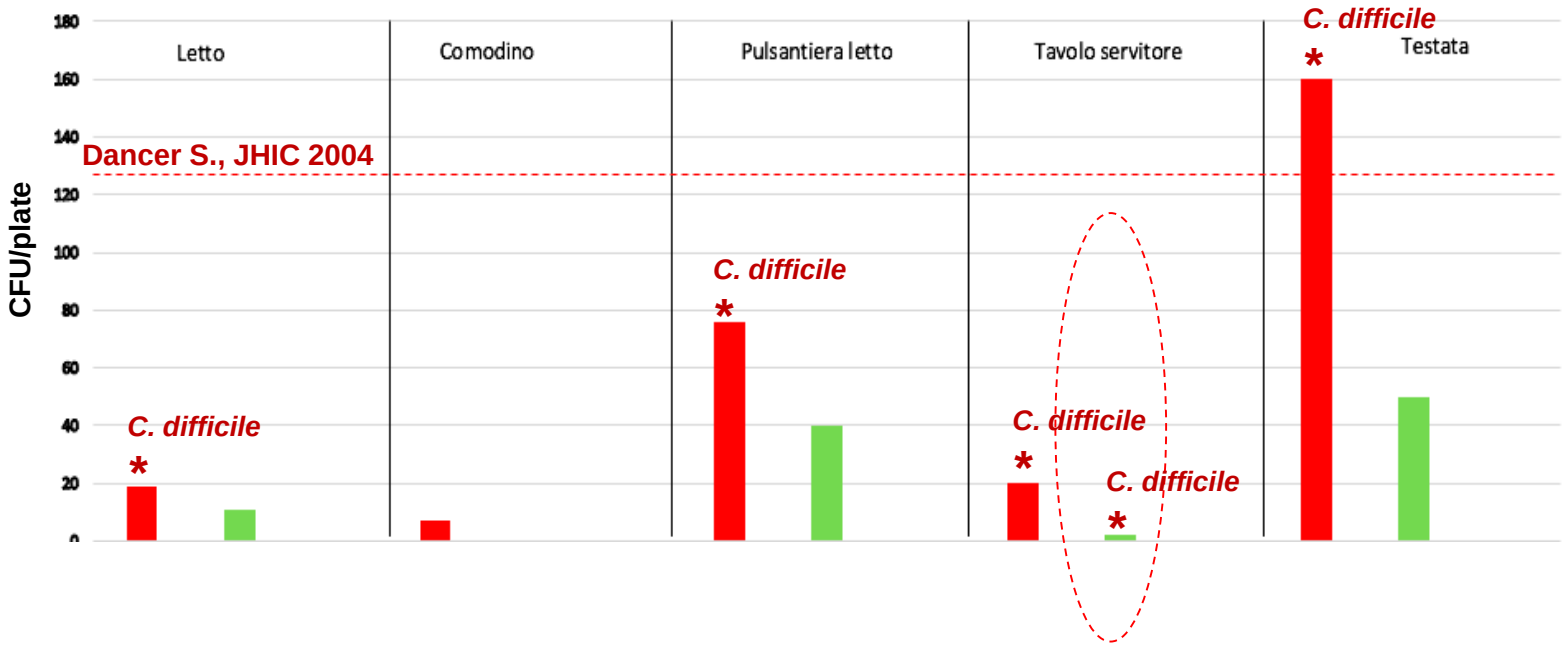
L’efficacia della disinfezione Pulsed UV (PX-UVC)

RISULTATI: SALE OPERATORIE (A BASSA TURNAZIONE)



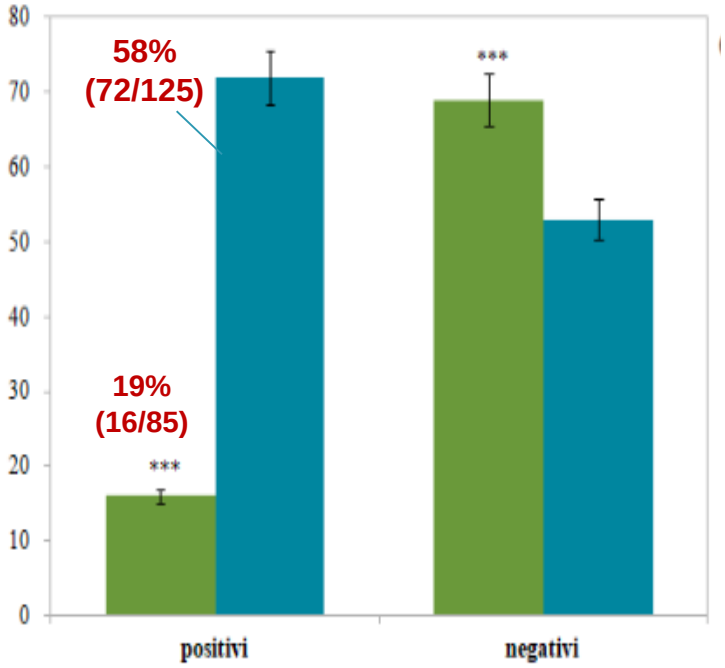
L’efficacia della disinfezione Pulsed UV (PX-UVC)

