Tru-D SmartUVC

● ● ●

CLINICAL COMPENDIUM

June 2018

TABLE OF CONTENTS

BACKGROUND & OVERVIEW

Hospital-acquired infections (HAIs) cost health care facilities billions of dollars each year, and, according to the Centers for Disease Control and Prevention, 75,000 patients die annually in the U.S. alone from these infections. *Tru-D SmartUVC is changing the way health care works* by providing hospitals with cutting-edge technology for enhanced disinfection of hospital environments. Tru-D aims to offer a programmatic solution for hospitals' room disinfection needs and works with each facility to achieve their specific HAI reduction goals, resulting in significant cost savings and improved patient outcomes.

Company Profile

More than a decade ago, Tru-D was the first to bring to market a UV disinfection robot capable of precisely measuring UVC dose with its patented Sensor360 technology, resulting in consistent and thorough room disinfection. Validated by more than 15 independent studies, including the only randomized clinical trial on UV disinfection, which was funded by the Centers for Disease Control and Prevention (the Benefits of Enhanced Terminal Room-Disinfection or "BETR-Disinfection Study"), Tru-D's combined automated, measured dosing capabilities and real-time usage-tracking features make it one of the most precise and advanced automated UV disinfection systems available.

The BETR-Disinfection study, a well-controlled, randomized clinical trial, proves that Tru-D, in combination with quaternary ammonium disinfectants, makes a meaningful difference in patient outcomes and provides evidence that Tru-D helps reduce transmission of dangerous infections to at-risk patients. Further, the study proves that when used in "at-risk" rooms, Tru-D affects every patient who enters the hospital, providing a safer environment. Just as the BETR-Disinfection researchers continue to purchase Tru-D and utilize it in their individual hospitals, they have validated this as a very important step forward for hospitals and is a very significant complement to hospitals' infection reduction programs.

Tru-D provides an unmatched standard of care by reducing infections hospital-wide and improving patient safety while impacting community perceptions, reimbursements and profitability.

Clinical Compendium

This overview of third-party, peer-reviewed publications provides device-specific clinical validations of Tru-D's capabilities on HAI reduction, workflow, pathogen reduction, competitive comparatives, OR and ICU use and disinfection of complex medical devices.

The Future

In the growing UV disinfection space, Tru-D will build on its leadership position and strategic alliances to broaden its footprint as an infection prevention solution company. By investing in research and development, Tru-D will be able to have a wider impact and provide additional products and services to assist hospitals in the fight against HAIs.

Tru-D takes pride in the research and science behind its product and looks to expand upon the solid studies that validate its technology to provide hospitals with evidence-based best practices. With strategic leadership and a growing team, Tru-D will continue to offer best-in-class support and partnership to its customer base.

Tru-D's basis of scientific evidence and widespread adoption throughout prestigious hospital systems continue to drive market acceptance of UV disinfection technology. As more evidence of UV disinfection's efficacy becomes available, enhanced terminal room disinfection strategies will likely become a standard of care for all hospitals.

LITERATURE REVIEW

David J. Weber MD, MPH, William A. Rutala PhD, MPH, Deverick J. Anderson MD, MPH, Luke F. Chen MBBS, MPH, Emily E. Sickbert-Bennett PhD, MS, John M. Boyce MD, et al (2016). Effectiveness of ultraviolet devices and hydrogen peroxide systems for terminal room decontamination: Focus on clinical trials. American Journal of Infection Control, e77-e84.

A growing number of clinical studies have demonstrated that ultraviolet devices and hydrogen peroxide systems when used for terminal disinfection can reduce colonization or health care-associated infections in patients admitted to these hospital rooms. In this review, out of the 11 studies included, seven used Tru-D compared to four using competitor devices.

●　　●　　●

David J. Weber, Hajime Kanamori, and William A. Rutalaa, et al (2016). 'No touch' technologies for environmental decontamination: focus on ultraviolet devices and hydrogen peroxide systems. Current Opinion in Infectious Diseases, 29:000-000.

A validated 'no touch' device or system should be used for terminal room disinfection following discharge of patients on contact precautions.

●　　●　　●

William Rutala, PhD, MPH., David J. Weber, MD, MPH., et al (2011). Are room decontamination units needed to prevent transmission of environmental pathogens? Infection Control and Hospital Epidemiology, 32(8) 743-747.

There are now 3 studies that have demonstrated that this UVC system (Tru-D SmartUVC) is capable of reducing vegetative bacteria inoculated C. difficile by 1.7–4 log_{10}.

Results proved that enhanced terminal room disinfection strategies that utilized Tru-D SmartUVC reduced the risk of acquisition and infection of four, major multidrug-resistant organisms (MDROs) by a cumulative 30% among patients who entered the same room, which was previously occupied by a patient colonized or infected with one of these pathogens.

