SARS Coronavirus UV Susceptibility

Severe Acute Respiratory Syndrome (SARS) virus is an emerging respiratory infection that has caused outbreaks in health care settings (Ho et al 2003, HWFB 2003). SARS virus is a new variant of the Coronavirus family and transmits by the airborne route and by direct contact or contact with fomites on surfaces. Transmission is believed to be by droplet spray from coughing and sneezing and by direct contact but airborne transmission can also occur (He et al 2003, CDC 2003). SARS has been transmitted to HCWs during high-risk exposure associated with aerosolization of respiratory secretions.

Coronaviruses are members of the Coronaviridae group and contain a single-stranded, positive-sense RNA genome surrounded by a corona-like helical envelope (Ryan 1994). The SARS virus genome consists of 29,751 base pairs. Approximately 41% of the genome is GC base pairs while 59% is TA base pairs. Coronaviruses have a size range of 0.08-0.15 microns; with a mean size of 0.11 microns (see Figure 1). Common Coronaviruses are responsible for colds and can transmit by the airborne route as well as through direct contact.

NOTE: SARS is not to be confused with Influenza A viruses (i.e. Influenza AH1N1) which are members of the Orthomyxovirus group and contain a single-stranded RNA genome enclosed in a helical envelope. The genome consists of 13,588 base pairs. Influenza viruses are responsible for flus and can transmit by the airborne route as well as through direct contact.

SARS coronavirus is one of the most hazardous infections for hospital personnel. In a study by He et al (2003) it was found that index patients were the first generation source of transmission and they infected inpatients and medical staff, creating second generation patients. The major transmission routes were close proximity airborne droplet infection and close contact infection. There was also evidence for the likelihood of aerosol transmission of infections through the ventilation system, which spread the infection to other hospital floors. A similar report comes from Ho et al (2003), who found that Hospital outbreaks of SARS typically occurred within the first week after admission of the first SARS cases before recognition and before isolation measures were implemented. In the majority of hospital infections, there was close contact with a SARS patient, and transmission occurred via large droplets, direct contact with infectious fluids or by contact with fomites from infectious fluids. In some instances, potential airborne transmission was reported in association with endotracheal intubation, nebulised medications and non-invasive positive pressure ventilation of SARS patients. Nosocomial transmission was effectively halted by enforcement of standard routines, contact and droplet precautions in all clinical areas, and additional airborne precautions in high-risk areas.

Table 1: Summary of Ultraviolet Studies on Coronaviruses

Microbe	D_{90} J/m^2	UVGI k m^2/J	Media	RH %	Dia. μm	Base Pairs kb	Source
Coronavirus	3	0.37700	Air	50	0.113	30.738	Walker 2007
Coronavirus	7	0.32100	W	Wat	0.113	30.738	Weiss 1986
Coronavirus (SARS)	9	0.25340	W	Wat	0.113	29.751	Duan 2003
Coronavirus (SARS)	226	0.01000	W	Wat	0.113	29.751	Kariwa 2004
Coronavirus (SARS)	3046	0.00076	W	Wat	0.113	29.751	Darnell 2004
Genomic Prediction	7	0.3289	W	Wat	0.113	29.751	Kowalski 2015

Table 1 summarizes the studies that have been performed on Coronaviuses under UV exposure and also shows the genomic prediction of the UV rate constant in the final row. The last two studies (Kariwa 2004 and Darnell 2004) seem to be anomalous but it is unclear from the data why these results indicate such an unusually high UV resistance, but have been included for completeness. All the data in Table 1 except for the Duan (2003) study were used in the development of the genomic model of ssRNA viruses shown in Figure 2. Based on the ssRNA genomic model the UV rate constant for SARS Coronavirus computes to be **0.3289 m^2/J** and this gives a D90 value of **7 J/m^2**, which is in fairly good agreement with the first three studies shown in Table 1.