RISULTATI: STANZE DEGENZA

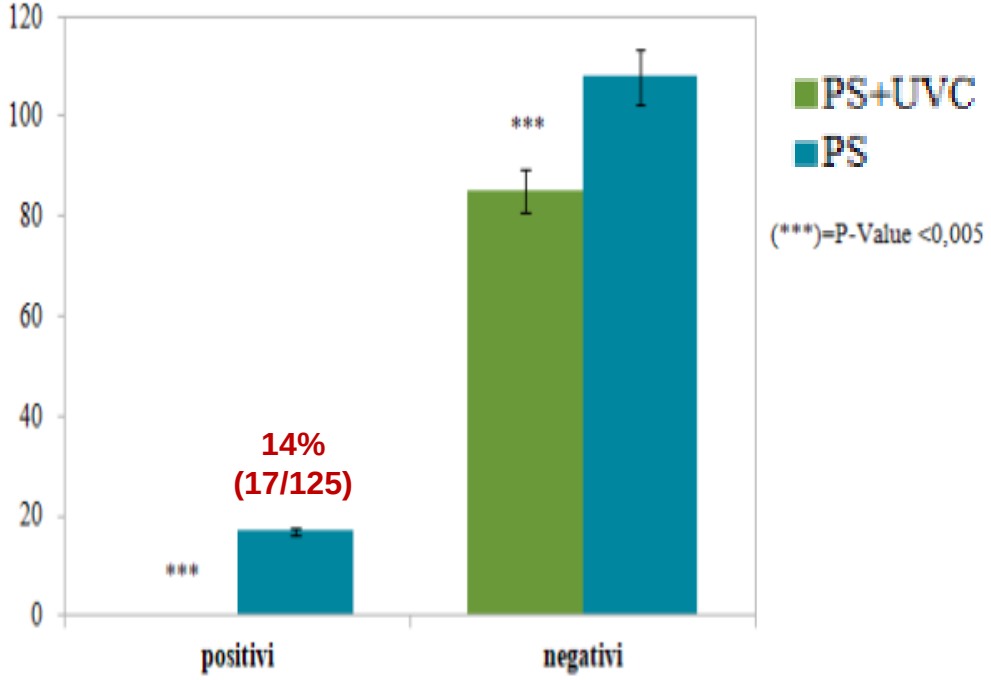


L’efficacia della disinfezione Pulsed UV (PX-UVC)

Siti positivi per carica microbica totale



Non conformità



HTA (GRADE rating evaluation) on automated UV-C disinfection in HAIs prevention

Ultraviolet radiation (UVC)

Pulsed-xenon UV (PX-UV)

Health Quality Ontario

Let's make our health system healthier

Ontario
Health Quality Ontario

Published February 2018
Volume 18, Number 1

ONTARIO HEALTH TECHNOLOGY ASSESSMENT SERIES

Portable Ultraviolet Light Surface-Disinfecting Devices for Prevention of Hospital-Acquired Infections: A Health Technology Assessment

8 rooms/device daily
321-347 $/day

HAI cost: 12197$
(Friedman C., 2016)

What Did This Health Technology Assessment Find?

We can't be certain of the effectiveness of ultraviolet light disinfection in reducing hospital-acquired infections, given the very low to low quality of evidence. We estimated that the typical cost for a hospitals that purchases two portable devices would be $586,023 over 5 years for devices that use the pulsed xenon technology and $634,255 over 5 years for devices that use the mercury technology. Our budget impact estimates change the most if we vary our assumptions about the number of portable ultraviolet light disinfecting devices purchased per hospital, frequency of daytime use, and staff time required per use.

Table 15: Base Case Results of Budget Impact Analysis

Type of Cost (in 2017 CAD)	Year 1	Year 2	Year 3	Year 4	Year 5	Total (5 Years)
Mercury bulb device						
UV device cost	249,034	0	0	0	0	249,034
Maintenance/warranty cost	0	26,712	26,712	26,712	26,712	106,848
Staff/operating cost	55,675	55,675	55,675	55,675	55,675	278,373
Total budget impact	**304,708**	**82,387**	**82,387**	**82,387**	**82,387**	**634,255**
Xenon bulb device						
UV device cost	284,650	0	0	0	0	284,650
Maintenance/warranty cost	0	0	0	0	23,000	23,000
Staff/operating cost	55,675	55,675	55,675	55,675	55,675	278,373
Total budget impact	**340,324**	**55,675**	**55,675**	**55,675**	**78,675**	**586,023**

Abbreviations: CAD, Canadian dollars; UV, ultraviolet.