The Benefits of Enhanced Terminal Room (BETR) Disinfection Study: A Cluster Randomized, Multicenter Crossover Study with 2x2 Factorial Design to Evaluate the Impact of Enhanced Terminal Room Disinfection on Acquisition and Infection Caused by Multidrug-Resistant Organisms (MDRO)

Deverick Anderson, Md, Mph, Fidsa, Fshea[1], Luke F. Chen, Mbbs, Mph, Cic, Fracp[1], David J. Weber, Md, Mph, Fidsa, Fshea[2], Rebekah W. Moehring, Md, Mph[1], Sarah S. Lewis, Md Mph[1], Patricia Triplett, Md[3], Michael Blocker, Md[4], Paul Becherer, Md[5], J. Conrad Schwab, Md[6], Lauren P. Knelson, Msph[1], Yuliya Lokhnygina, Ms, Phd[7], William Rutala, Phd, Mph, Fshea[2], Daniel J. Sexton, Md, Fidsa, Fshea[1] And Cdc Prevention Epicenters Program; [1]Duke Infection Control Outreach Network, Duke University Medical Center, Durham, NC, [2]University of North Carolina Health Care, Chapel Hill, NC, [3]High Point Regional Health System, High Point, NC, [4]Alamance Regional Medical Center, Burlington, NC, [5]Rex Healthcare, Raleigh, NC, [6]Chesapeake Regional Healthcare, Chesapeake, VA, [7]Duke University, Durham, NC

Background

Enhanced terminal disinfection may decrease the risk of acquiring MDROs from the environment, but these strategies have not been evaluated in a large, randomized trial.

Methods

The BETR-Disinfection study was performed over 28 months in 9 study hospitals from 4/2012 to 7/2014. Each hospital used four strategies for terminal room disinfection in a randomized sequence. Each strategy was used for 7-month study arms, including a 1 month wash-in period. Two of these strategies used a UV-C emitting device.

A total of 311,407 patients had 606,828 unique room stays in the study hospitals during the study; 24,589 eligible patients were exposed resulting in 122,873 exposure days.

Conclusion

Enhanced terminal room disinfection strategies that utilized UV-C emitters reduced the risk of acquisition and infection caused by target MDRO.

Publication

The Lancet

Trial Registration

Clinical Trials Identifier: NCT 01579370

HAI REDUCTION - Randomized Clinical Trial

In conclusion, enhanced terminal room disinfection with UV in a targeted subset of high-risk rooms (ie, contact precaution rooms) led to a decrease in risk of acquisition of target multidrug-resistant organisms such as C difficile and VRE for all hospitalised patients, through both direct and indirect effects. These findings are important, because they suggest that strategies targeting high-risk rooms might have benefit for the larger population of patients admitted to hospital, by reducing the burden of pathogenic organisms in the hospital microbiome.

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

Background

The hospital environment is a source of pathogen transmission. The effect of enhanced disinfection strategies on the hospital-wide incidence of infection has not been investigated in a multicentre, randomised controlled trial. We aimed to assess the effectiveness of four disinfection strategies on hospital-wide incidence of multidrug resistant organisms and Clostridium difficile in the Benefits of Enhanced Terminal Room (BETR) Disinfection study.

Methods

We did a prespecified secondary analysis of the results from the BETR Disinfection study, a pragmatic, multicentre, crossover cluster-randomised trial that assessed four different strategies for terminal room disinfection in nine hospitals in the southeastern USA.

Conclusion

Enhanced terminal room disinfection with UV in a targeted subset of high-risk rooms led to a decreasein hospital-wide incidence of C difficile and VRE. Enhanced disinfection overcomes limitations of standard disinfection strategies and is a potential strategy to reduce the risk of acquisition of multidrug-resistant organisms and C difficile.

Publication

The Lancet Infectious Diseases

Trial Registration

Clinical Trials Identifier: NCT 01579370

HAI REDUCTION - Long Term Care

In an effort to prevent additional CDI recurrences, we used an automated UV radiation device (Tru-D SmartUVC), which has been shown to reduce the environmental burden of C. difficile.

Decontamination with Ultraviolet Radiation to Prevent Recurrent Clostridium difficile Infection in 2 Roommates in a Long-Term Care Facility

Brett Sitzlar, BS; Ravy K. Vajravelu, BS; Lucy Jury, NP; Curtis J. Donskey, MD; Robin L.P. Jump, MD, PhD

Methods

In an effort to prevent additional CDI recurrences, we used an automated UV radiation device (Tru-D SmartUVC), which has been shown to reduce the environmental burden of C. difficile. The UV radiation device was run for a full cycle in both the bathroom and patient room (22,000 mWs/cm$_2$ for ~ 90 min) at a time when both patients were absent. Afterward, a second set of environmental swab samples were obtained. C. difficile was detected only on a bed rail (1 colony). Five weeks after UV radiation, rectal swab samples obtained from both patients were negative for C. difficile. In the subsequent months, neither patient had additional episodes of CDI.