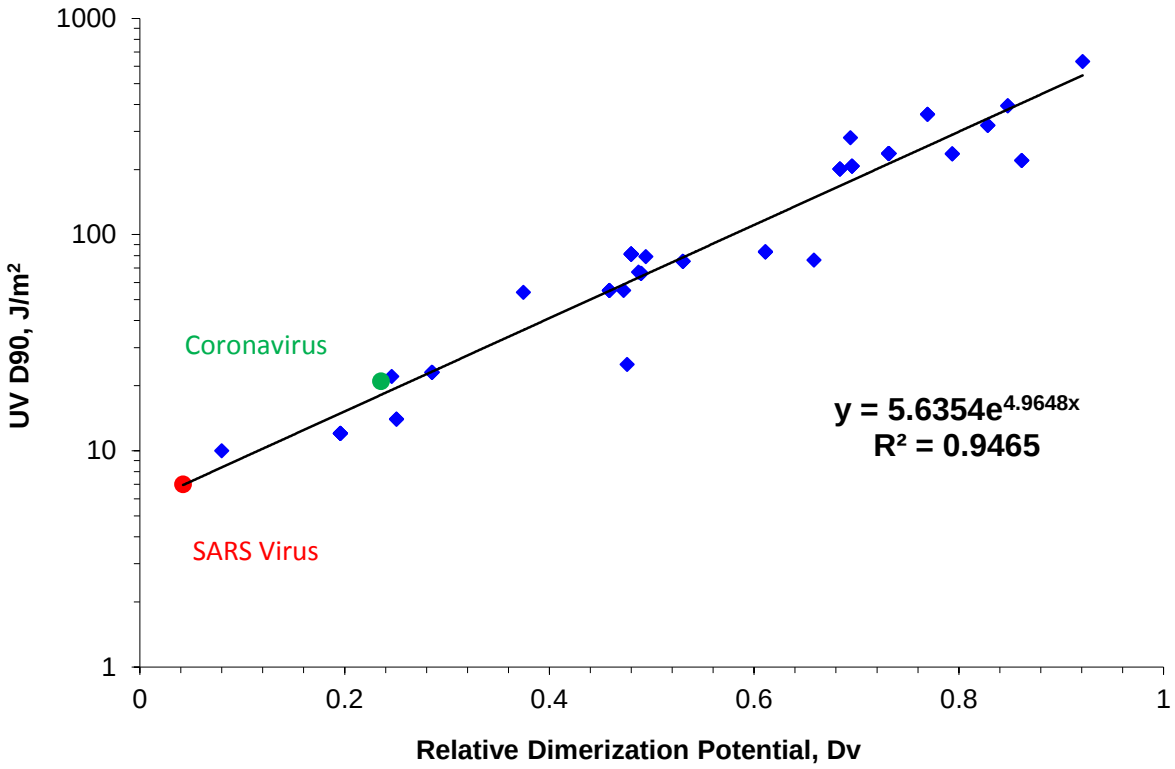

Figure 2: Genomic model of 27 ssRNA viruses representing 62 data sets (Kowalski et al 2009). The SARS virus (NC_004718) is highlighted in red and the average of the four Coronavirus studies are highlighted in green.

Dr. W. J. Kowalski

11-12-2015

Aerobiological Engineering, LLC

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Limpie las bobinas para un sistema más eficiente

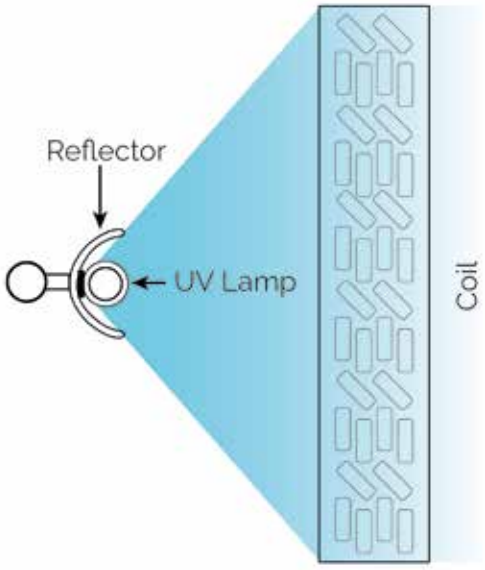
| IL COIL CLEAN

Limpiador de bobinas

Los sistemas UV patentados Sanuvox IL Coil Clean están diseñados para evitar y destruir el moho y otros crecimientos microbianos de crecer en la bobina del evaporador y las áreas circundantes.