L'efficacia della disinfezione Pulsed UV (PX-UVC)

Pulsed-xenon UV (PX-UV)

HAIs REDUCTION

Lancet 2017; 389: 805–14

Enhanced terminal room disinfection and acquisition and infection caused by multidrug-resistant organisms and *Clostridium difficile* (the Benefits of Enhanced Terminal Room Disinfection study): a cluster-randomised, multicentre, crossover study

Deverick J Anderson, Luke F Chen, David J Weber, Rebekah W Moehring, Sarah S Lewis, Patricia F Triplett, Michael Blocker, Paul Becherer, J Conrad Schwab, Lauren P Knelson, Yuliya Lokhnygina, William A Rutala, Hajime Kanamori, Maria F Gergen, Daniel J Sexton; for the CDC Prevention Epicenters Program

Multicenter cluster randomized controlled crossover trial at nine hospitals in USA
31226 patients

Lancet Infect Dis 2018; 18: 845–53

Effectiveness of targeted enhanced terminal room disinfection on hospital-wide acquisition and infection with multidrug-resistant organisms and *Clostridium difficile*: a secondary analysis of a multicentre cluster randomised controlled trial with crossover design (BETR Disinfection)

Deverick J Anderson, Rebekah W Moehring, David J Weber, Sarah S Lewis, Luke F Chen, J Conrad Schwab, Paul Becherer, Michael Blocker, Patricia F Triplett, Lauren P Knelson, Yuliya Lokhnygina, William A Rutala, Daniel J Sexton, for the CDC Prevention Epicenters Program

The incidence of target organisms (*C. difficile* e VRE) among exposed patients was significantly lower after adding UV to standard cleaning strategies

Le radiazioni elettromagnetiche UV-C

American Journal of Infection Control 44 (2016) 1089-94

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

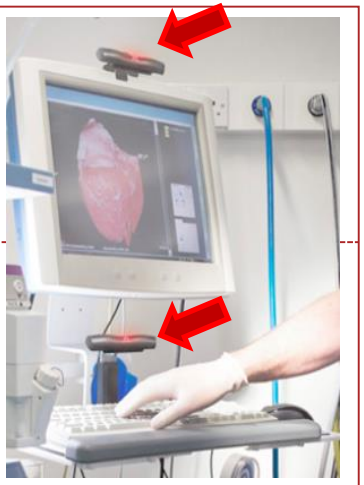
Major Article

Evaluating the effectiveness of ultraviolet-C lamps for reducing keyboard contamination in the intensive care unit: A longitudinal analysis

Andrew Gostine MD, MBA [a,*], David Gostine BS [b], Cristina Donohue MD [b], Luke Carlstrom MD [c]

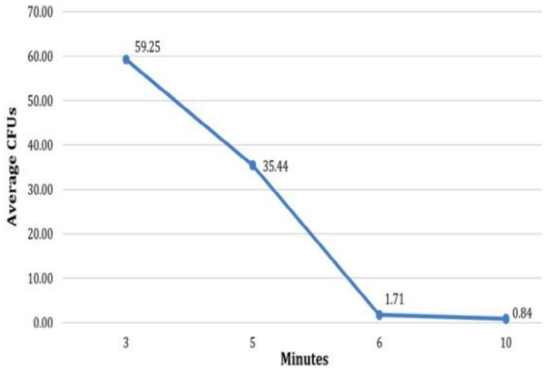
[a] Northwestern Memorial Hospital, Chicago, IL
[b] Medstar Georgetown University Medical Center, Washington, DC
[c] Presence Resurrection Medical Center, Chicago, IL

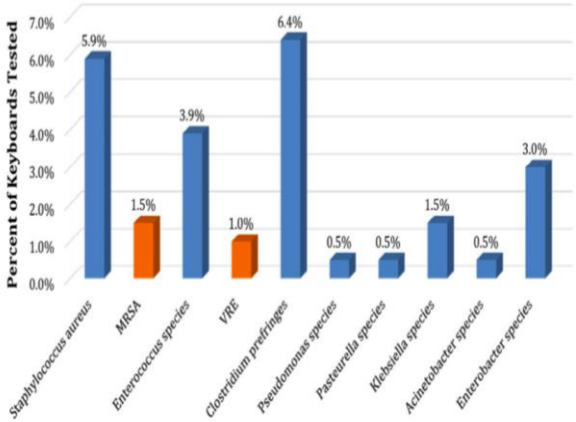
Radiazione UVC 254 nm attivata in continuo



6-minute every hour light is interrupt if keyboard use is required

Comparison of pre- and post-UV decontamination median CFU values revealed a **>99% reduction in bacteria.** The UV lamp effectively decontaminates keyboards with minimal interruption and **low UV exposure**





UVC exposure calculation

Metric	6-min cycle/90-s delay
Average daily cycles initiated	83.51 cycles
Average cycle interruption rate, %	54.64
Average daily interruptions	45.63 cycles
Average interruptions per 8-h period	15.21 cycles
Maximum UVC exposure per interruption, s	1
Average UVC exposure per 8-h period, s	15.21
NIOSH UVC (60 μW/cm^2) limit per 8-h period, s	100
Percent of NIOSH limit	15.21% of NIOSH limit

NIOSH, National Institute for Occupational Safety and Health; *UVC*, ultraviolet-C.

