Disinfection and Sterilization:
Current Issues and New Technologies

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Former Director, Hospital Epidemiology, Occupational Health and Safety, UNC Health Care, Chapel Hill, NC (1979-2017)

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DISCLOSURES

2022

- **Consultations**
  - PDI (Professional Disposables International)
- **Honoraria**
  - PDI
- **Other**
  - Kinnos, Ideate Medical

Disinfection and Sterilization: Current Issues and New Technologies

- Overview DS
- HLD to Sterilization
- HLD to Sterilization-new tech
- LLD-Electrostatic sprayers-new data
- LLD-new sporicide-HP-new tech
- LLD-sporicide in all discharge pt rooms
- LLD-colorized disinfectant-new tech
- LLD-“no” touch room decontamination
- Continuous room decontamination technologies
  - Continuously active disinfectant-new technology

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Disinfection and Sterilization

EH Spaulding believed that how an object will be disinfected depended on the object's intended use.

CRITICAL - objects which enter normally sterile tissue or the vascular system or through which blood flows should be sterile.

SEMICRITICAL - objects that touch mucous membranes or skin that is not intact require a disinfection process (**high-level disinfection[HLD]**) that kills all microorganisms but high numbers of bacterial spores.

NONCRITICAL -objects that touch only intact skin require **low-level disinfection**.

Transition from HLD to Sterilization

GI Endoscopes: Shift from Disinfection to Sterilization

Rutala, Weber. JAMA 2014. 312:1405-1406

EDITORIAL

Editorials represent the opinions of the authors and *JAMA* and not those of the American Medical Association.

Gastrointestinal Endoscopes
A Need to Shift From Disinfection to Sterilization?

William A. Rutala, PhD, MPH; David J. Weber, MD, MPH

More than 10 million gastrointestinal endoscopic procedures are performed annually in the United States for diagnostic purposes, therapeutic interventions, or both.[1] Because gastrointestinal endoscopes contact mucosal surfaces, use of a contaminated endoscope may lead to patient-to-patient transmission of potential pathogens with a subsequent risk of infection.[1]

In this issue of *JAMA*, Epstein and colleagues[2] report findings from their investigation of a cluster of New Delhi metallo-β-lactamase (NDM)–producing *Escherichia coli* associated with gastrointestinal endoscopy that occurred from March 2013 to July 2013 in a single hospital in northeastern Illinois. During the 5-month period, 9 pa-

Related article page 1447

First, endoscopes are semicritical devices, which contact mucous membranes or nonintact skin, and require at least high-level disinfection.[3,4] High-level disinfection achieves complete elimination of all microorganisms, except for small numbers of bacterial spores. Because flexible gastrointestinal endoscopic instruments are heat labile, only high-level disinfection with chemical agents or low-temperature sterilization technologies are possible.[3] However, no low-temperature sterilization technology is US Food and Drug Administration (FDA)–cleared for gastrointestinal endoscopes such as duodenoscopes.

Second, more health care–associated outbreaks and clusters of infection have been linked to contaminated endoscopes than to any other medical device.[3,5] However, until now,

Infections/Outbreaks Associated with Semicritical Medical Devices

Rutala, Weber, AJIC 2019;47:A79-A89

Medical Device	No. Outbreaks/Infections	No. Outbreaks/Infections with Bloodborne Pathogens
Vaginal Probes	0	0
Ear-Nose-Throat Endoscopes	0	0
Urologic instruments (e.g. cystoscopes)	8	0
Hysteroscopes	0	0
Laryngoscopes	2	0
Transrectal ultrasound guided prostate	1	0
Applanation tonometers	2	0
TEE-Transesophageal echocardiogram	5	0
GI Endoscopes/Bronchoscopes	~130	3 (HBV-1 GI; HCV-2 GI; HIV-0)

What Is the Public Health Benefit?
No ERCP-Related Infections

Margin of Safety-currently nonexistent; sterilization will provide a safety margin (~6 $\log_{10}$). To prevent infections, all duodenoscopes should be devoid of microbial contamination.

HLD (≥6 $\log_{10}$ reduction)

vs

Sterilization (12 $\log_{10}$ reduction spores=SAL 10^{-6})

Disinfection and Sterilization

Rutala, Weber. Am J Infect Control. 2016;44:e1-e6; Rutala, Weber ICHE. 2015;36:643.

EH Spaulding believed that how an object will be disinfected depended on the object's intended use (proposed clarification).

CRITICAL - objects which directly or indirectly/secondarily (i.e., via a mucous membrane such as duodenoscope, cystoscope, bronchoscope) enter normally sterile tissue or the vascular system or through which blood flows should be sterile.

SEMICRITICAL - objects that touch mucous membranes or skin that is not intact require a disinfection process (high-level disinfection [HLD]) that kills all microorganisms but high numbers of bacterial spores.

NONCRITICAL -objects that touch only intact skin require low-level disinfection (or non-germicidal detergent).

Future Approaches to Endoscope Reprocessing to Improve Patient Safety

Rutala et al. AJIC 2019:47:A62; Chua et al. Techniq Innov Gastro Endo 2021;23:190

- Optimize current LTST or new LTST proving SAL 10^{-6} achieved
- Disposable endoscopes (device innovations)
  - Partially-endcaps, decrease bacterial contamination after HLD
  - Fully-GI and bronchoscopes
- Steam sterilization for GI and other endoscopes
- Use of non-endoscopic methods to diagnose or treat disease
- Stop HLD for affected Storz urological endoscopes, transition to sterilization

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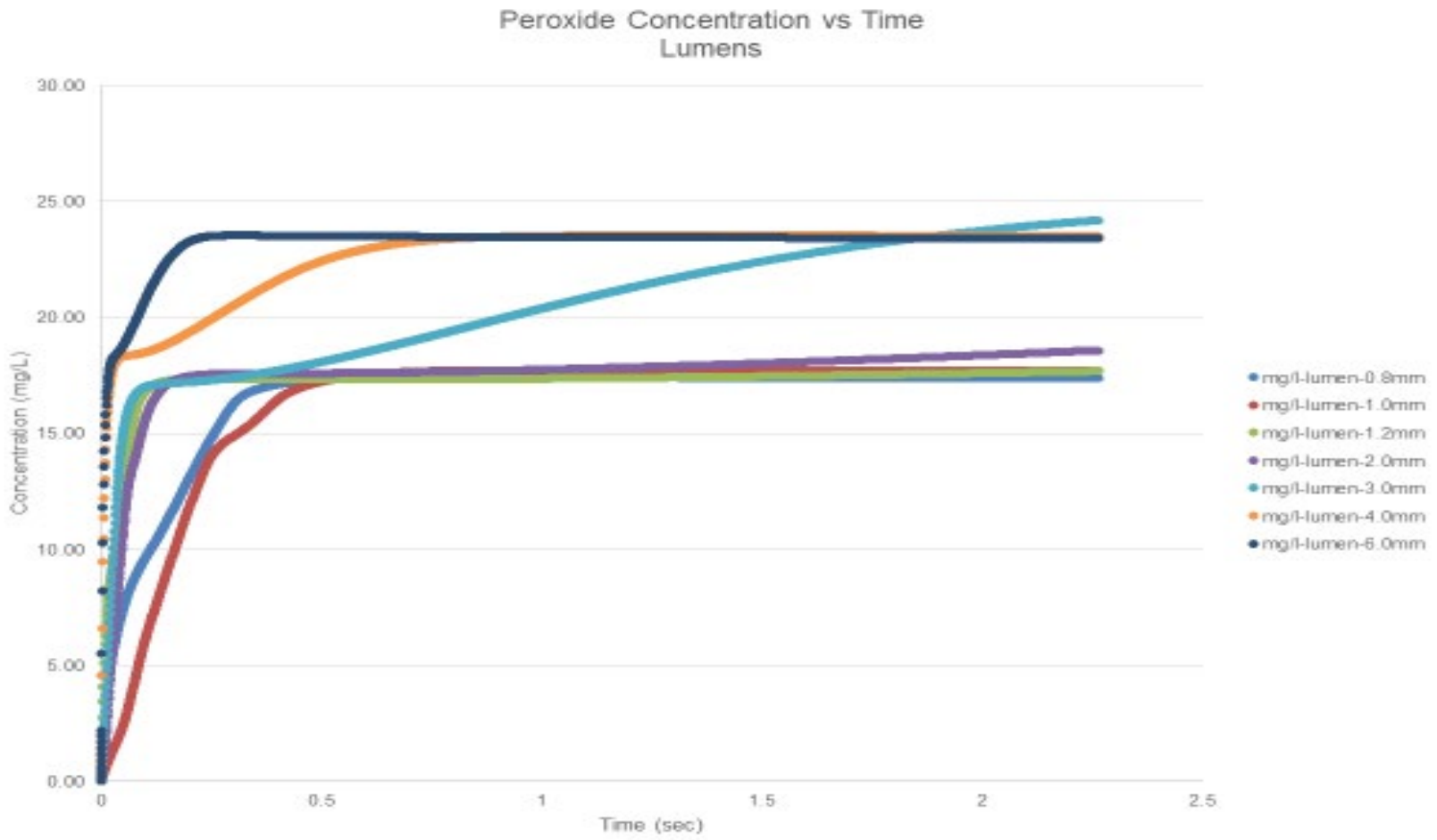
New Endoscope Sterilization Technology