Típicamente, el biofilm recubre la bobina reduciendo la transferencia de calor negativamente y afectando la eficiencia de la bobina. El IL Coil Clean permite que la bobina funcione con una eficiencia óptima ahorrando energía.

Mediante el uso de reflectores parabólicos de aluminio anodizado, el IL Coil Clean es capaz de dirigir prácticamente toda la energía UV a la bobina. El reflector también protege los plásticos y el cableado de los rayos UV destructivos.



VENTAJAS

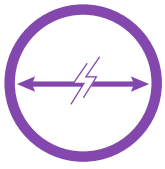
- Reduce el consumo de energía
- Reduce los olores asociados con el moho
- Mejora la calidad del aire
- Elimina la limpieza química de las bobinas

CARACTERÍSTICAS

- Disponible en tamaños de hasta 60"
- Pantalla de estado LED
- Incluye contactos secos para BMS
- El arranque de la lámpara UV protege la conexión

GARANTÍA

- Lámpara: 2 años
- Balastro: 15 años



Longitud de las lámparas:
12" to 60"

Instalación:
Frente a las bobinas
del evaporador (in-duct)

Elimina los gérmenes

Desinfección automática de baños de pacientes

ASEPT.1X

Unidad de protección automatizada 24/7 contra patógenos

La unidad ASEPT.1X supera los límites de la desinfección de la superficie al desinfectar automáticamente los baños de los pacientes, que son un depósito conocido de enfermedades nosocomiales en los hospitales.

Completamente automatizada, la unidad ASEPT.1X incluye las siguientes características de seguridad: contacto de puerta y detectores de movimiento infrarrojos redundantes. Esto permite que la unidad solo funcione cuando no hay nadie en el baño del paciente, durante ciclos de desinfección de 5 minutos después de cada uso.

ASEPT.1X desinfecta el 99.99% de los contaminantes como VRE, C.difficile y MRSA esterilizando las áreas más tocadas.

BENEFICIOS

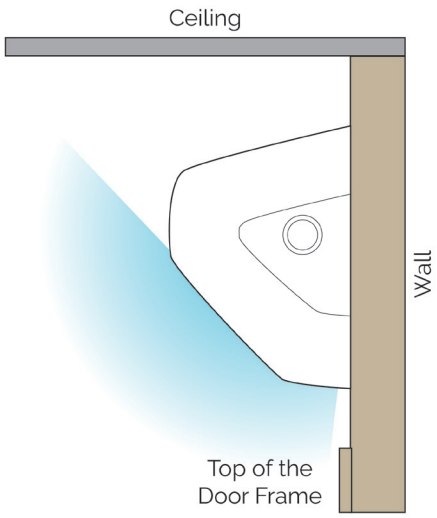
- Desinfección automatizada para baños de pacientes.
- Ciclo de desinfección de 5 minutos después del uso del baño de cada paciente.
- Destruye los patógenos responsables de las enfermedades nosocomiales.
- Elimina el 99.99% de los patógenos nosocomiales

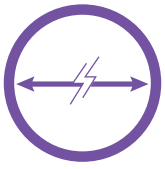
CARACTERÍSTICAS

- Ventilador para desinfección del aire.
- Montado en la pared
- sistema de detección de movimiento
- Interruptor de puerta de seguridad.
- Dimensiones de la unidad: 83.82cmx 20.32cm x 13.97cm

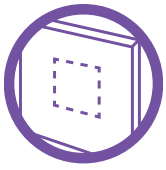
GARANTÍA

- Lampara: 1 años
- Balastro: 3 años





Longitud de las lámpas
76cm



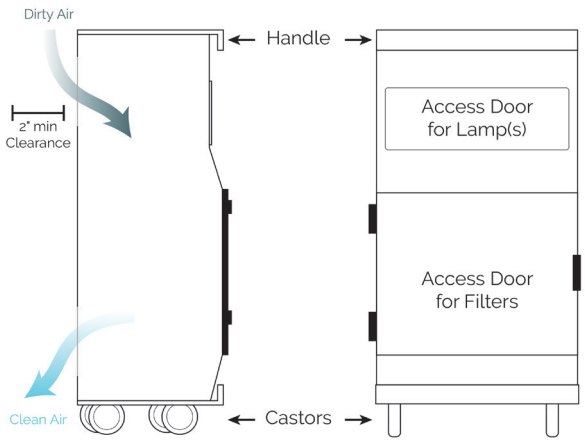
Instalación:
independiente
(en una pared)