Le radiazioni elettromagnetiche UV-A

Journal of Hospital Infection 76 (2010) 247–251

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Environmental decontamination of a hospital isolation room using high-intensity narrow-spectrum light

M. Maclean [a,*], S.J. MacGregor [a], J.G. Anderson [a], G.A. Woolsey [a], J.E. Coia [b], K. Hamilton [b], I. Taggart [b], S.B. Watson [b], B. Thakker [b], G. Gettinby [c]

[a] Robertson Trust Laboratory for Electronic Sterilisation Technologies (ROLEST), University of Strathclyde, Glasgow, UK
[b] Glasgow Royal Infirmary, Glasgow, UK
[c] Department of Mathematics and Statistics, University of Strathclyde, Glasgow, UK

Riduzione del 90% di *S.aureus* (anche MRSA) in assenza di pazienti in un Centro Grandi Ustionati. **La riduzione scende al 56-86% in presenza di pazienti con ferite infette stafilococchi**

Journal of Hospital Infection 88 (2014) 1–11

Available online at www.sciencedirect.com

Journal of Hospital Infection

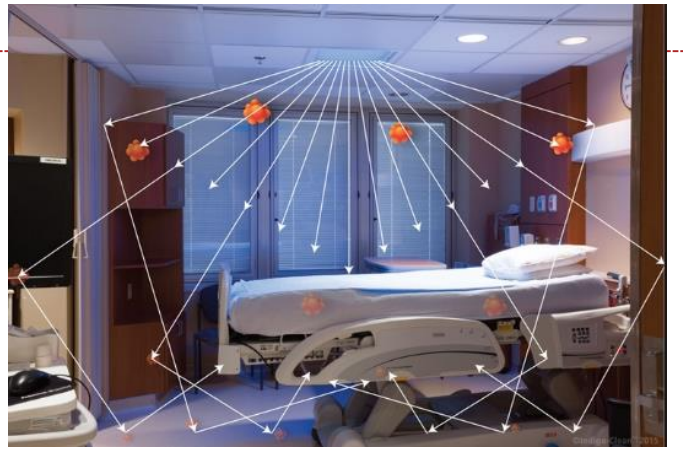
journal homepage: www.elsevierhealth.com/journals/jhin

Review

405 nm light technology for the inactivation of pathogens and its potential role for environmental disinfection and infection control

M. Maclean [a,*], K. McKenzie [a], J.G. Anderson [a], G. Gettinby [b], S.J. MacGregor [a]

[a] The Robertson Trust Laboratory for Electronic Sterilisation Technologies, University of Strathclyde, Glasgow, UK
[b] Department of Mathematics and Statistics, University of Strathclyde, Glasgow, UK



Radiazione UV-A continua emessa da LED a 405 nm

VANTAGGI

- Può essere utilizzata **in presenza del paziente/operatore** ai livelli di irradiazione raccomandati (150 a 2000 J/m^2; Hooke RJ, PPS 2017).
- Azione intracellulare con attivazione dello stress ossidativo, anche nei confronti delle **spore**
- **Non induce resistenza**
- L'efficacia **non decade** con la distanza
- Elevata **compatibilità con i materiali**
- Può penetrare la **plastica, il vetro e i tessuti**

Vapore o aerosol di perossido di idrogeno

ATTIVITÀ

•Produzione del **radicale idrossilico** da **30-35% H_2O_2** (**vapore**) **5-12% H_2O_2** (**aerosol**). **Particelle da 0.5 a 10 µm.**

•Attivo su un **ampio spettro** di microrganismi, anche MDRO; meno sensibili batteri produttori di **catalasi e perossidasi**.

•L'attività più elevata in fase gassosa (**vapore saturo**), spesso potenziata per **sinergismo da ioni metallici (Ag)**, **ac. peracetico**, dal **calore**, dall'energia **ultrasonica**

VANTAGGI

•**Compatibile** con la maggior parte dei materiali.

•Efficace anche sui **materiali porosi** (tessuti)

•**Biodegradabile**: il vapore viene rimosso per **conversione catalitica attiva (H_2O, O_2)**; l'aerosol per deposizione passiva.

•Sistemi automatici con **tracciabilità** delle operazioni

•Apparecchi conformi alle **normative europee** (**NF T 72-281**)