- New HP gas plasma sterilizer designed for the terminal sterilization of flexible endoscopes (will support sterilization of GI endoscopes and bronchoscopes/urologic endoscopes at initial release)
- Directs HP into the internal lumen channels of an endoscope
- Achieves the required concentration of VHP in channels up to 4m in <20s
- Footprint of automated endoscope reprocessor
- Uses lower concentration of HP with short exposure time, no damage
- Proprietary container facilitates sterile storage for 6 months
- Developer will seek FDA clearance in first-half of 2023

NEW STERILIZATION TECHNOLOGY

- Hydrogen Peroxide Gas Plasma sterilizer designed specifically for the terminal sterilization of flexible endoscopes
- Incorporates a proprietary vapor diffusion technology to direct Vaporized Hydrogen Peroxide (VHP) into the internal lumen channels of an endoscope
  - Utilizes a pressure differential in each internal endoscope channel to rapidly diffuse VHP to sterilize all endoscope channels
  - Achieves the required VHP efficacy concentration in all internal endoscope channels (up to 4 meters) in < 20 secs
  - Uses lower overall concentration of H_2O_2 with shorter exposure times, thereby eliminating potential damage to the endoscope
- Incorporates a proprietary sterilization container that interfaces with the sterilizer during the sterilization process and facilitates sterile storage (6 months) of the endoscope after processing
- Incorporates a proprietary pre-sterile single-use channel connector that is pressure activated. It seals during VHP transfer and then releases to allow sterilization of the mated connector interface
- Based on initial testing, we were able to sterilize an Olympus duodenoscope (TJF-Q160F) 125 times with no damage to the device

INTERNAL LUMEN H2O2 CONCENTRATONS (SURROGATE SCOPE - 3 METERS/7 CHANNELS)



DUODENOSCOPE ELEVATOR CHANNEL EFFICACY DATA

0.8mm ID X 1.6 M with 59% H202

Run	$[H_2O_2]_{Chamber}$ (mg/L)	Wire-BI Positives
1	19.2657	0
2	19.0984	0
3	19.8270	0
4	16.7001	0
5	20.9575	0
6	20.3405	0
7	19.2491	0
8	19.9215	0
9	21.5882	0
10	19.3935	0
11	23.1596	0
12	21.8425	0
13	22.0940	0
14	17.4122	0
15	23.1596	0

Run	$[H_2O_2]_{Chamber}$ (mg/L)	Wire-BI Positives
16	23.4499	0
17	20.4509	0
18	21.6296	0
19	20.4399	0
20	20.6036	0
21	21.4005	0
22	20.0804	0
23	20.2234	0
24**	N/A	N/A
25	13.6994	0
26	15.6713	0
27	18.7494	0
28	20.6106	0
29	19.7891	0
30	20.4717	0

Run	$[H_2O_2]_{Chamber}$ (mg/L)	Wire-BI Positives
31	19.7248	0
32	21.4151	0
33	18.4306	0
34	18.1938	0
35	20.6381	0
36	21.558	0
37	20.4089	0
38	19.4266	0
39	18.4615	0
40	19.8363	0
Average	**19.9639**	
SD	1.9128	

** PC did not record

Feasibility results: 0 positives/39 runs (SS wires inoculated with 10^6 *Geobacillus stearothermophilus* spores)

CAPABILITY TO TERMINALLY STERILIZE BROAD RANGE OF ENDOSCOPES

Name	Model	Total Length (mm)	Lumen Inner Diameter (mm)	# of Channels & Names	
Fuji Enteroscope	EN-580T	2300	1.2 – 3.2	4	1 Suction/Biopsy, 1 Air, 1 water, 1 Second Air
Olympus Duodenoscope	TJF-Q160F	1585	0.8	5	1 Suction/Biopsy, 1 Air, 1 water, 1 Second Air, 1 Elev. Wire
Olympus Gastrointestinal Videoscope	GIF-XTQ160	1400	6	5	1 Suction/Biopsy, 1 Air, 1 water, 1 Second Air, 1 Elev. Wire
Olympus Ultrasound Gastroscope	GF-UM160	1560	3.7	7	1 Suction/Biopsy, 1 Air, 1 water, 1 Second Air, 1 Elev. Wire, 1 Balloon Inflation, 1 Balloon Evacuation
Pentax Colonoscope	EC-38-i10L	2016	1.2-3.8	5	1 Suction/Biopsy, 1 Air, 1 water, 1 Second Air, 1 Aux. Water

- Boundary condition devices

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PMCID: PMC7275188
PMID: 32522608

Evaluation of an electrostatic spray disinfectant technology for rapid decontamination of portable equipment and large open areas in the era of SARS-CoV-2

Jennifer L. Cadnum, BS,[a] Annette L. Jencson, CIC,[a] Scott H. Livingston, MD,[b] Daniel F. Li, BS,[a] Sarah N. Redmond, BS,[b] Basya Pearlmutter, BS,[a] Brigid M. Wilson, PhD,[c] and Curtis J. Donskey, MD[b,c,*]

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Abstract

Go to:

In the setting of the coronavirus disease 2019 pandemic, efficient methods are needed to decontaminate shared portable devices and large open areas such as waiting rooms. We found that wheelchairs, portable equipment, and waiting room chairs were frequently contaminated with potential pathogens. After minimal manual precleaning of areas with visible soiling, application of a dilute sodium hypochlorite disinfectant using an electrostatic sprayer provided rapid and effective decontamination and eliminated the benign virus bacteriophage MS2 from inoculated surfaces.

Efficacy of Disinfectant Electrostatic Spray (positive charged droplets attracted to negatively charged surfaces or microbes) in Reducing Pathogen Contamination

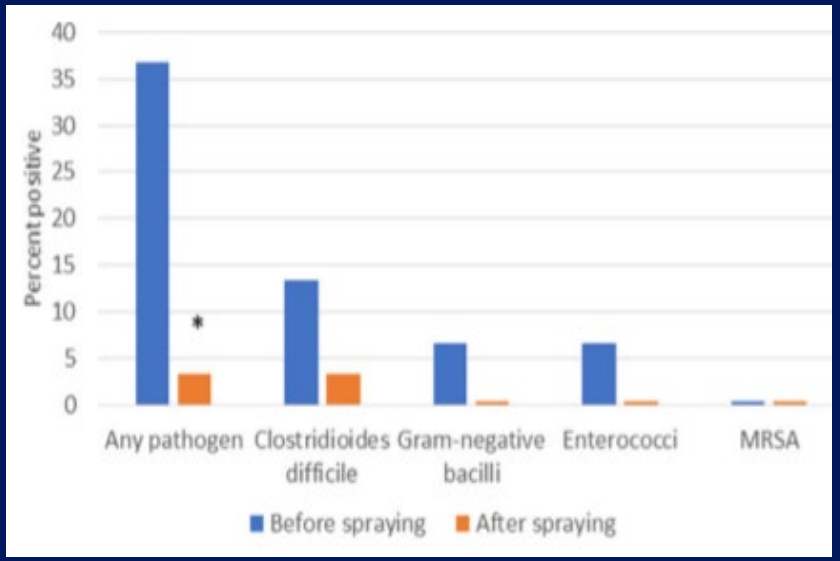
Cadnum et al. AJIC 2020

Picture of electrostatic sprayer

(0.25% sodium hypochlorite)

Efficacy of disinfectant spray

(waiting room chairs)