Findings

Routine use of UV radiation devices to decrease the environmental burden of pathogens is a feasible addition to current infection control and housekeeping measures and may ultimately help to reduce rates of CDI among patients in hospitals and LTCFs.

Publication

HAI REDUCTION

Quat vs. Quat/UV revealed that a reduction of 94% in epidemological important pathogens (EIP) (60.8 vs. 3.36) led to a 35% decrease in colonization/infection (2.3% vs. 1.5%).

Microbial Load on Environmental Surfaces: The Relationship Between Reduced Environmental Contamination and Reduction of Healthcare-Associated Infections

William A. Rutala[1,2], PhD, MPH, Hajime Kanamori[1,2], MD, PhD, MPH, Maria F. Gergen[1], MT (ASCP), Emily E. Sickbert-Bennett[1,2], PhD, Lauren P. Knelson[3], MSPH, Luke F. Chen[3], MBBS, MPH, MBA, Daniel J. Sexton[3], MD, Deverick J. Anderson[3], MD, MPH and David J. Weber[1,2], MD, MPH, and the CDC Prevention Epicenters Program

[1]Hospital Epidemiology, University of North Carolina Health Care, [2]Division of Infectious Diseases, University of North Carolina School of Medicine, Chapel Hill, NC, [3]Duke Infection Control Outreach Network, Division of Infectious Diseases, Duke University Medical Center, Durham, NC, USA

Background

Disinfection of noncritical environmental surfaces and equipment is an essential component of infection prevention as surfaces may contribute to cross-trans mission of epidemiologically important pathogens. We monitored four epidemiologically-important pathogens (EIP), including MRSA, VRE, C. difficile and MDR-Acinetobacter. The current study was performed in two hospitals contemporaneously with the BETR-Disinfection study, a multi-center cross-over study comparing the feasibility and effectiveness of three enhanced disinfection strategies for terminal room disinfection against standard practice.

Methods

Microbiological samples were collected from eight previously-identified high-frequency-touch hospital room surfaces. Each surface was sampled repeatedly using 10 individual Rodac plates (25cm2/plate).

Results

All enhanced disinfection interventions (i.e., Quat/UV, Bleach, Bleach/UV) were significantly superior to a Quat alone in reducing EIP (Table). The BETR-Disinfection study demonstrated the rate of colonization/infection in a patient subsequently admitted to a room of a patient colonized/infected with an EIP was Quat, 2.3%; Quat/UV, 1.5%; Bleach, 1.9%, and Bleach/UV, 2.2%.

Conclusion

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 3.36) 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 subsequent patient colonization/infection.

Publication | Presentation

ID Week Abstract 2016

HAI REDUCTION - CDI Rates

When Tru-D was added to a compendium of infection reduction efforts, HO CDI rates dropped from 11.49 to 6.93 per 10,000 patient days.

Everything But the Kitchen Sink: Reducing Hospital Onset Clostridium difficile Infections

Marc-Oliver Wright, MT (ASCP), MS, CIC, FAPIC, Linda Stevens, DNP, RN, Amy Marver, RN, MSN, Nasia Safdar. MD, PhD

University of Wisconsin Hospitals and Clinics, University of Wisconsin-Madison, School of Medicine and Public Health, Division of Infectious Disease

William S. Middleton Veterans Hospital, Department of Veterans Affairs

Background

Despite broad utilization of a sporicidal disinfectant, an established antimicrobial stewardship program, sporadic supplemental UV light disinfection and a quality assurance program for monitoring cleaning of high touch surfaces, the hospital onset (HO) LabID rate for Clostridium difficile infection (CDI) as defined by the National Healthcare Safety Network (NHSN) at a major academic medical center was in excess of expected in 2014-2015 (SIR = 1.26 from 2006-2008 baseline, 372/323893 or 11.49 per 10,000 patient days).