SVANTAGGI

•**Vietata la presenza di persone** nel locale in corso di trattamento

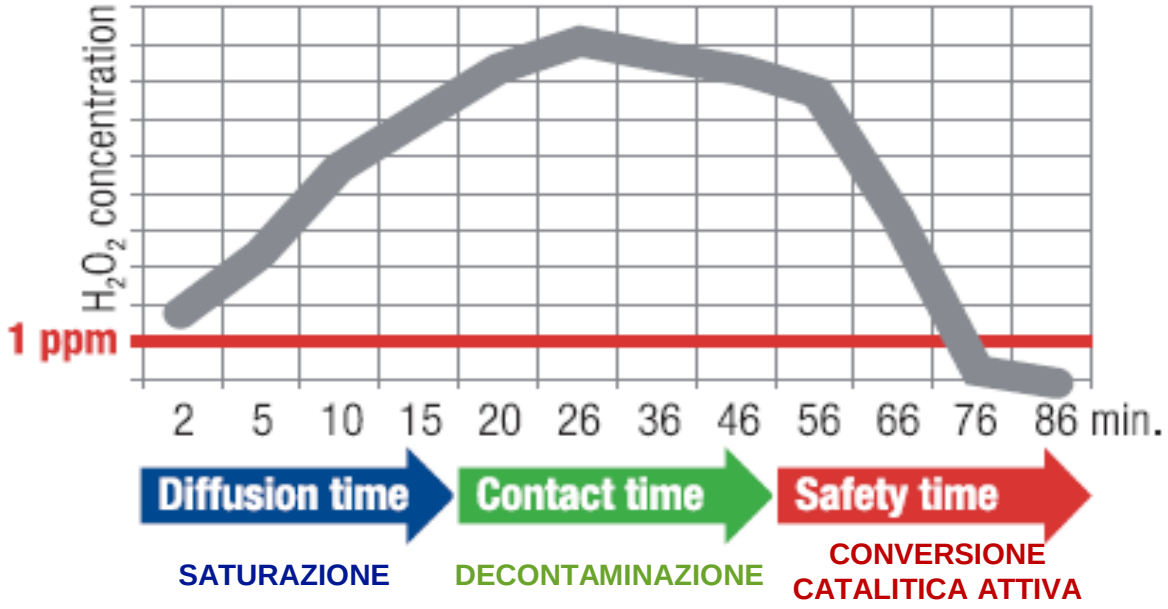
•Per i sistemi a vapore è necessario **confinare l'ambiente**

•È necessario rispettare **i tempi per l'accesso al locale** (H_2O_2 < 1ppm=1,4 mg/m^3). Nei sistemi a vapore la conversione catalitica riduce i tempi di decadimento

Vapore o aerosol di perossido di idrogeno

- Trattamento di locali **fino a 300 m³**
- **Processo automatico**
- **Avvio ritardato**
- **Portata costante** del prodotto
- **Tracciabilità** su chiave USB
- Identificazione del **locale e dell'addetto** mediante lettore di codice a barre

Ciclo completo di decontaminazione



NECESSARIO MONITORAGGIO RESIDUI ACGIH TLV-TWA <1ppm = 1,4 mg/m3

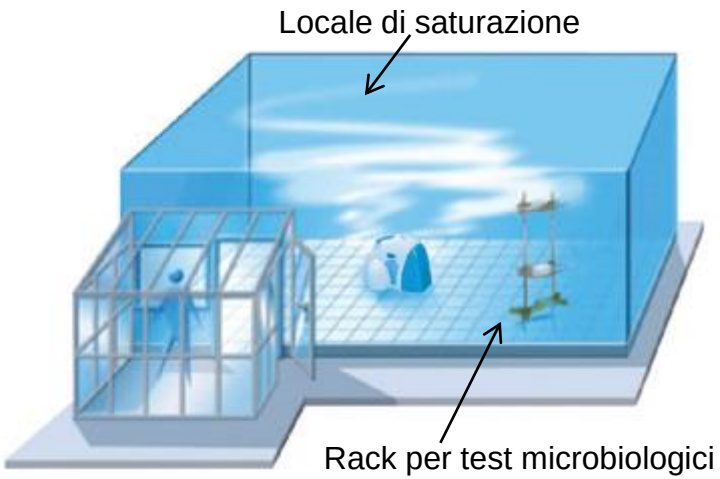
H_2O_2 detector

Standard NF-T 72-281, AFNOR 2014

Lo Standard fornisce il metodo di prova per valutare il **sistema Nebulizzatore/biocida** come efficacia nella disinfezione delle superfici per via aerea.

PATHOGENS	STRAINS	Logarythm reduction objectives specified by NF T72-281: 2014
BACTERIA	*Pseudomonas aeruginosa* *Escherichia coli* *Staphylococcus aureus* *Enterococcus hirae*	5 log
FUNGI & YEAST	*Candida albicans* *Aspergillus brasiliensis (niger)*	4 log
SPORES	*Bacillus subtilis* *Clostridium difficile*	3 log
TUBERCULOSIS & MYCOBACTERIA	*Mycobacterium terrae* *Mycobacterium avium*	4 log
VIRUS	*Adenovirus*	4 log

Il Regolamento UE sui biocidi n. 528/2012: BIOCIDI GRUPPO 1



Vaporizzazione a perossido di idrogeno

Journal of Hospital Infection (2016), doi: 10.1016/j.jhin.2016.01.016.

Efficacy of two hydrogen peroxide vapour aerial decontamination systems for enhanced disinfection of meticillin-resistant *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Clostridium difficile* in single isolation rooms

S. Ali[a,*], M. Muzslay[a], M. Bruce[b], A. Jeanes[b], G. Moore[c], A.P.R. Wilson[a]

Device 1: vapor produced by **30% H_2O_2 at 130°C**, followed by **catalytic conversion**

Device 2: vapor produced by **4,9% H_2O_2 with piezo-ultrasonics,** equipped with an **aeration unit integrated**

Enhanced disinfection using HPV **reduced surface contamination to low levels:** HPS1 [0.25 CFU, IQR 0-1.13] and HPS2 (0.5 CFU, IQR 0–2.0).
Both systems demonstrated similar turnaround times **(~2–2.5 h**), and no differences were observed in the efficacy against ***C. difficile*** (~5.1 $\log_{10}$) **MRSA/*K. pneumoniae*** (~6.3 $\log_{10}$).
MRSA persisted on 27% of coupons after HPV decontamination.