Elimina Germenes

- Agrobacterium tumefaciens
- Adenos Virus Tipo III
- Aspergillus Amstelodamy
- Aspergillus flavus
- Aspergillus glaucus
- Aspergillus niger
- Bacillus Anthracis
- Bacillus Anthracis (esporas)
- Bacillus Megatherium SP
- Bacillus Megatherium SP (esporas)
- Bacillus Paratyphosus
- Bacillus subtilis
- Bacillus subtilis (esporas)
- Bacteriófago
- Campulobacter jejuni
- Chiorella vulgaris (Algas)
- Cianobacteria sp.
- Clostridium botulinum
- Clostridium tetani
- Corynebacterium diphtheriae
- Coxsackie
- Cryptosporidium parvum
- Dysentery bacilli
- E. hystolitica
- Eberthella typhosa
- Echovirus I (Picornaviridae)
- Echovirus II (Picornaviridae)
- Enterococcus faecalis
- Escherichia Coli (E. Coli)
- Giardia lamblia
- Huevos de nematdo (helmintos)
- Influenza (orthomyxovaridae)
- Legionella bozemanii
- Legionella dumofii
- Legionella gormanii
- Legionella longbeachae
- Legionella micdadei
- Legionella pneumophila
- Leptospira canicola
- Leptospira interrogans
- Listeria monocytogenes
- Micrococcus candidus
- Micrococcus sphaeroides
- Mosaico del tabaco (TMV)
- Mucor Mucedo
- Mucor Recemosus (A y B)
- Mycobacterium tuberculosis
- Neisseria – moraxella catarrhalis
- Oospora lactis
- Paramecium sp.
- Penicillium chrysogenum
- Penicillium digitatum
- Penicillium expansum
- Penicillium roqueforti
- Phytomonas tumefaciens
- Poliovirus (picornaviridae)
- Proteus vulgaris
- Pseudomonas aeruginosa
- Pseudomonas fluorescens
- Rhizopus nigricans
- Rhodospirillum rubrum
- Rotavirus (Reoviridae)
- Saccharomyces cerevisiae
- Saccharomyces ellipsoideus
- Saccharomyces sp.
- Salmonella enteritidis
- Salmonella paratyphi
- Salmonella Species
- Salmonella typhi
- Salmonella typhimurium
- Sarcina lutea
- Serratia marcescens
- Shigella dysenteriae
- Shigella flexneri
- Shigella paradysenteriae
- Shigella sonnei
- Spirillum rubrum
- Staphylococcus albus
- Staphylococcus aureus
- Staphylococcus epidermidis
- Streptococcus haemolyticus
- Streptococcus lactis
- Streptococcus pyrogenes
- Streptococcus salivarius
- Streptococcus viridans
- Trichosporon
- Variola Virus (Poxviridae)
- Vibrio cholerea
- Vibrio comma
- Virus de la Hepatitis A (VHA)
- Virus de la Hepatitis B (VHB)
- Yersinia Enterocolitica

Desinfección de aire en habitaciones de pacientes

Side View Back View



S300GX-MED2

Unidad de desinfección de aire HEPA y UV

Diseñado para hogares de ancianos y clínicas médicas para mejorar la calidad del aire de pacientes inmunocomprometidos.

Proceso de desinfección del aire en 4 pasos:

1) Germicida UV destruye bacterias, virus y moho
2) La oxidación trata olores y químicos.
3) La prefiltración protege el soplador
4) a filtración HEPA captura partículas finas de polvo

El aire desinfectado y altamente filtrado se distribuye por toda la habitación.

BENEFICIOS

- Protege a los pacientes inmunocomprometidos.
- Esteriliza contaminantes biológicos en el aire, incluidos virus y bacterias.
- Destruye contaminantes químicos, olores y COV

CARACTERÍSTICAS

- Equipado con prefiltro y filtro HEPA, capturando efectivamente más del 99.97% de partículas de 0.3 micras
- Ligero y fácil de transportar a cualquier parte del edificio.
- Ventilador de 2 velocidades
- Dimensiones de la unidad: 43.18cm x 76.2cm x 30.48cm

GARANTÍA

- Lámpara (s): 2 años
- Balástro: 3 años
- Motor: 3 años.