UVC vs Electrostatic Sprayer (0.25% NaOCl) for Adjunctive Room Decontamination

Carlisle MG, Rutala WA…Donskey CJ. ICHE. 2022. doi:10.1017/ice.2022.132

ES Sprayer and UVC similarly effective in reducing pathogen contamination on floors and high-tech surfaces

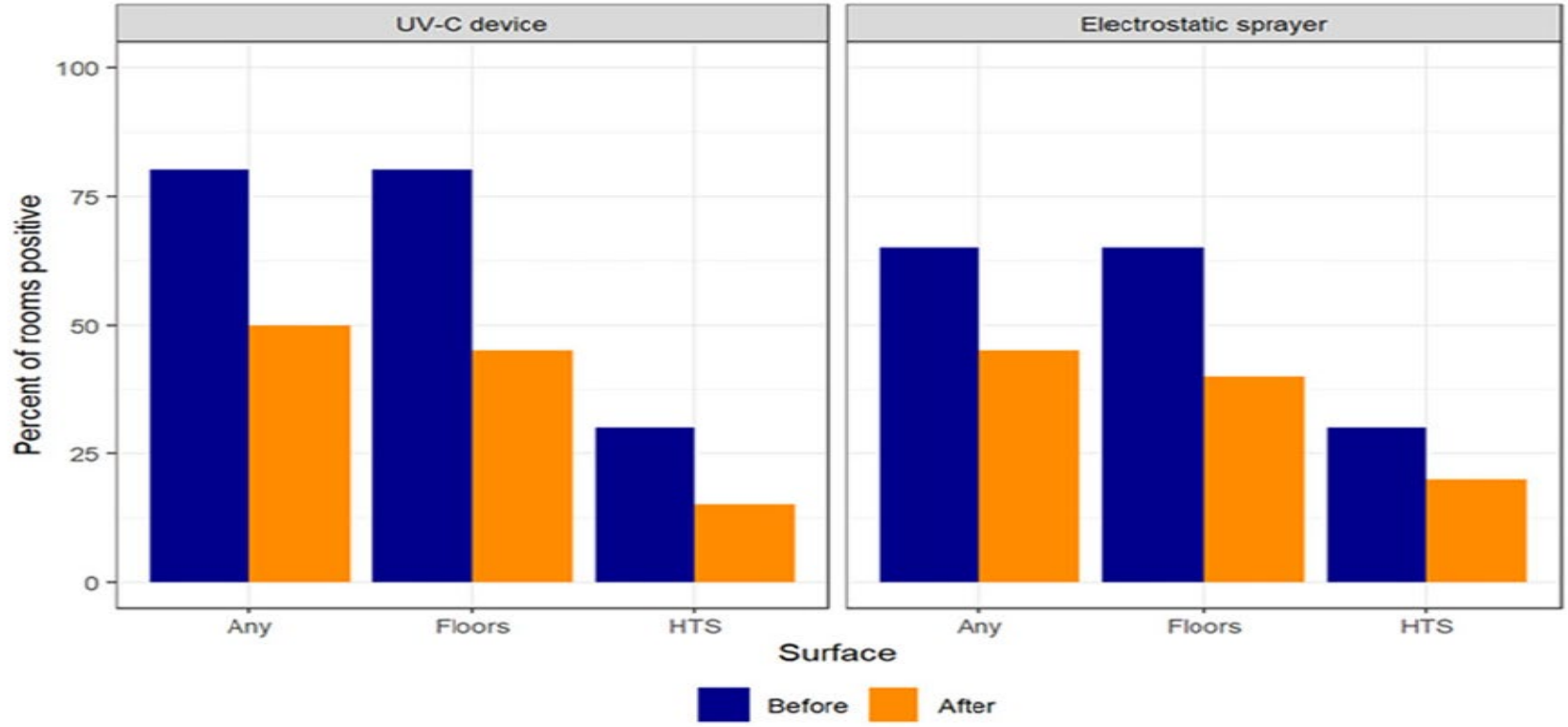


Fig. 1. Percentages of rooms with positive cultures for 1 or more healthcare-associated pathogens before versus after treatment with the ultraviolet-C (UV-C) light device or the electrostatic sprayer. Note. HTS, high-touch surface.

Summary of Electrostatic Sprayer Issues Include

- Optimal droplet size is between 40-70u; what is the droplet size of the proposed unit
- Spray patterns vary tremendously across vendors and even across products from a single vendor
- EPA demands that all surfaces being disinfected be thoroughly wetted for the contact time of the specific disinfectant
- Person applying the disinfectant may need to wear full PPE because of inhalation concerns
- Electrostatic sprayer does not replace the initial cleaning and disinfecting that EVS performs
- Cadnum/Donskey study used sporicidal disinfectant alone with no pre-cleaning or wiping
- Electrostatic sprayers might be most useful for items and areas that are not amenable to standard cleaning and disinfection (Cadnum/Donskey)
- Effectiveness on soft surfaces?
- Considerations for purchase include: coverage requirements, weight of loaded device; ease of handling; effective distance; particulate size; and disinfectant safety
- Electrostatic sprayers are promoted as a “get in” and “get out” time saving technology
- How many seconds per square foot with a sprayer to properly treat the surface
- Equipment can be easily misused (must prevent misuse and consider sprayer, time allotted to perform, disinfectant, surface [soft v hard], space/area to disinfect, level of cleaning prior to application, user training)

Novel Hydrogen Peroxide Sporicide

Cadnum et al. AJIC 2021

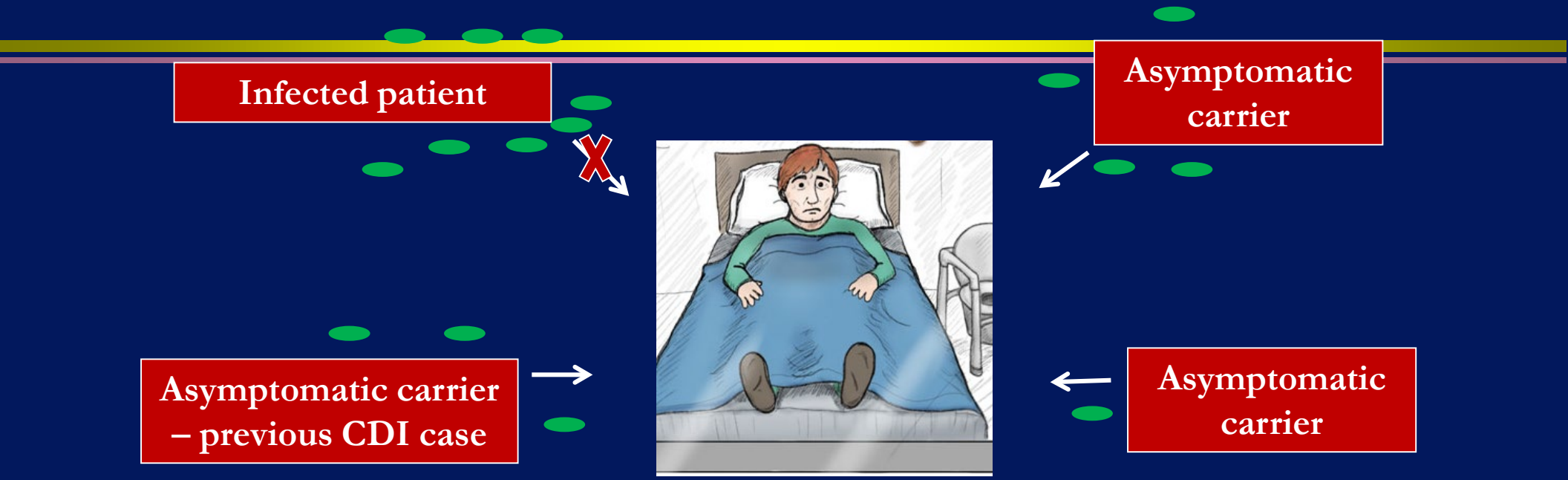
A novel 4% HP was effective against MRSA, CRE, *C. difficile* spores and *C. auris.* HP may be a useful addition to the sporicidal products available in healthcare.