Efficacia del vapore di perossido di idrogeno

Journal of Hospital Infection 94 (2016) 185–187

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Short report

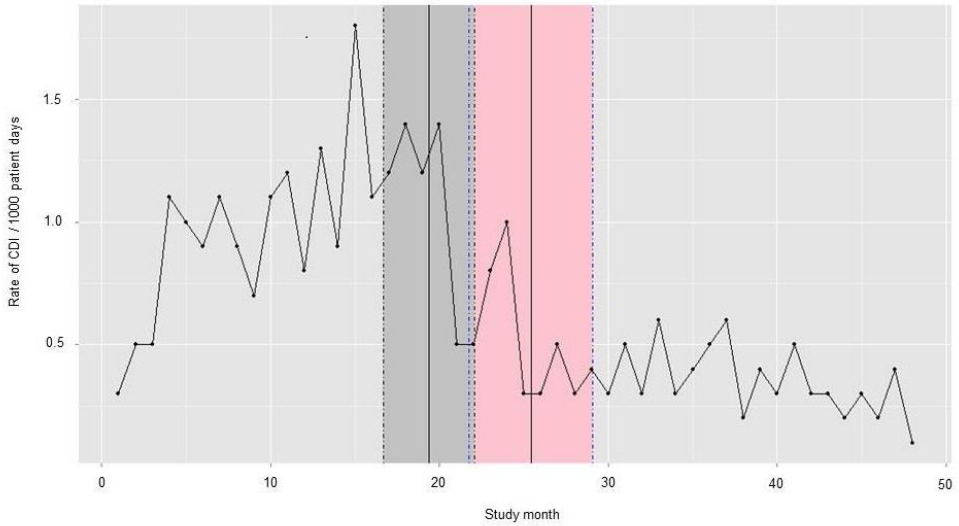
Reduction in *Clostridium difficile* infection associated with the introduction of hydrogen peroxide vapour automated room disinfection

J. McCord[a,*], M. Prewitt[a], E. Dyakova[b], S. Mookerjee[b], J.A. Otter[b]

[a] North Mississippi Medical Center, Tupelo, MI, USA
[b] Imperial College Healthcare NHS Trust, London, UK

Riduzione del 60% delle infezioni da *C. difficile* dopo l'introduzione del trattamento a vapore di H_2O_2

2 years before HPV, 2 years during HPV. Breakpoint model **indicated significant reduction in rate of CDI when HPV implemented** (1.0 to 0.4 per 1000 patient days).



Efficacia del vapore di perossido di idrogeno

MAJOR ARTICLE

An Evaluation of Environmental Decontamination With Hydrogen Peroxide Vapor for Reducing the Risk of Patient Acquisition of Multidrug-Resistant Organisms

Catherine L. Passaretti,[1,2,3] Jonathan A. Otter,[4] Nicholas G. Reich,[5,6] Jessica Myers,[5] John Shepard,[1] Tracy Ross,[7] Karen C. Carroll,[7] Pam Lipsett,[8] and Trish M. Perl[1,2,5]

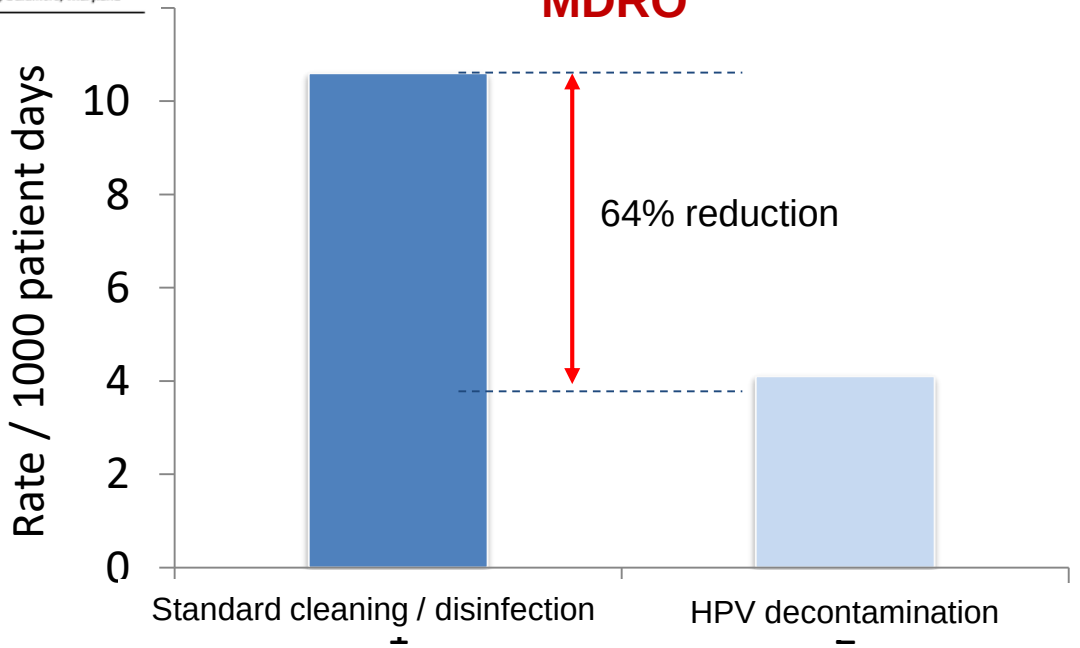
[1]Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine, [2]Department of Hospital Epidemiology and Infection Control, The Johns Hopkins Hospital, Baltimore, Maryland; [3]Division of Infectious Diseases, Department of Medicine, Carolinas Medical Center, Charlotte, North Carolina; [4]Bioquell Inc, Horsham, Pennsylvania; [5]Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland; [6]Division of Biostatistics and Epidemiology, School of Public Health and Health Sciences, University of Massachusetts, Amherst; [7]Department of Pathology, and [8]Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, Maryland