Methods

A number of interventions were implemented anew or intensified if already being used. The number of high touch objects being monitored for effective cleaning was doubled and a diagnostic testing algorithm designed to discourage inappropriate testing was developed and released in late 2015 (A) and hardwired into the organization's electronic health record in 2016 (B for on admission, C for HO). Screening asymptomatic bone marrow transplant patients on admission began in a single mixed oncology unit and student volunteer hand hygiene and isolation compliance audits were conducted in random CDI patient rooms (D). In 2016, unit-based rapid intervention teams with staff and patient education and unit-based event reviews for hospital onset CDI were deployed in all inpatient units (E). Fluoroquinolones required pre-approval in two high acuity/utilization units (F) and systematic implementation of UV light technology for all CDI discharges was implemented (G) (Figure 1)
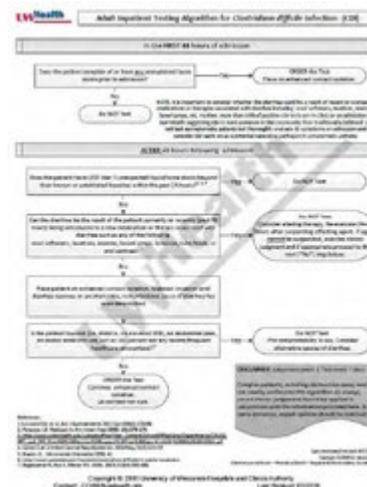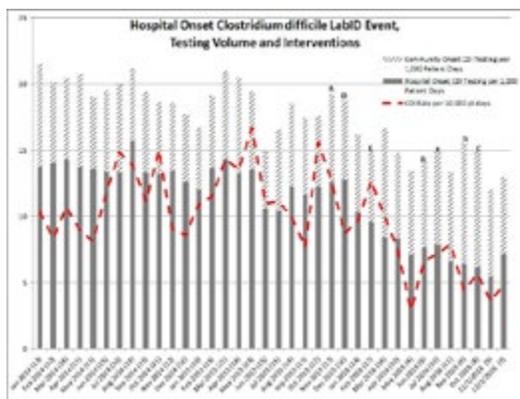
Results

HO-CDI dropped to 6.93 per 10,000 patient days (115/165869, RR=0.60, p<0.001) in 2016. Hospital onset CDI testing dropped precipitously from 13 per 1,000 patient days to 7.0 (p<0.001).

Conclusions

An existing multi-faceted prevention strategy was insufficient in achieving low HO-CDI rates. Only after implementing a more aggressive program and specifically addressing diagnostic/laboratory stewardship was a sustained improvement attained.

Publication

WORKFLOW & UTILIZATION

The combined results of the study concluded that "routine use of UV disinfection is a feasible addition to current infection control and environmental management service measures and may help reduce rates or health care-associated infections and ensure our Veterans a clean, safe environment for their health care."

Infection Prevention: Ultraviolet Disinfection Trial

Tina Schmidt, BSN, RN, CIC Infection Prevention Nurse

Paulette Masberg, BSN, RN MDRO Coordinator

Publication / Presentation

VA Health Care

Close up of the 12/16/2016 ENDOSCOPY Rm 251 lap top keyboard. 6 different colonies growth prior to TRU-D on the left, and no growth noted on the plate post TRU-D on the right.

Before Tru-D   After Tru-D
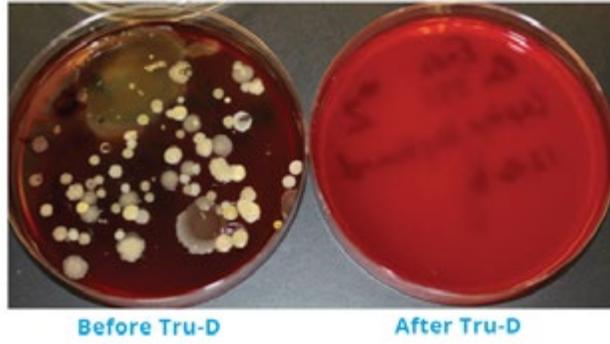
We believe that this conflict needs to be viewed as a safety issue because enhanced disinfection using UV devices is an evidence-based strategy to improve patient safety.
(Room turnover time vs. admitting patient to at risk room)

Implementation Lessons Learned From the Benefits of Enhanced Terminal Room (BETR) Disinfection Study: Process and Perceptions of Enhanced Disinfection with Ultraviolet Disinfection Devices

Deverick J. Anderson, MD;[1] Lauren P. Knelson, MSPH;[1] Rebekah W. Moehring, MD, MPH;[1,3] Sarah S. Lewis, MD, MPH;[1] David J. Weber, MD, MPH;[2] Luke F. Chen, MBBS, MPH;[1] Patricia F. Triplett, MD;[2,4] Michael Blocker, MD;[5,6] R. Marty Cooney, MPH, MSE, BSN;[7] J. Conrad Schwab, MD;[8] Yuliya Lokhnygina, PhD;[9] William A. Rutala, PhD;[2] Daniel J. Sexton, MD1 for the CDC Prevention Epicenters Program

Objective

To summarize and discuss logistic and administrative challenges we encountered during the Benefits of Enhanced Terminal Room (BETR) Disinfection Study and lessons learned that are pertinent to future utilization of ultraviolet (UV) disinfection devices in other hospitals

Design

Multicenter cluster randomized trial

Setting & Participants

Nine hospitals in the southeastern United States

Methods

All participating hospitals developed systems to implement 4 different strategies for terminal room disinfection. We measured compliance with disinfection strategy, barriers to implementation, and perceptions from nurse managers and environmental services (EVS) supervisors throughout the 28-month trial results. Implementation of enhanced terminal disinfection with UV disinfection devices provides unique challenges, including time pressures from bed control personnel, efficient room identification, negative perceptions from nurse managers, and discharge volume. In the course of the BETR Disinfection Study, we utilized several strategies to overcome these barriers: (1) establishing safety as the priority;(2) improving communication between EVS, bed control, and hospital administration; (3) ensuring availability of necessary resources; and (4) tracking and providing feedback on compliance. Using these strategies, we deployed ultraviolet (UV) disinfection devices in 16,220 (88%) of 18,411 eligible rooms during our trial (median per hospital, 89%; IQR, 86%–92%).