Table. Mean (Standard error) $\log_{10}$ reductions in healthcare-associated pathogens using a quantitative carrier test with a 1-minute exposure time

Disinfectant	*C. difficile*	MRSA	CRE (*E. coli*)	*Candida auris* (N=2)
Sani-HyPerCide	4.7 (0.08)	≥6.4 (0)	≥5.6 (0)	>5.1 (0)
Clorox germicidal bleach	≥6.7 (0)	≥6.4 (0)	≥5.6 (0)	≥6.1 (0)
OxyCide	≥5.0 (0)	≥5.48 (0)	≥5.6 (0)	≥5.1 (0)
Oxivir 1	2.6 (0.3)	≥6.5 (0)	6.2 (0.3)	≥5.1 (0)

Asymptomatic carriers contribute to *C. difficile* transmission

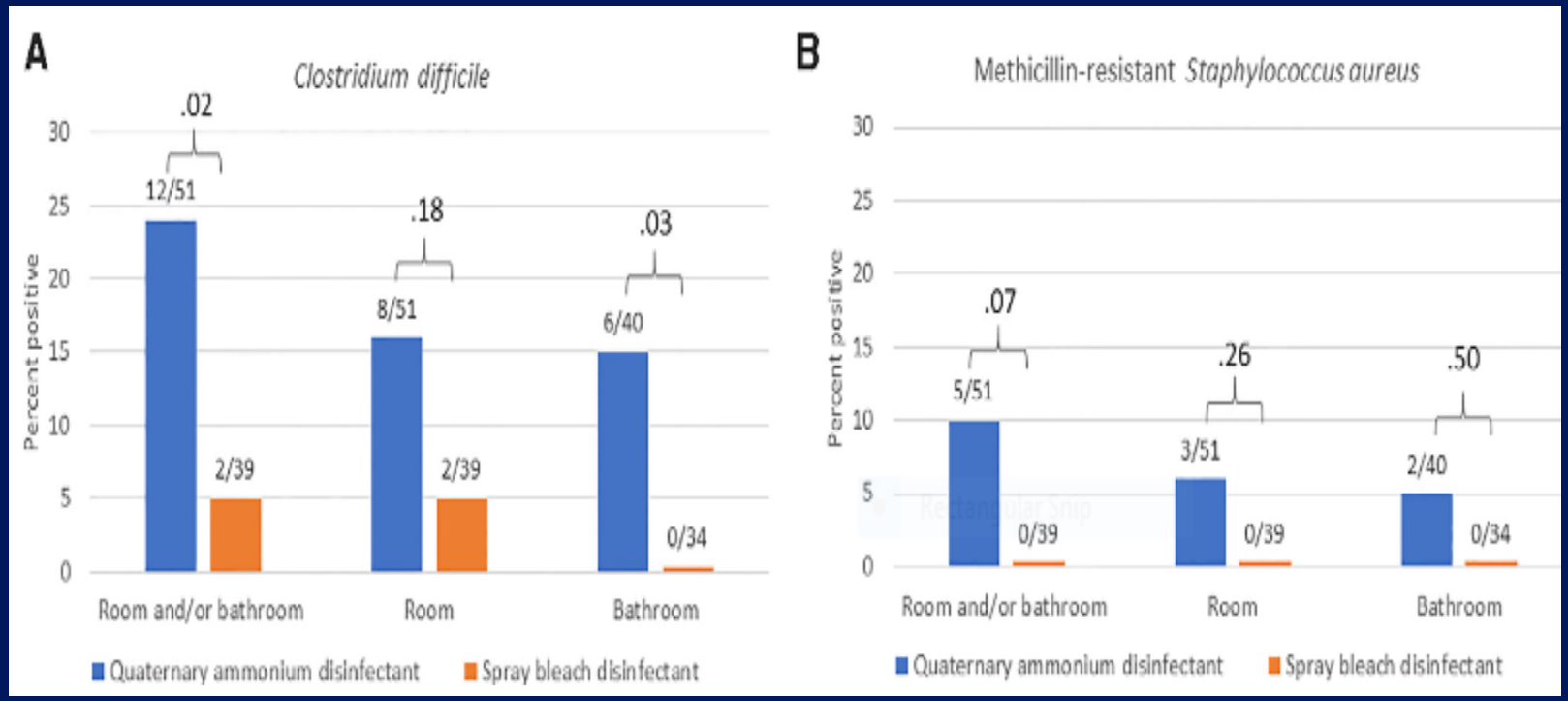
(courtesy Dr. Donskey)



Use of Sporicidal Disinfectant on *C. difficile* spore Contamination in non-*C. difficile* Infection Rooms

Wong et al. AJIC. 2019:47:843-845

The percentage of rooms contaminated with *C. difficile* was significantly reduced during the period with a sporicidal product was used 5% vs 24%. Results suggest sporicidal disinfectant in all postdischarge rooms could potentially be beneficial in reducing the risk *for C. difficile* transmission from contaminated surfaces