(See the Editorial Commentary by McDonald and Arduino, on pages 36–9.)

CID 2013:56 (1 January) • 27

30-month prospective cohort intervention study performed on 6 high-risk units (5 ICUs) including **8813 patients at Johns Hopkins Hospital.**

Riduzione del 64% del tasso di acquisizione di MDRO



Efficacia aerosol vs vapore di perossido di idrogeno

Blazejewski *et al. Critical Care* (2015) 19:30
DOI 10.1186/s13054-015-0752-9

CRITICAL CARE

RESEARCH Open Access

Efficiency of hydrogen peroxide in improving disinfection of ICU rooms

Caroline Blazejewski[1], Frédéric Wallet[2], Anahita Rouzé[1], Rémi Le Guern[2], Sylvie Ponthieux[1], Julia Salleron[3] and Saad Nseir[1,4*]

Aerosolizer device compliant with French standard **NF T 72-281**

5 ICUs, 182 rooms: **H_2O_2 technologies were efficient** for environmental MDRO decontamination (6% of rooms contaminated with MDRO at T1 versus 0.5% at T2, P = 0.004).

No significant difference was found between the **aerosolizer, using 7% H_2O_2 and 0,25% peracetic acid (aHPP; treatment time 2h, 54min) and the vaporizator, using 30% H_2O_2 (HPV; 1h, 40min)**, regarding the rate of rooms contaminated with MDRO at T2 (P = 0.313)

The residual concentration of H_2O_2 appears to be higher using aHPP, compared with HPV, probably due to its elimination by passive deposition

Vaporizzazione ad acido peracetico

Vapore di acido peracetico 1260 ppm (7ml/m³)

Application standard NF T 72-281 (November 2014)			
BACTERIA	Enterococcus hirae	6,8log	30 min.
	Escherichia coli	5,3log	30 min.
	Pseudomonas aeruginosa	6,2log	30 min.
	Staphylococcus aureus	6,8log	30 min.
MYCOBACTERIA	Mycobacterium terrae	6,3log	60 min.
	Mycobacterium avium	6,2log	60 min.
YEASTS	Candida albicans	5,8log	15 min.
MOULDS	Aspergillus brasiliensis	6log	120 min.
VIRUSES	Enterovirus Polio	4,58log	60 min.
	Adenovirus	4,16log	60 min.
	Norovirus Murin MNV	5,5log	60 min.
SPORES OF BACTERIA	Bacillus subtilis	3,2log	120 min.

Produzione di ac. peracetico 1260ppm da perossido di idrogeno al 2,5% e acido acetico al 4,4% (7ml/m³)

Richiesti **5 ricambi d'aria** al termine della nebulizzazione (TWA: 0,2 ppm, 0.6 mg/m3)

Vaporizzazione ad acido peracetico

Thevenin *et al. BMC Infectious Diseases* 2013, **13**:177
http://www.biomedcentral.com/1471-2334/13/177

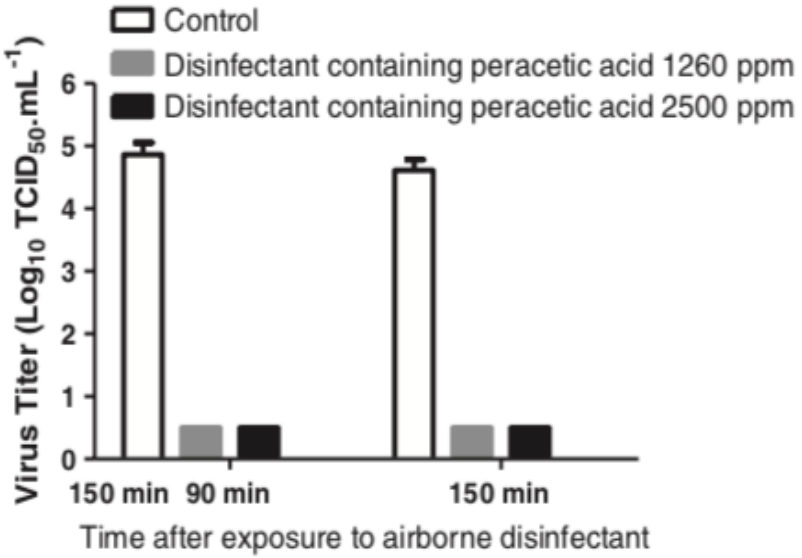
BMC Infectious Diseases

RESEARCH ARTICLE Open Access

Inactivation of an enterovirus by airborne disinfectants

Thomas Thevenin[†], Pierre-Emmanuel Lobert[†] and Didier Hober[*]