Lámpara UV 'J' | Portátil | Elimina olores y contaminantes químicos. | Elimina Gérmenes | Elimina compuestos orgánicos volátiles (COV) | Filtro HEPA: elimina el moho en el aire

Resultados aprobados y publicados

Los sistemas UV de Sanuvox han sido probados por agencias gubernamentales, laboratorios y universidades. Estos incluyen:

RTI, US EPA y National Homeland Security, Penn State University y McGill University. En el Lancet Medical Journal revisado por pares, se publicó un estudio de dos años de Sanuvox

Encuentre la información solicitada en las unidades ASEPT.2X vendidas en todo el mundo.

Hunterdon Healthcare , NJ, USA

MERCY hospital, Il,USA
KSB hospital ,IL, USA
Comprehensive Risk Services , AR, USA
Desert Spring hospital, NV, USA
Healthscience center, Winnipeg,
Hegyejaro, Hungary
Humber River Hospital - Toronto
St. Mary's Hospital - Kitchener
SAGOL ditributor, ISRAEL
ANSR, Malaysia
YK medical, Korea
ALFATEC Sitemas , Valencia, SPAIN

STUDY REPORT

STUDY TITLE

Evaluation of Antimicrobial Effectiveness of a UVC Generating Device on Hard Nonporous Surfaces

Test Organisms:

Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)
Clostridium difficile - spore form (ATCC 43598)
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)

PRODUCT IDENTITY

Aseptix

AUTHOR

Joshua Luedtke, M.S.
Study Director

STUDY COMPLETION DATE

January 17, 2014

PERFORMING LABORATORY

ATS Labs
1285 Corporate Center Drive, Suite 110
Eagan, MN 55121

SPONSOR

Sanuvox Technologies Inc.
146, rue Barr
Saint-Laurent, QC H4T 1Y4
Canada

PROJECT NUMBER

A15984

STUDY REPORT

GENERAL STUDY INFORMATION

Study Title: Evaluation of Antimicrobial Effectiveness of a UVC Generating Device on Hard Nonporous Surfaces

Project Number: A15984

TRF Number: SXT01121613.CUST

TEST SUBSTANCE IDENTITY

Test Device Name: Aseptix

STUDY DATES

Date Sample Received: December 27, 2013
Study Initiation Date: December 27, 2013
Experimental Start Date: January 8, 2014
Experimental End Date: January 13, 2014
Study Completion Date: January 17, 2014

Test Organism	ATCC #	Culture Medium	Incubation Parameters
Methicillin Resistant *Staphylococcus aureus* - MRSA	33592	Synthetic Broth	35-37°C, aerobic
Clostridium difficile - spore form	43598	CDC Anaerobic Blood Agar	35-37°C, anaerobic
Vancomycin Resistant *Enterococcus faecalis* – VRE	51575	Fluid Thioglycollate Medium	35-37°C, aerobic

The test organisms to be used in this study were obtained from the American Type Culture Collection (ATCC), Manassas, Virginia.

Exposure Times: 5 minutes, 10 minutes and 15 minutes

Exposure Temperature: Room temperature (20.3°C)

Number of Carriers Tested: 2 per organism per location

Soil Load Description: No organic soil load required

Neutralizer: Letheen Broth

Agar Plate Medium: Tryptic Soy Agar with 5% Sheep Blood (BAP) [for MRSA and VRE]
BHI-HT Agar [for *Clostridium difficile* – spore form]

EXPERIMENTAL DESIGN

Glass carriers (1" x 3") inoculated with a dry film of the test organism were placed into the testing room and exposed to the UV generating device(s) for the Sponsor specified exposure times. Duplicate carriers per organism per location were placed around the testing area as indicated by the Sponsor. Briefly, two carriers per organism were placed on the bedrail of a hospital bed approximately 3 feet off the floor and approximately 2 feet from a UV device. The second set of carriers was located on the opposite side of the hospital bed, on a hospital table approximately 4 feet off the ground and approximately 5 feet from a UV device. Each test carrier was oriented so that the inoculated area of the carrier was perpendicular to the ground, parallel to the device and as vertical as possible. After exposure, the carriers were transferred to vessels containing subculture media and assayed for survivors. Appropriate culture purity, media sterility, carrier sterility, carrier quantitation, HCl resistance (for *Clostridium difficile*) and neutralization confirmation controls were performed.