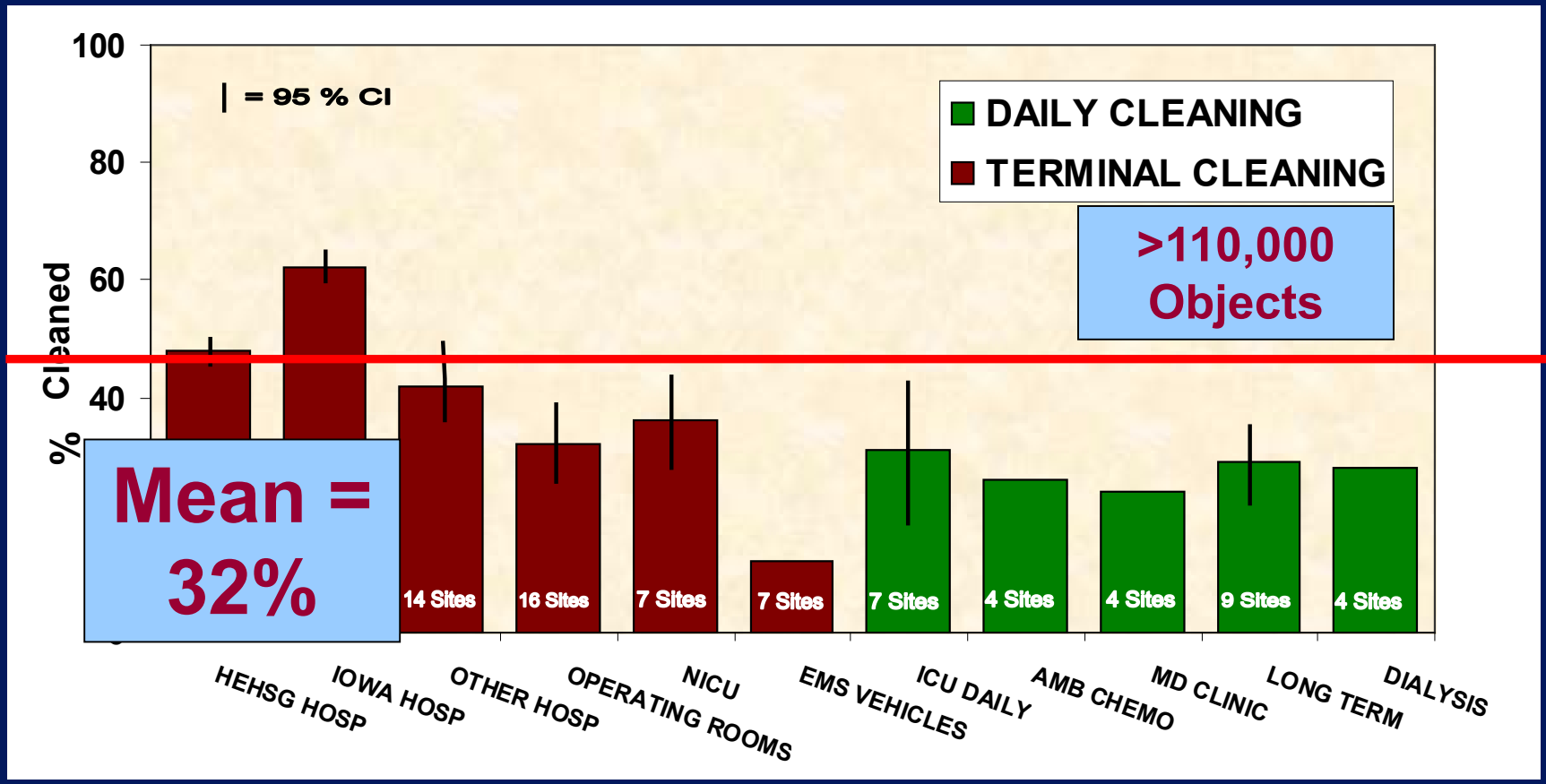


Effective Surface Decontamination

Product and Practice = Perfection

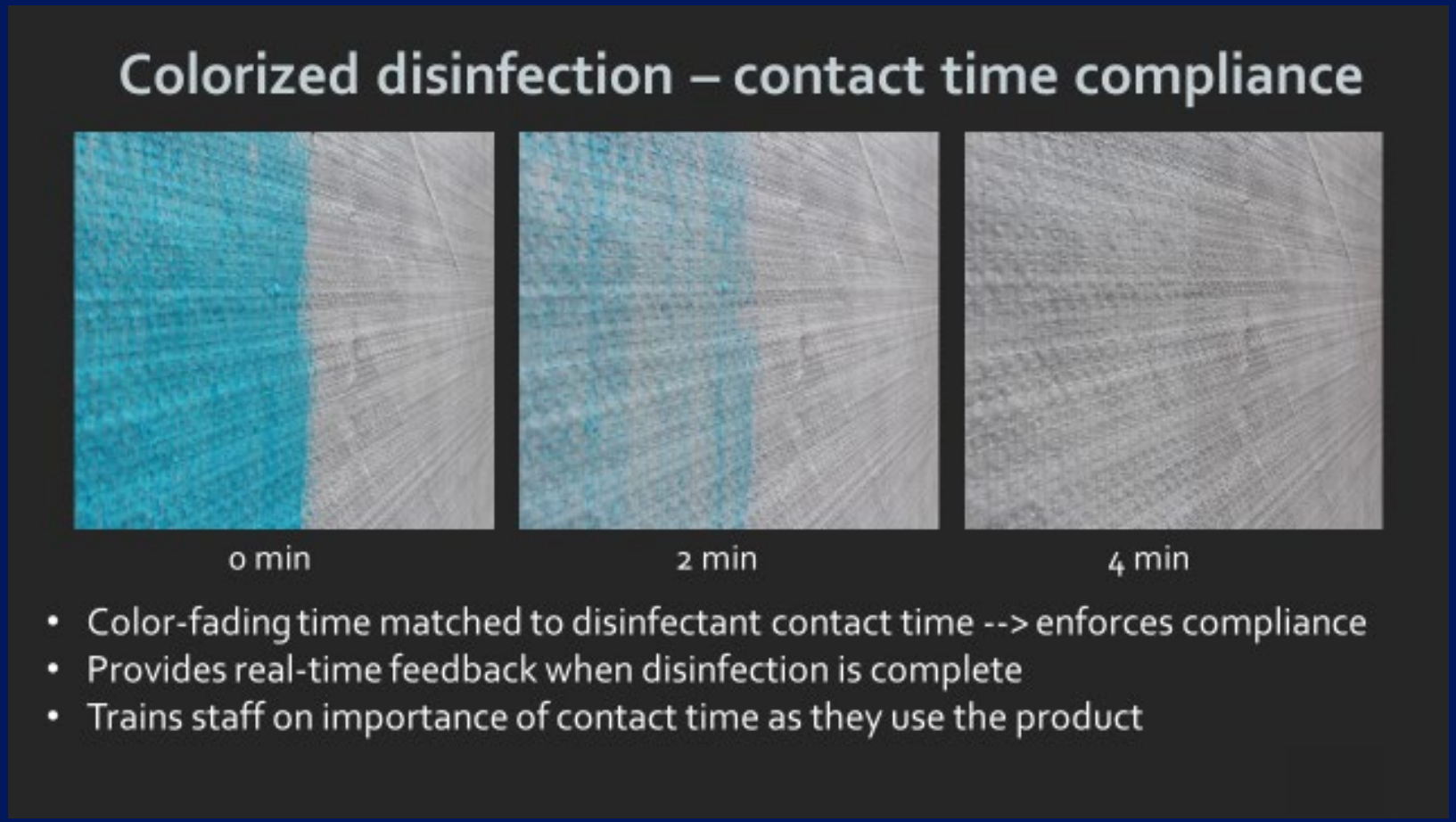
Thoroughness of Environmental Cleaning

Carling et al. ECCMID, Milan, Italy, May 2011



Methods to Ensure Thoroughness Such as Colorized Disinfectant

Kang et al. J Hosp Infect 2017



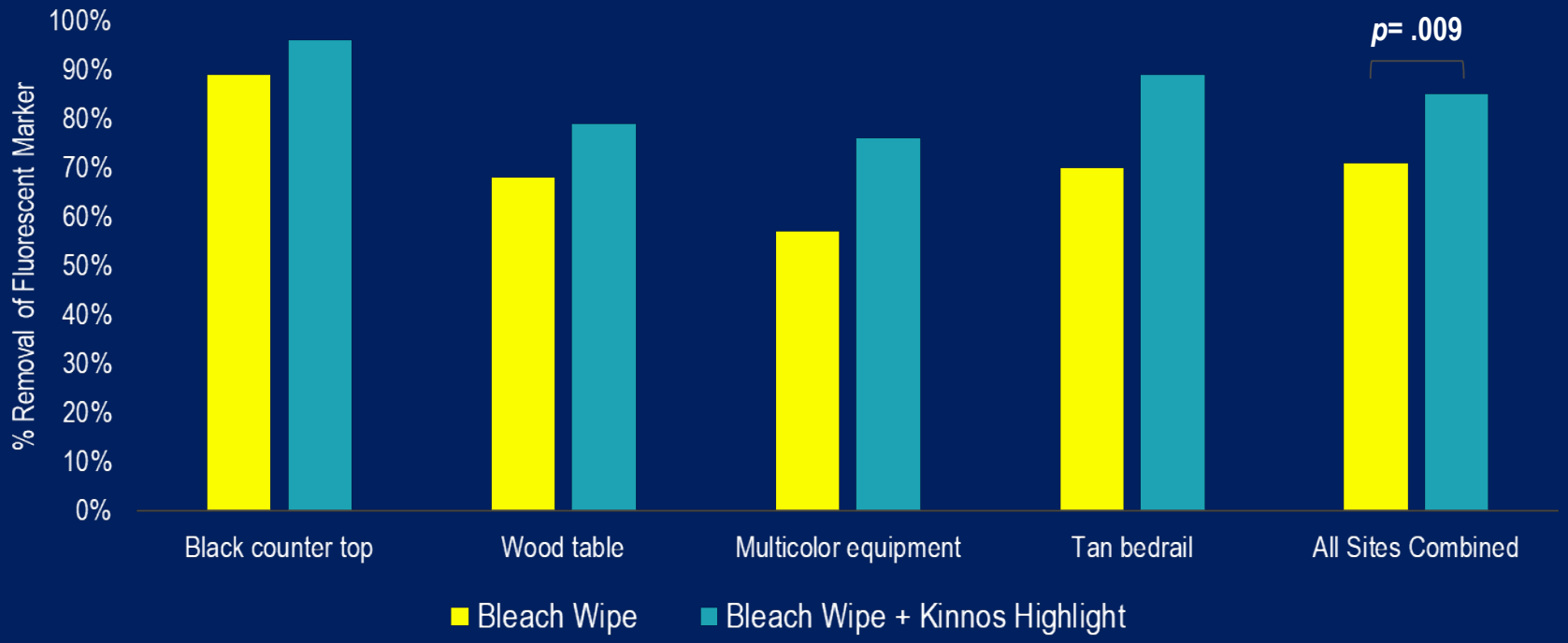
Courtesy of Kevin Tyan and Rachael Sparks

Colorized disinfection – empowers behavior change to improve coverage

- Increased visibility when disinfecting surfaces, fewer missed spots
- Real-time quality control that allows staff to monitor thoroughness of cleaning

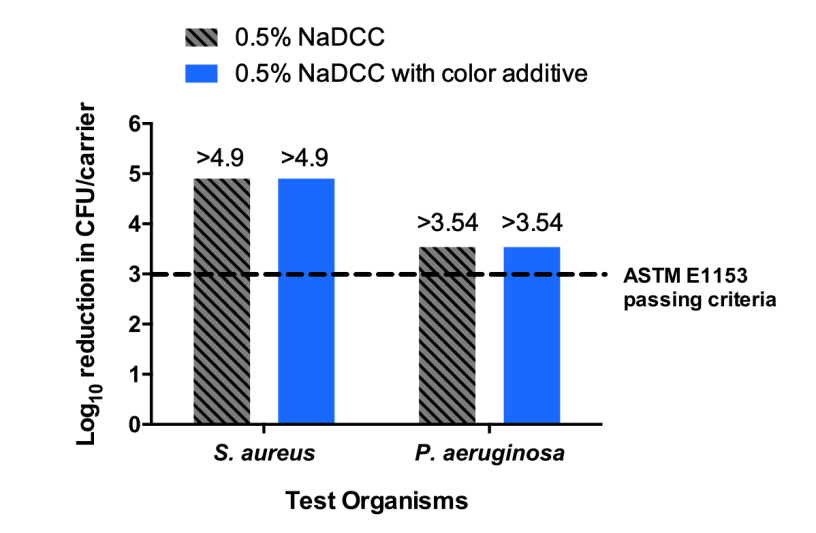
Colorized disinfectant increases cleaning efficacy by 29%