4 log reduction on Poliovirus type 1 of **peracetic acid**-based airborne disinfectants (**1260ppm and 2500ppm**) spread into the room by hot fogging at 55°C for 30 minutes at a concentration of 7.5 ml/m^3:



Vaporizzazione ad acido peracetico

Compatibilità con i materiali

- Stainless steel 304
- Acrylobutadiene Styrene (ABS)
- PolyMethyl Methacrylate (PMMA)
- Polyethylene High Density (HDPE)
- PVC floors covering
- Polycarbonate (PC)
- Plexiglas®
- Metal sheet plasticized, painted, galvanized with epoxy paint
- Mattress cover (Dartex®, Polyurethane stretch)
- Cover of medical transport (Polyurethane, Rubber, Polypropylene)

Vapore di Perossido di idrogeno VS Emissione UVC

Variabile	UVC-continua o UVC-pulsata	Vapore di Perossido di idrogeno
Modalità d'uso	Decontaminazione di **più stanze**	Decontaminazione di **una stanza**
Livello di efficacia richiesto	**Riduzione significativa dei patogeni**	**Eliminazione totale dei patogeni**
Tempo richiesto per il trattamento	**15min - 45min**	**2-2,3 ore**

Havil NL et al. Infect Control Hosp Epidemiol 2012; 33: 507
Otter JA et al. J Hosp Infect 2013: 83:1

CID 2018:66 (1 April)
IDSA GUIDELINE

Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA)

L. Clifford McDonald,[1] Dale N. Gerding,[2] Stuart Johnson,[2,3] Johan S. Bakken,[4] Karen C. Carroll,[5] Susan E. Coffin,[6] Erik R. Dubberke,[7] Kevin W. Garey,[8] Carolyn V. Gould,[1] Ciaran Kelly,[9] Vivian Loo,[10] Julia Shaklee Sammons,[6] Thomas J. Sandora,[11] and Mark H. Wilcox[12]

DISINFEZIONE AMBIENTALE AUTOMATIZZARA

What is the role of automated terminal disinfection using a method that is sporicidal against C. difficile?

1. There are limited data at this time to recommend use of automated, terminal disinfection using a sporicidal method for CDI prevention *(no recommendation)*.

ESCMID EUROPEAN SOCIETY OF CLINICAL MICROBIOLOGY AND INFECTIOUS DISEASES

Clin Microbiol Infect. 2018 Oct;24(10):1051-1054.

Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

Guidelines

Guidance document for prevention of *Clostridium difficile* infection in acute healthcare settings

S. Tschudin-Sutter [1,*], E.J. Kuijper [2], A. Durovic [3], M.J.G.T. Vehreschild [3], F. Barbut [4], C. Eckert [4], F. Fitzpatrick [5], M. Hell [6], T. Norèn [7], J. O'Driscoll [8], J. Coia [9], P. Gastmeier [10], L. von Müller [11], M.H. Wilcox [12], A.F. Widmer [1] on behalf of the Committee†

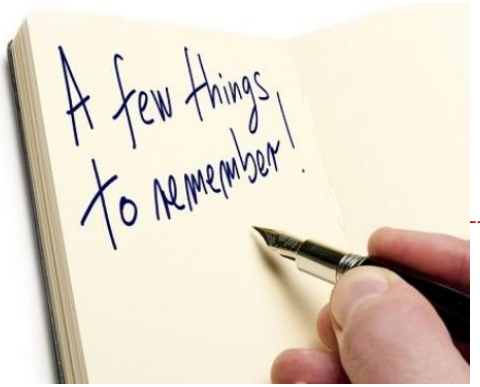
DISINFEZIONE AMBIENTALE AUTOMATIZZARA

Are no-touch disinfection systems as effective as hypochlorite to reduce the environmental contamination in rooms of patients with CDI?

Recommendation for outbreak and endemic settings

The panel concludes that both in the outbreak and the endemic setting, **no touch disinfection systems may be as effective in reducing transmission/incidence of CDI as hypochlorite** (very low quality of evidence).

Take home message….



Le nuove tecnologie possono essere un valido ausilio nell'implementazione dei protocolli di pulizia e disinfezione ambientale, ma la loro scelta deve essere effettuata in base a:

- **Efficacia nella riduzione dei patogeni** ad alta persistenza ambientale (attività sporicida se richiesta), anche in presenza di **residui organici**
- **Tasso di utilizzo del posto letto**: se vicino al 100% è necessario scegliere il sistema automatizzato più rapido
- Possibilità di **confinare il locale e disattivare i sistemi di aerazione**
- Disponibilità di **personale dedicato e formato**
- **Costo**
- **Rischi per gli operatori**

Sono ancora limitate le evidenze che dimostrano il loro ruolo nella riduzione delle ICA

Grazie per l'attenzione

Beatrice Casini

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