Per Sponsor's direction, the study was not required to be conducted under US EPA 40 CFR Part 160 or US FDA 21 CFR Part 58.

STUDY RESULTS

TABLE 1: CONTROL RESULTS

The following results from controls confirmed study validity:

Type of Control	Results		
	Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	***Clostridium difficile* - spore form (ATCC 43598)**	**Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)**
Purity Control	Pure	Pure	Pure
Neutralizer Sterility Control	No Growth		
Carrier Sterility Control	No Growth		

TABLE 2: NEUTRALIZATION CONFIRMATION CONTROL RESULTS

Test Device	Test Organism	Neutralization Confirmation (CFU/plate)		±1.0 Log_{10} Pass/Fail
		Numbers Control	Results	
Aseptix	Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	20,13	21,14	-0.03 (Pass)
	Clostridium difficile - spore form (ATCC 43598)	40,36	40,34	0.01 (Pass)
	Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	17,11	15,15	-0.03 (Pass)

CFU = Colony Forming Unit

TABLE 3: CARRIER QUANTITATION CONTROL RESULTS

Test Organism	Carrier #	Result CFU/Carrier (Log_{10})	Average Log_{10}	Geometric Mean
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	1.5×10^6 (6.18)	6.18	1.51×10^6
	2	1.5×10^6 (6.18)		
Clostridium difficile - spore form (ATCC 43598)	1	9.0×10^6 (6.95)	6.95	8.91×10^6
	2	9.0×10^6 (6.95)		
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	1.7×10^5 (5.23)	5.17	1.48×10^5
	2	1.3×10^5 (5.11)		

CFU = Colony Forming Unit

TABLE 4: EVALUATION OF TEST CARRIER DATA – 5 Minute Exposure

Test Device: Aseptix							
Carrier Location: Bedrail (approximately 3 feet off ground and 2 feet from device)							
Test Organism	**Carrier #**	**Number of Survivors (CFU)**					
		Dilution					
		Filtered 10^0	**10^0 (1.00 mL)**	**10^0**	**10^{-1}**	**10^{-2}**	**10^{-3}**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Clostridium difficile – spore form (ATCC 43598)	1	3	0,0	0,0	0,0	0,0	0,0
	2	52	3,8	0,0	0,0	0,0	0,0
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Carrier Location: Table (approximately 4 feet off ground and 5 feet from device)							
Test Organism	**Carrier #**	**Number of Survivors (CFU)**					
		Dilution					
		Filtered 10^0	**10^0 (1.00 mL)**	**10^0**	**10^{-1}**	**10^{-2}**	**10^{-3}**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Clostridium difficile – spore form (ATCC 43598)	1	TNTC	30,20	3,2	0,0	0,0	0,0
	2	TNTC	46,40	3,9	0,0	0,0	0,0
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	14	1,1	1,0	0,0	0,0	0,0
	2	2	1,0	0,0	0,0	0,0	0,0

CFU = Colony Forming Unit
TNTC = Too Numerous To Count
A value of <1 was used in place of zero for calculation purposes only.

TABLE 5: EVALUATION OF TEST CARRIER DATA – 10 Minute Exposure

Test Device: Aseptix							
Carrier Location: Bedrail (approximately 3 feet off ground and 2 feet from device)							
Test Organism	**Carrier #**	**Number of Survivors (CFU)**					
		Dilution					
		Filtered 10^0	**10^0 (1.00 mL)**	**10^0**	**10^{-1}**	**10^{-2}**	**10^{-3}**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Clostridium difficile – spore form (ATCC 43598)	1	1	0,0	0,0	0,0	0,0	0,0
	2	15	0,0	0,0	0,0	0,0	0,0
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Carrier Location: Table (approximately 4 feet off ground and 5 feet from device)							
Test Organism	**Carrier #**	**Number of Survivors (CFU)**					
		Dilution					
		Filtered 10^0	**10^0 (1.00 mL)**	**10^0**	**10^{-1}**	**10^{-2}**	**10^{-3}**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Clostridium difficile – spore form (ATCC 43598)	1	80	1,8	0,0	0,0	0,0	0,0
	2	52	2,5	0,0	0,0	0,0	0,0
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	39	3,2	0,0	0,0	0,0	0,0
	2	TNTC	36,46	1,0	0,0	0,0	0,0