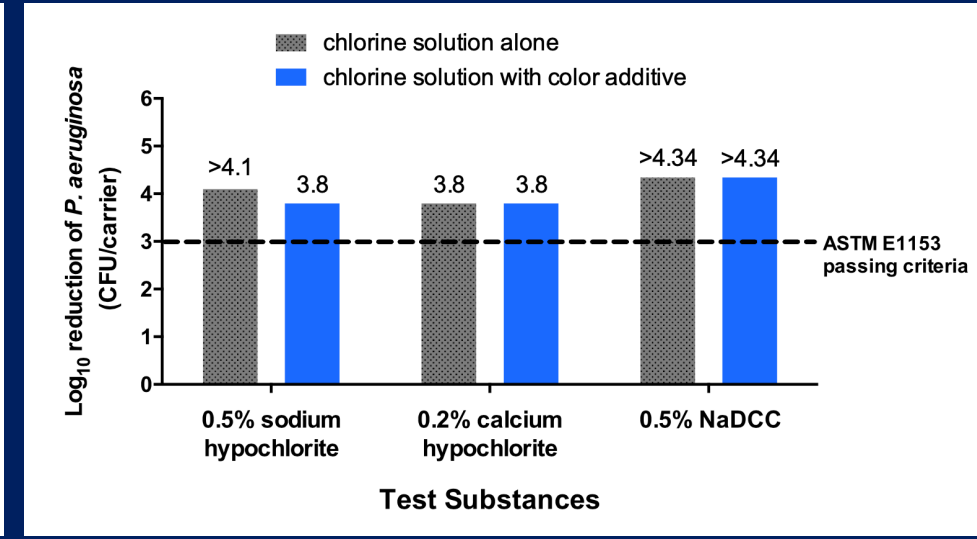
Cleveland VA Medical Center found colorized disinfectant to quantifiably improve thoroughness of cleaning



Manuscript in preparation.

Efficacy and skin toxicity testing of colorized disinfectant®

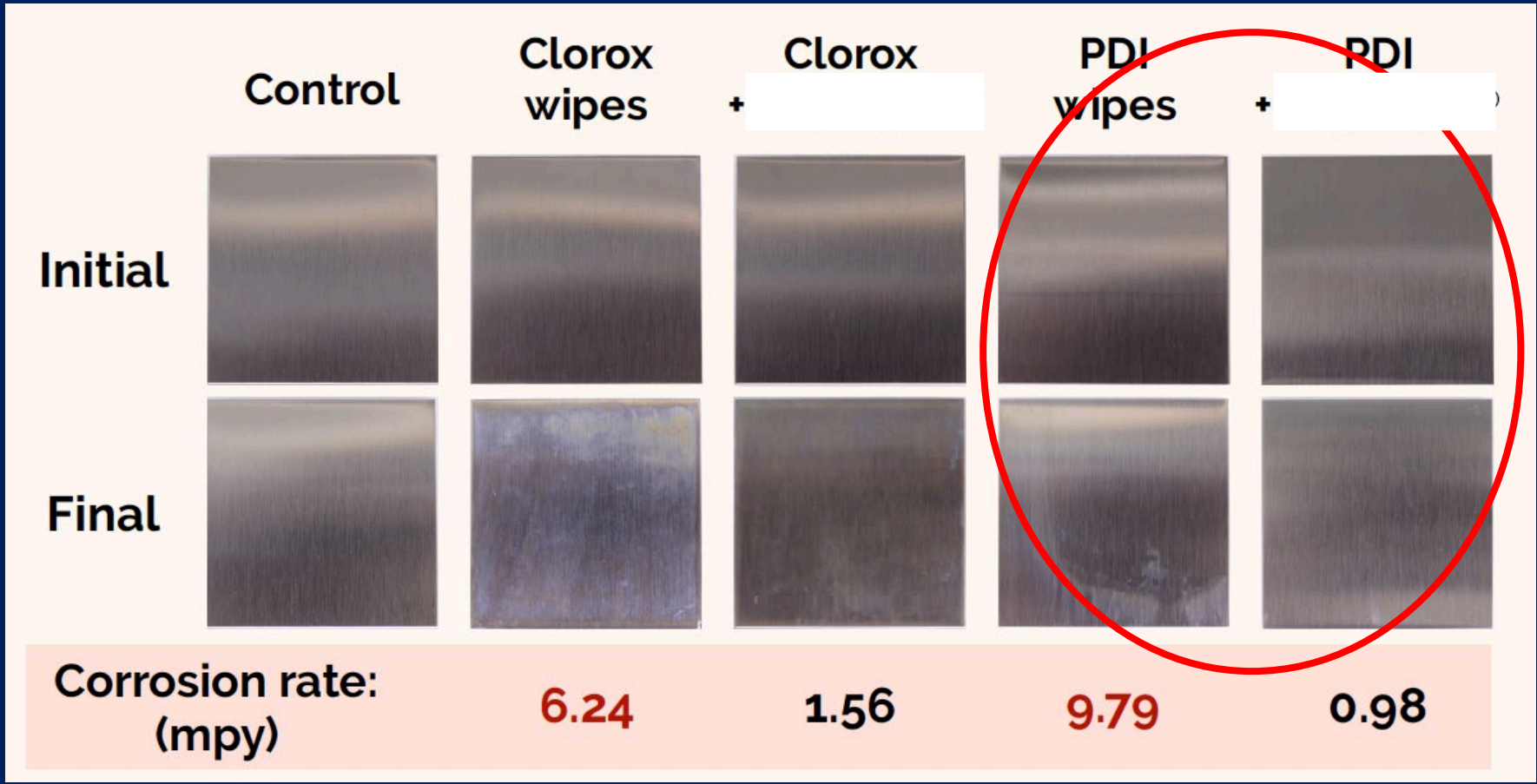




- 3rd party testing: **Colorized disinfectant** is a non-irritant and **does not reduce efficacy of disinfectant**

Tyan KS, Kang J, Jin K, Kyle AM. *Am J Infect Control*. 2018;46:1254-61.

Colorized disinfectant reduces bleach corrosiveness



Bleach wipes alone caused severe corrosion (> 5 mils per year [mpy], 1 normal) while the addition of colorized disinfectant both significantly reduced corrosion rate (< 2 mils per year) and prevented discoloration of the metal.

Tyan K, Jin K, Kang J. *J Hosp Infect.* 2018;S0195-6701(18)30491-2.

Lids fit onto bleach wipe cannisters

(feeds wipe out for the user and retracts them to prevent dry-out when not in use)

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Environmental Contamination Leads to HAIs

- By contaminating hands/gloves via contact with the environment and transfer to patient or patient self inoculation
- Surfaces should be hygienically clean (not sterile)-free of pathogens in sufficient numbers to prevent human disease
- Two environmental surface concerns
  - Discharge/terminal-prevent infection to new patient in room
  - Daily room decontamination, suboptimal CD and recontamination

Best Practices in Disinfection of Noncritical Surfaces in the Healthcare Setting: A Bundle Approach

NL Havill AJIC 2013;41:S26-30; Rutala, Weber. AJIC 2019;47:A96-A105

A Bundle Approach to Surface Disinfection

- Develop policies and procedures
- Select cleaning and disinfecting products
- Educate staff-environmental services and nursing
- Monitor compliance (thoroughness of cleaning, product use) and feedback
- Implement "no touch" room decontamination technology and monitor compliance (and new strategies)

Enhanced Disinfection Leading to Reduction of Microbial Contamination and a Decrease in Patient Col/Infection

Anderson et al. Lancet 2017;289:805; Rutala et al. ICHE 2018;39:1118

	Standard Method	Enhanced method		
	Quat	Quat/UV	Bleach	Bleach/UV
EIP (mean CFU per room)[a]	60.8	3.4	11.7	6.3
Reduction (%)		94	81	90
Colonization/Infection (rate)[a]	2.3	1.5	1.9	2.2
Reduction (%)		35	17	4

All enhanced disinfection technologies were significantly superior to Quat alone in reducing EIPs. Comparing the best strategy with the worst strategy (i.e., Quat vs Quat/UV) revealed that a reduction of 94% in EIP (60.8 vs 3.4) led to a 35% decrease in colonization/infection (2.3% vs 1.5%). Our data demonstrated that a decrease in room contamination was associated with a decrease in patient colonization/infection. First study which quantitatively described the entire pathway whereby improved disinfection decreases microbial contamination which in-turn reduced patient colonization/infection.