Conclusion

Implementation of enhanced terminal room disinfection strategies using UV devices requires recognition and mitigation of 2 key barriers: (1) timely and accurate identification of rooms that would benefit from enhanced terminal disinfection and (2) overcoming time constraints to allow EVS cleaning staff sufficient time to properly employ enhanced terminal disinfection methods.

Trial Registration

Clinical Trials Identifier: NCT 01579370

WORKFLOW & UTILIZATION

- *88% Utilization (target at-risk room vs. capture rate)*

- *Maintained 19 months resulting in 100% utilization*

Deployment of a touchless ultraviolet light robot for terminal room disinfection: The importance of audit and feedback

Michele Fleming MSN, RN, CIC*, Amie Patrick BSN, RN, Mark Gryskevicz,Nadia Masroor MPH, BS, Lisa Hassmer MBA, Kevin Shimp MSN, RN, Kaila Cooper MSN, RN, CIC, Michelle Doll MD, MPH, Michael Stevens MD, MPH,Gonzalo Bearman MD, MPH

Virginia Commonwealth University Health System, Richmond, VA

Results

During the 25-month assessment period, UVD capture rate increased from a baseline of 20% (14 out of 70) to 100% (47 out of 47) (Fig 1). During the first month, there were 70 opportunities for UVD; 14 rooms were disinfected for a capture rate of 20% (Fig 2).

During the final month of assessment, the capture rate for the UV disinfection was 100%: 47 rooms were disinfected and 47 rooms were eligible for disinfection. The UVD capture rate remained consecutively above 80% for 19 of the 25 months. During months 21-25, the capture rate remained above the goal of ≥90%. Tracking of UVD device use indicated that as the capture rate increased, the number of days the devices were not used decreased. The standardized infection ratio for National Healthcare Safety Network Lab ID C difficile decreased from 1.283 in 2015 to 1.212 in 2016. This result was not statistically significant (P = .6067).

Conclusions

Multidisciplinary collaboration, education, and structured A&F improve fidelity with UVD of rooms of patients with a history of Cdifficile infection.

Publication

PATHOGEN REDUCTION

Concludes pathogen reduction in patient rooms in direct & indirect areas before stnadard terminal room disinfection by environmental services.

Decontamination of Targeted Pathogens from Patient Rooms Using an Automated Ultraviolet-C-Emitting Device

Deverick J. Anderson, MD, MPH;[1,2] Maria F. Gergen, MT (ASCP);[3] Emily Smathers, MPH;[2] Daniel J. Sexton, MD;[1,2] Luke F. Chen, MBBS, MPH;[1,2] David J. Weber, MD, MPH;[3,4] William A. Rutala, PhD, MPH;[3,4] CDC Prevention Epicenters Program

Objective

To determine the effectiveness of an automated ultraviolet-C (Tru-D SmartUVC) emitter against vancomycin-resistant enterococci (VRE), Clostridium difficile,nand Acinetobacter spp.in patient rooms.

Prospective cohort study. Two tertiary care hospitals. Convenience sample of 39 patient rooms from which a patient infected or colonized with 1 of the 3 targeted pathogens had been discharged.

Results

In total, 142 samples were obtained from 27 rooms of patients who were colonized or infected with VRE, 77 samples were obtained from 10 rooms of patients with C. difficile infection, and 10 samples were obtained from 2 rooms of patients with infections due to Acinetobacter. Use of an automated UV-C emitting device led to a significant decrease in the total number of colony forming units (CFUs) of any type of organism (1.07 log10 reduction; $P < .0001$), CFUs of target pathogens (1.35 log10 reduction; $P < .0001$), VRE CFUs (1.68 log10 reduction; $P < .0001$), and C. difficile CFUs (1.16 log10 reduction; $P < .0001$). CFUs of Acinetobacter also decreased (1.71 log10 reduction), but the trend was not statistically significant ($P = .25$). CFUs were reduced at all 9 of the environmental sites tested. Reductions similarly occurred in direct and indirect line of sight.

Conclusions

Our data confirm that automated UV-C-emitting devices can decrease the bioburden of important pathogens in real-world settings such as hospital rooms.

Publication

PATHOGEN REDUCTION

Colony counts were also reduced on surfaces such as grab bars and toilet seats in the patients' bathrooms, which were not in direct line of sight from the device (shadowed areas), but to a lesser degree.

We confirmed the results of 2 previous studies that demonstrated that an automated UVLD device significantly reduced environmental contamination on high-touch surfaces in patient rooms.