CFU = Colony Forming Unit
TNTC = Too Numerous To Count
A value of <1 was used in place of zero for calculation purposes only.

TABLE 6: EVALUATION OF TEST CARRIER DATA – 15 Minute Exposure

Test Device: Aseptix							
Carrier Location: Bedrail (approximately 3 feet off ground and 2 feet from device)							
Test Organism	**Carrier #**	**Number of Survivors (CFU)**					
		Dilution					
		Filtered 10^0	**10^0 (1.00 mL)**	**10^0**	**10^{-1}**	**10^{-2}**	**10^{-3}**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Clostridium difficile – spore form (ATCC 43598)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Carrier Location: Table (approximately 4 feet off ground and 5 feet from device)							
Test Organism	**Carrier #**	**Number of Survivors (CFU)**					
		Dilution					
		Filtered 10^0	**10^0 (1.00 mL)**	**10^0**	**10^{-1}**	**10^{-2}**	**10^{-3}**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	0	0,0	0,0	0,0	0,0	0,0
	2	0	0,0	0,0	0,0	0,0	0,0
Clostridium difficile – spore form (ATCC 43598)	1	6	0,0	0,0	0,0	0,0	0,0
	2	18	0,0	0,0	0,0	0,0	0,0
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	0	0,0	0,0	0,0	0,0	0,0
	2	4	0,0	0,0	0,0	0,0	0,0

CFU = Colony Forming Unit
A value of <1 was used in place of zero for calculation purposes only.

TABLE 7: CALCULATED VALUES – 5 Minute Exposure

Test Device: Aseptix

Carrier Location: Bedrail (approximately 3 feet off ground and 2 feet from device)

Test Organism	Carrier #	# Survivors/ Carrier (Log_{10})	Average Log_{10}	Geometric Mean	Percent Reduction (Log_{10})
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.18)
	2	<1 (<0.00)			
Clostridium difficile - spore form (ATCC 43598)	1	4 (0.60)	1.20	1.58×10^1	>99.999% (5.75)
	2	6.2×10^1 (1.79)			
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	<1 (<0.00)	<0.00	<1	>99.999% (>5.17)
	2	<1 (<0.00)			

Carrier Location: Table (approximately 4 feet off ground and 5 feet from device)

Test Organism	Carrier #	# Survivors/ Carrier (Log_{10})	Average Log_{10}	Geometric Mean	Percent Reduction (Log_{10})
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.18)
	2	<1 (<0.00)			
Clostridium difficile - spore form (ATCC 43598)	1	5.0×10^2 (2.70)	2.82	6.60×10^2	99.99% (4.13)
	2	8.6×10^2 (2.93)			
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	1.7×10^1 (1.23)	0.77	5.89×10^0	>99.99% (4.40)
	2	2 (0.30)			

TABLE 8: CALCULATED VALUES – 10 Minute Exposure

Test Device: Aseptix

Carrier Location: Bedrail (approximately 3 feet off ground and 2 feet from device)

Test Organism	Carrier #	# Survivors/ Carrier (Log_{10})	Average Log_{10}	Geometric Mean	Percent Reduction (Log_{10})
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.18)
	2	<1 (<0.00)			
Clostridium difficile - spore form (ATCC 43598)	1	1 (0.00)	0.63	4.27×10^0	>99.9999% (6.32)
	2	1.8×10^1 (1.26)			
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	<1 (<0.00)	<0.00	<1	>99.999% (>5.17)
	2	<1 (<0.00)			

Carrier Location: Table (approximately 4 feet off ground and 5 feet from device)