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  - Discharge/terminal-prevent infection to new patient in room
  - Daily room decontamination (referred to “trash and dash”) suboptimal C/D and recontamination

Microbial Assessment of Recontamination with *Acinetobacter* in Patient Room Environment in Burn Units

Rutala et al. AJIC. 2020; 48 Suppl;S20

- Purpose: assess how much environmental sites (e.g., chair, bedrail, overbed table, stock cabinet, IV pump, etc.) become recontaminated with *Acinetobacter* over time after cleaning/disinfection.
- Results:
- At baseline all environmental sites sampled except overbed table were contaminated with *Acinetobacter*.
- No *Acinetobacter* were detected except bed rail just after cleaning/disinfection.
- First time to recontamination with *Acinetobacter* was 3 hours at chair, 2 hours at overbed table, 3 hours at stock cabinet, and 2 hours at IV pump. No recontamination was observed at the monitor.
- The level of *Acinetobacter* contamination on surfaces was occasionally high (e.g., when a stock cabinet was sampled at 5 hours, 75 of 96 CFU were *Acinetobacter*).
- The amount of recontamination with aerobes and *Acinetobacter* on some surfaces tended to increase over time.

Rationale for Continuous Room Decontamination Methods

- Key issues in daily room disinfection and rationale for improving daily room disinfection (patients, staff, visitors can be in room during continuous decontamination)
  - Environmental contamination leads to HAIs
  - Suboptimal disinfection
  - Rapid recontamination of surface occurs after disinfection
  - EIP are present on environmental surfaces (via prevalence survey, after terminal disinfection)
  - All touchable surfaces are equally contaminated
  - Increased surface bioburden is associated with an increased rate of HAIs and decreasing the bioburden (terminal disinfection) reduces HAIs
- Need to evaluate continuous room disinfection

Continuous Room Decontamination Technologies for Disinfection of the Healthcare Environment

Weber, Rutala et al. AJIC. 2019;47:A72; Rutala et al. ICHE 2019; Weber D, Rutala W. AJIC 2013;41:S31

- Visible light disinfection through LEDs
- Dry/dilute hydrogen peroxide; hydroxyl radicals, free reactive oxygen
- Self-disinfecting surfaces (e.g., heavy metals-copper, silver)
- Far UV 222 nm
- Bipolar ionization
- Multijet cold air plasma
- Continuously active disinfectant (CAD) or persistent disinfectant that provides continuous disinfection action
  - Allows continued disinfection and may eliminate the problem of recontamination
  - Patients, staff and visitors can remain in the room

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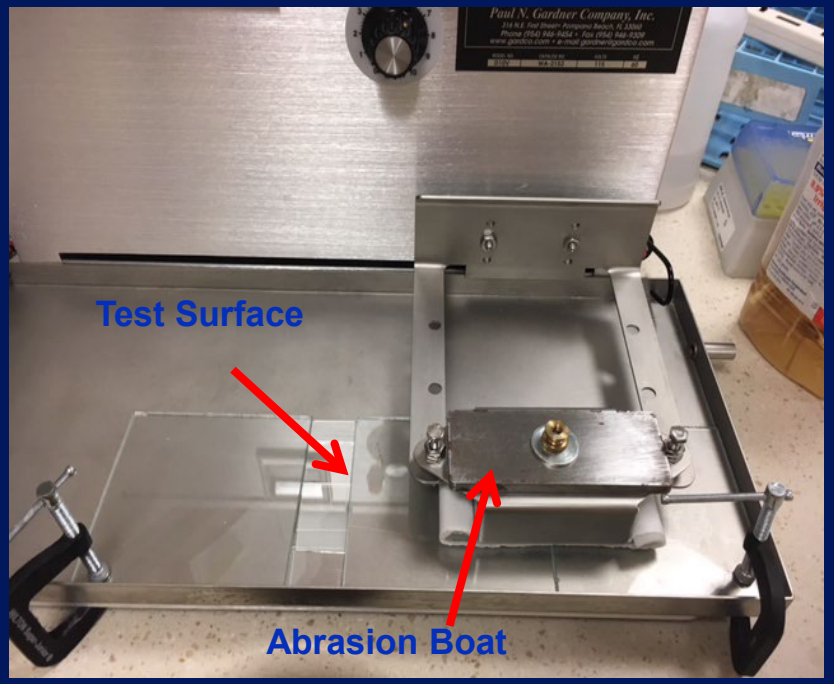
Evaluation of a Continuously Active Disinfectant "EPA Protocol for Residual Self-Sanitizing Activity of Dried Chemical Residuals on Hard, Non-Porous Surfaces"

Rutala et al. ICHE;2021: doi:10.1017/ice.2021.481; Rutala et al. ICHE 2019;40:1284

- Test surface inoculated (10^5), treated with test disinfectant, allowed to dry.
- Surface will undergo "wears" (abraded under alternating wet and dry conditions [24 passes, 12 cycles]) and 6 re-inoculations ($10^{\geq 3.75}$, 30min dry) over 48hr
- At the end of the study and at least 48 hours later, the ability of the test surface to kill microbes (99.9%) within 1 min is measured using the last inoculation (10^6)



Efficacy of a Continuously Active Disinfectant Against Healthcare Pathogens

Rutala WA et al. ICHE 2019;40:1284; Redmond et al. ICHE 2021, https://doi.org/10.1017/ice.2021.66

4-5 log_{10} reduction in 5 min over 24hr for HA pathogens; ~99% reduction with *Klebsiella* and CRE *Enterobacter*. Redmond et al. found 5 log_{10} reduction for CRE *Enterobacter, K. pneumoniae*, MRSA, VRE, and *C. auris*

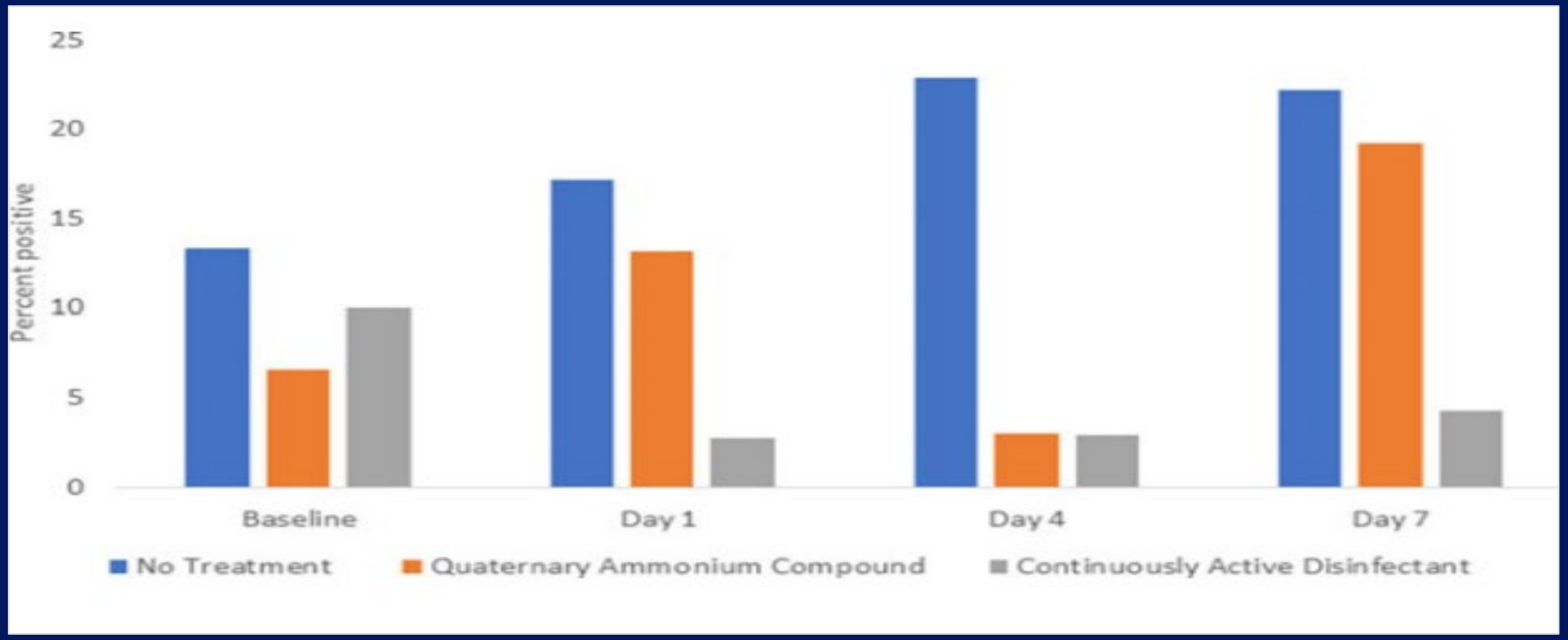
Test Pathogen	Mean Log_{10} Reduction , 95% CI n=4
*S.aureus**	4.4 (3.9, 5.0)
S.aureus (formica)	4.1 (3.8, 4.4)
S.aureus (stainless steel)	5.5 (5.2, 5.9)
VRE	≥4.5
E.Coli	4.8 (4.6, 5.0)
Enterobacter sp.	4.1 (3.5, 4.6)
Candida auris	≥5.0
K pneumoniae	1.5 (1.4, 1.6)
CRE *E.coli*	3.0 (2.6, 3.4)
CRE *Enterobacter*	2.0 (1.6, 2.4)
CRE *K pneumoniae*	2.1 (1.8, 2.4)