Terminal Decontamination of Patient Rooms Using an Automated Mobile UV Light Unit,

John M. Boyce MD; Nancy L. Havill, MT; Brent A. Moore, PhD

To determine the ability of a mobile UV light unit to reduce bacterial contamination of environmental surfaces in patient rooms.

An automated mobile UV light unit that emits UV-C light was placed in 25 patient rooms after patient discharge and operated using a 1- or 2-stage procedure.

1 stage – Bathroom door is open and Tru-D placed in center of the room

2 stage – Bathroom is disinfected separately

Conclusions

The mobile UV-C light unit significantly reduced aerobic colony counts and C. difficile spores on contaminated surfaces in patientrooms.

Noted: In conclusion, we confirmed the results of 2 previous studies that demonstrated that an automated UVLD device significantly reduced environmental contamination on hightouch surfaces in patient rooms. Although the methods we used to assess the efficacy of the device differed from those used in previous studies, the levels of reduction in vegetative bacteria and C. difficile spores observed in our study were similar to those reported previously.

Publication

Infection Control & Hospital Epidemiology 2011, Vol 32(8) 737-742

It is noted that High Log$_{10}$ reduction of C.diff occurred near the end of Tru-D's measured dose cycle.

Evaluation of an automated ultraviolet radiation device for decontamination of Clostridium difficile and other healthcare-associated pathogens in hospital rooms

Michelle M Nerandzic, Jennifer L Cadnum Michael J Pultz and Curtis J Donskey MD

Background

Environmental surfaces play an important role in transmission of healthcare-associated pathogens. There is a need for new disinfection methods that are effective against Clostridium difficile spores, but also safe, rapid, and automated.

Methods

We examined the efficacy of environmental disinfection using the Tru-D device in the laboratory and in rooms of hospitalized patients. Cultures for C. difficile, methicillin-resistant Staphylococcus aureus (MRSA), and vancomycin-resistant Enterococcus (VRE) were collected from commonly touched surfaces before and after use of Tru-D.

Results

On inoculated surfaces, application of Tru-D's reflected dose consistently reduced recovery of C. difficile spores and MRSA by >2-3 log10 colony forming units (CFU)/cm2 and of VRE by >3-4 log10 CFU/cm2. Similar killing of MRSA and VRE was achieved in ~20 minutes at a reflected dose of 12,000 μWs/cm2, but killing of C. difficile spores was reduced. Disinfection of hospital rooms with Tru-D reduced the frequency of positive MRSA and VRE cultures by 93% and of C. difficile cultures by 80%. After routine hospital cleaning of the rooms of MRSA carriers, 18% of sites under the edges of bedside tables (i.e., a frequently touched site not easily amenable to manual application of disinfectant) were contaminated with MRSA, versus 0% after Tru-D (P < 0.001). The system required <5 minutes to set up and did not require continuous monitoring.

Conclusions

The Tru-D SmartUVC device is a novel, automated, and efficient environmental disinfection technology that significantly reduces C. difficile, VRE and MRSA contamination on commonly touched hospital surfaces.

Publication
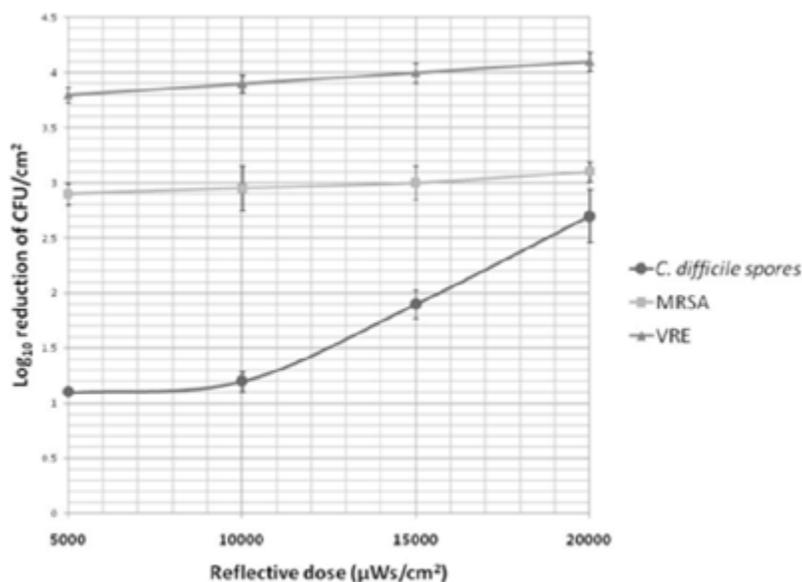
PATHOGEN REDUCTION

First study to conclude significant C. difficile reductions in direct & indirect shadowed areas.

Room Decontamination with UV Radiation

William A.Rutala, PhD, MPH; Maria F. Gergen, MT (ASCP); David J.Weber, MD, MPH

Objective

To determine the effectiveness of a UV-C–emitting device (Tru-D SmartUVC) to eliminate clinically important nosocomial pathogens in a contaminated hospital room.

Methods

This study was carried out in a standard but empty hospital room (phase 1) and in a room previously occupied by a patient with methicillinresistant Staphylococcus aureus (MRSA) or vancomycin-resistant Enterococcus (VRE) infection (phase 2) in an acute care tertiary hospital in North Carolina from January 21 through September 21, 2009.

Results

In our test room, the effectiveness of UV-C radiation in reducing the counts of vegetative bacteria on surfaces was more than 99.9% within 15 minutes, and the reduction in C. difficile spores was 99.8% within 50 minutes

Conclusion

This UV-C device was effective in eliminating vegetative bacteria on contaminated surfaces both in the line of sight and behind objects within approximately 15 minutes and in eliminating C. difficile spores within 50 minutes.

Publication

Infect Control Hosp Epidemiol 2010;31(10):1025-1029.

| | | UV-C line of sight | | | | | | |
| | | Total | | Direct | | Indirect | | |
Organism	Inoculum	No. of samples	Decontamination, $\log_{10}$ reduction, mean (95% CI)	No. of samples	Decontamination, $\log_{10}$ reduction, mean (95% CI)	No. of samples	Decontamination, $\log_{10}$ reduction, mean (95% CI)	P
MRSA	4.88 $\log_{10}$	50	3.94 (2.54–5.34)	10	4.31 (3.13–5.50)	40	3.85 (2.44–5.25)	.06
VRE	4.40 $\log_{10}$	47	3.46 (2.16–4.81)	15	3.90 (2.99–4.81)	32	3.25 (1.97–4.62)	.003
MDR A. baumannii	4.64 $\log_{10}$	47	3.88 (2.59–5.16)	10	4.21 (3.27–5.15)	37	3.79 (2.47–5.10)	.07
C. difficile spores	4.12 $\log_{10}$	45	2.79 (1.20–4.37)	10	4.04 (3.71–4.37)	35	2.43 (1.46–3.40)	<.001

NOTE. Patient rooms had a mean area of 12.1 m² including bathroom. CI, confidence interval.

PATHOGEN REDUCTION

We suggest that effective disinfection of operating tables and bed railings in military treatment facilities can be achieved with UVC lamps. Tru-D is a cost-effective, easy to use noninvasive, noncorrosive approach, with no adverse environmental effects.

Disinfection of Acinetobacter Baumannii-Contaminated Surfaces Relevant to Medical Treatment Facilities with Ultraviolet C Light

Vipin K. Rastogi, PhD; Lalena Wallace,MS; Lisa S. Smith, MS

Conclusion

We suggest that effective disinfection of operating tables and bed railings in military treatment facilities can be achieved with UVC lamps. UVC irradiation is a cost-effective, easy-to-use, noninvasive, noncorrosive approach, with no adverse environmental effects. All three dimensional surfaces must be directly exposed to the UVC irradiation (either direct line of site or indirect via relected UV dose), to ensure better infection control in patient treatment facilities.

Publication

COMPARATIVE STUDY: TRU-D VS. XENEX

Real world performance and comparative effectiveness of different devices

Objective

To determine the effectiveness of a pulsed xenon ultraviolet (PX-UV) disinfection device for reduction in recovery of healthcare-associated pathogens.

Setting

Two acute-care hospitals.

Methods

We examined the effectiveness of PX-UV for killing of Clostridium difficile spores, methicillin-resistant Staphylococcus aureus (MRSA), and vancomycin-resistant Enterococcus (VRE) on glass carriers and evaluated the impact of pathogen concentration, distance from the device, organic load, and shading from the direct field of radiation on killing efficacy. We compared the effectiveness of PX-UV and ultraviolet-C (UV-C) irradiation, each delivered for 10 minutes at 4 feet. In hospital rooms, the frequency of native pathogen contamination on high-touch surfaces was assessed before and after 10 minutes of PX-UV irradiation.

Results

On carriers, irradiation delivered for 10 minutes at 4 feet from the PX-UV device reduced recovery of C. difficile spores, MRSA, and VRE by 0.55 ± 0.34, 1.85 ± 0.49, and 0.6 ± 0.25 log_{10} colony-forming units (CFU)/cm2, respectively. Increasing distance from the PX-UV device dramatically reduced killing efficacy, whereas pathogen concentration, organic load, and shading did not. Continuous UV-C achieved sig-nificantly greater log_{10}CFU reductions than PX-UV irradiation on glass carriers. On frequently touched surfaces, PX-UV significantly reduced the frequency of positive C. difficile, VRE, and MRSA culture results.