Efficacy of Continuously Active Disinfectant for Portable Medical Equipment (PME)

Redmond et al. ICHE 2021, https://doi.org/10.1017/ice.2021.66

Comparison of *S. aureus* and enterococci recovered from PME at baseline, 1, 4, 7days

The percentage of sites positive for *S. aureus* and/or enterococci was significantly reduced on days 1-7 in the continuously active group (3 of 93, 3%) versus both the no treatment group (20 of 97, 21%) and the Quat group (11 of 97, 11%)



Efficacy of a Continuously Active Disinfectant Against SARS-CoV-2 and Human Coronavirus, 229E, Evaluated after 48 hours

Rutala WA et al. ICHE, 2021 doi:10.1017/ice.2021.481

A novel disinfectant studied using an EPA protocol (wears/re-inoculations) demonstrated excellent continuous antiviral activity (i.e., >4-log_{10} reduction) in 1 minute after 48 hours for SARS-CoV-2 and human coronavirus, 229E

Table 1. Inactivation of SARS-CoV-2 and the Human Coronavirus 229E by a Continuously Active Disinfectant Following a 48-Hour Period of Wear and Abrasion Exposure

Carrier Treatment with Wears and Reinoculations	Contact Time	Mean Viral Recovery Titer per Carrier (Log_{10})	HCoV 229E Log_{10} Reduction	SARS-CoV-2 Log_{10} Reduction
Control (sterile ND water, n=3)	1 min	≥		NA
Continuously active disinfectant, n=3	1 min	≤ 1.50 ± 0.00	>4.50	>4.22

Note. NA, not available.

Efficacy of a Continuously Active Disinfectant

Summary

A continuously active disinfectant may reduce or eliminate the problem of recontamination of environmental surfaces and the role of contaminated environmental surfaces and equipment in transmission of healthcare pathogens including SARS-CoV-2.

Disinfection and Sterilization: Current Issues and New Technologies

- Overview DS
- HLD to Sterilization
- HLD to Sterilization-new tech
- LLD-Electrostatic sprayers-new data
- LLD-new sporicide-HP-new tech
- LLD-sporicide in all discharge pt rooms
- LLD-colorized disinfectant-new tech
- LLD-“no” touch room decontamination
- Continuous room decontamination technologies
  - Continuously active disinfectant-new technology

Disinfection and Sterilization:
Current Issues and New Technologies

- Endoscope represent a nosocomial hazard. Urgent need to transition from HLD to sterilization. New technology (e.g., disposable endcaps, LT sterilization, disposable scopes) should reduce or eliminate infection risk.
- Implement evidence-based practices for surface disinfection (product, practice, train, improve compliance, “no touch”)
- Continuous room decontamination technology (e.g., continuously active disinfectants, >4 $\log_{10}$ reduction in 1-5 min) shows promise and could reduce the risk of infections associated with devices (portable equipment) and surfaces

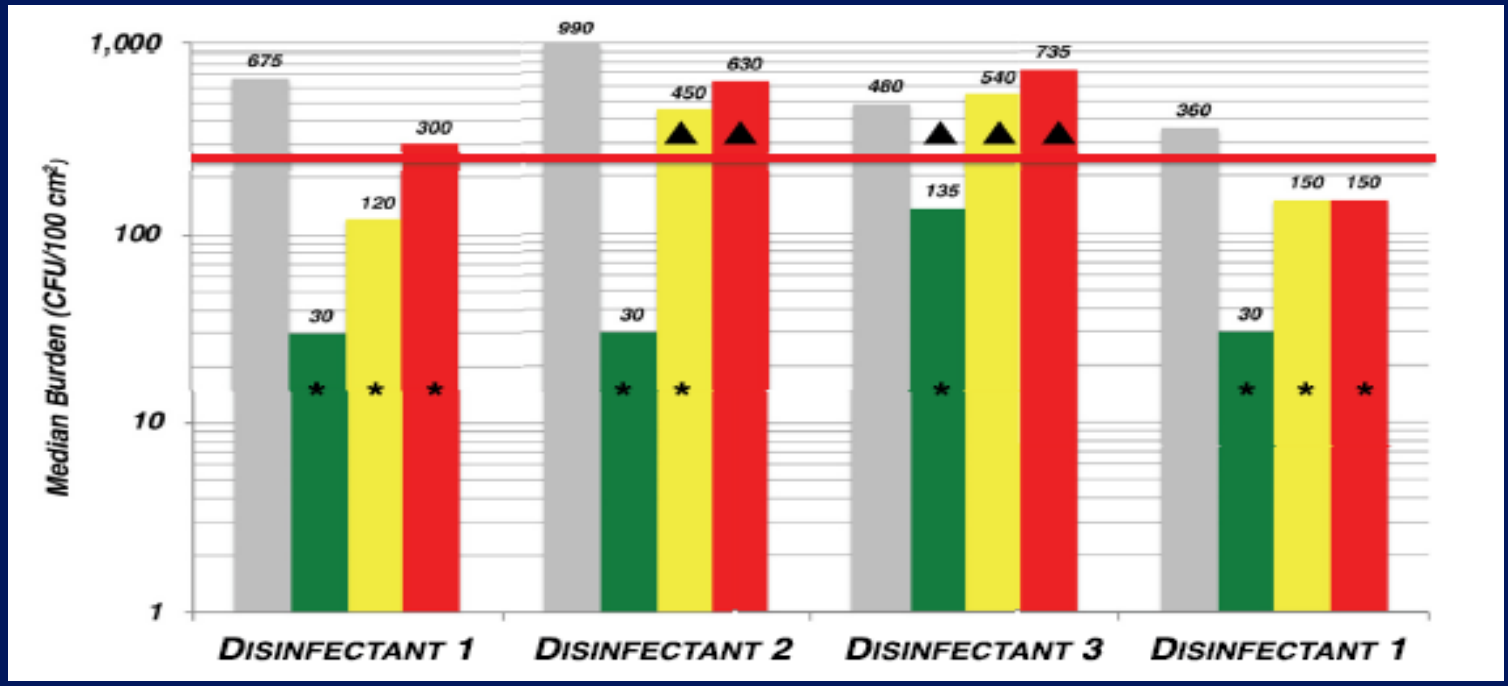
THANK YOU!

www.disinfectionandsterilization.org

Evaluation of Three Disinfectants for Ability to Limit Establishment of Bioburden After Disinfection

Schmidt et al. Am J Infect Control 2019;47:732-4

The continuously active disinfectant was able to significantly reduce bioburden on bed rails, a critical touch surface.



Bioburden samples (bed rails) were collected before disinfection (gray) and at 1, 6, and 24 hours. Each disinfectant significantly controlled bioburden for the first hour. In comparison, the CAD (Disinfectant 1) was found superior for all time points compared to two other Quats.