Conclusions

The PX-UV device reduced recovery of MRSA, C. difficile, and VRE on glass carriers and on frequently touched surfaces in hospital rooms with a 10-minute UV exposure time. PX-UV was not more effective than continuous UV-C in reducing pathogen recovery on glass slides, suggesting that both forms of UV have some effectiveness at relatively short exposure times

Publication
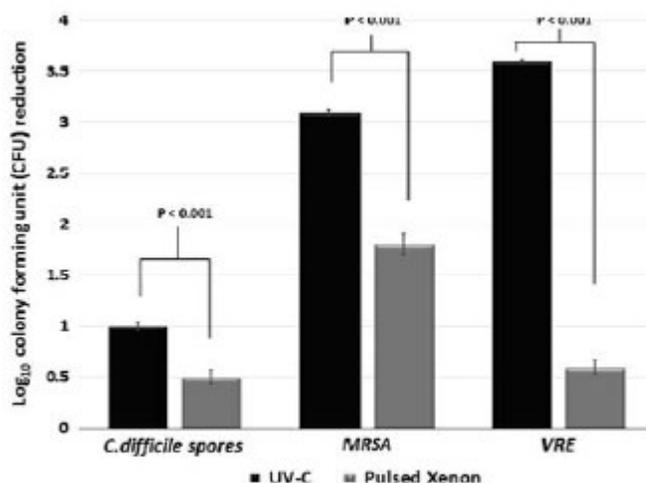
FIGURE 4. The efficacy of pulsed xenon ultraviolet (PX-UV) versus continuous mercury UV-C for killing of pathogens.

OPERATING ROOM & ICU UTILIZATION

The device was easy to transport and utilize, and able to disinfect rooms rapidly.

First UK evaluation of an automated ultraviolet-C room decontamination device (Tru-D)

N. Mahida a, N. Vaughan b, T. Boswell a, *

a Department of Clinical Microbiology, Nottingham University Hospitals NHS Trust, Nottingham, UK

b Infection Prevention and Control Department, Nottingham University Hospitals NHS Trust, Nottingham, UK

Tru-D is an automated room disinfection device that uses ultraviolet-C radiation to kill micro-organisms. The device was deployed in six side-rooms and an operating theatre. In a cleaned, unoccupied operating theatre, Tru-D eradicated all organisms from the environment. Using artificially seeded Petri dishes with meticillin-resistant Staphylococcus aureus, multi-resistant acinetobacter and vancomycin-resistant enterococci, the mean log_{10} reductions were between three and four when used at 22,000 mWs/cm2 reflected dose. The device was easy to transport and utilize, and able to disinfect rooms rapidly. This appears to be a practical alternative technology to other 'no-touch' automated room disinfection systems.

Publication

Figure 1. The Tru-D unit in operation.

OPERATING ROOM & COMPLEX EQUIPMENT

Regardless of room size and exposure type, automated UV-C treatment greatly influences BR on AW high-touch surfaces. Hospitals instituting an automated UV-C system as an infection prevention adjunct should consider utilizing it in operating rooms for BR as part of a horizontal infection prevention surgical site infection-reduction strategy.

Ultraviolet-C light as a means of disinfecting anesthesia workstations

Matthew Nottingham BS a,b,*, Gene Peterson MD, PhD b, Christopher Doern PhD b, Michelle Doll MD, MPH b, Nadia Masroor MS b, Kakotan Sanogo MPH b, Michael Stevens MD, MPH b, Gonzalo Bearman MD, MPH b

a Virginia Commonwealth University School of Medicine, Richmond, VA

b Virginia Commonwealth University Health System, Richmond, VA

Background

Anesthesia workstations (AWs) are a reservoir for pathogenic organisms potentially associated with surgical site infections. This study examined the effectiveness of the Tru-D SmartUVC device (Tru-D LLC, Memphis, TN) on bioburden reduction (BR) on AWs.

Methods

Strips of tissue inoculated with a known concentration of either Staphylococcus aureus, Enterococcus faecalis, or Acinetobacter sp were placed on 22 high-touch surfaces of an AW. Half of the AW surfaces received direct ultraviolet (UV) light exposure and half received indirect exposure. Two inoculated strips, in sterile tubes outside of the room, represented the control. Trials were conducted on AWs in an operating room and a small room. Strips were placed in a saline solution, vortexed, and plated onblood agar to assess BR by the number of colony forming units.

Results

All experimental trials, compared with controls, exhibited a BR >99%. There was a significantly greater reduction of E faecalis colony forming units in the operating room AW under direct exposure (P = .019) compared with indirect exposure. There was no significant difference in reduction when comparing AWs between rooms.

Conclusion

Regardless of room size and exposure type, automated UV-C treatment greatly influences BR on AW high-touch surfaces. Hospitals instituting an automated UV-C system as an infection prevention adjunct should consider utilizing it in operating rooms for BR as part of a horizontal infection prevention surgical site infection-reduction strategy.

Publication

Tru-D SmartUVC, LLC

743 S. Dudley

Memphis, TN 38104

(800) 774-5799

www.tru-d.com

info@tru-d.com

●   ●   ●