Test Organism	Carrier #	# Survivors/ Carrier (Log_{10})	Average Log_{10}	Geometric Mean	Percent Reduction (Log_{10})
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.18)
	2	<1 (<0.00)			
Clostridium difficile - spore form (ATCC 43598)	1	9.5×10^1 (1.98)	1.89	7.76×10^1	99.999% (5.06)
	2	6.2×10^1 (1.79)			
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	4.6×10^1 (1.66)	2.29	1.95×10^2	>99.8% (2.88)
	2	8.2×10^2 (2.91)			

TABLE 9: CALCULATED VALUES – 15 Minute Exposure

Test Device: Aseptix					
Carrier Location: Bedrail (approximately 3 feet off ground and 2 feet from device)					
Test Organism	**Carrier #**	**# Survivors/ Carrier (Log_{10})**	**Average Log_{10}**	**Geometric Mean**	**Percent Reduction (Log_{10})**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.18)
	2	<1 (<0.00)			
Clostridium difficile - spore form (ATCC 43598)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.95)
	2	<1 (<0.00)			
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	<1 (<0.00)	<0.00	<1	>99.999% (>5.17)
	2	<1 (<0.00)			
Carrier Location: Table (approximately 4 feet off ground and 5 feet from device)					
Test Organism	**Carrier #**	**# Survivors/ Carrier (Log_{10})**	**Average Log_{10}**	**Geometric Mean**	**Percent Reduction (Log_{10})**
Methicillin Resistant *Staphylococcus aureus* - MRSA (ATCC 33592)	1	<1 (<0.00)	<0.00	<1	>99.9999% (>6.18)
	2	<1 (<0.00)			
Clostridium difficile - spore form (ATCC 43598)	1	7 (0.85)	1.09	1.23×10^1	>99.999% (5.86)
	2	2.1×10^1 (1.32)			
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	1	<1 (<0.00)	<0.35	$<2.24 \times 10^0$	>99.99% (>4.82)
	2	5 (0.70)			

TABLE 10: VERIFICATION OF ANTIBIOTIC RESISTANCE – *Staphylococcus aureus* - MRSA

Organism (ATCC)	**Zone of Inhibition (mm)**	**CLSI* Resistant Range (mm)**
Methicillin Resistant *Staphylococcus aureus* – MRSA (ATCC 33592)	6	≤ 10
Quality Control Organism (ATCC)	**Zone of Inhibition (mm)**	**CLSI* Acceptable Range (mm)**
Staphylococcus aureus (ATCC 25923)	20	18 - 24

*CLSI = Clinical and Laboratory Standards Institute

TABLE 11: VERIFICATION OF ANTIBIOTIC RESISTANCE – *Enterococcus faecalis* - VRE

Quality Control Organism	**Zone of Inhibition (mm)**	**CLSI* Acceptable Range (mm)**
Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575)	10	≤14
Test Organism	**Zone of Inhibition (mm)**	**CLSI* Resistant Range (mm)**
Staphylococcus aureus (ATCC 25923)	17	17-21

*CLSI = Clinical and Laboratory Standards Institute
Interpretation of result and acceptable range are from the Clinical and Laboratory Standards Institute, Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Second Information Supplement January 2012, Volume 31 Number 1, Approved Standard M02-A11 and M07-A9, Wayne, Pennsylvania.

TABLE 12: HCL RESISTANCE VERIFICATION

Test Organism: *Clostridium difficile* – spore form (ATCC 43598)						
Exposure Time	**10^{-2}**	**10^{-3}**	**10^{-4}**	**CFU/mL (Log_{10})**	**Log_{10} Reduction from Control**	**Pass/Fail (≤ 2 log_{10} difference)**
5 minutes (test)	184,204	27,27	6,1	1.94×10^5 (5.29)	0.94	Not Applicable
10 minutes (test)	56,58	12,17	4,0	5.7×10^4 (4.76)	1.47	Pass
20 minutes (test)	4,7	1,3	0,0	6×10^3 (3.78)	2.45	Not Applicable
20 minutes (control)	T,T	142,200	29,37	1.71×10^6 (6.23)	Not Applicable	Not Applicable

T = Too Numerous To Count (≥300 colonies)

CONTROL RESULTS

The results of controls run for purity, carrier sterility, neutralizer sterility, neutralization confirmation, HCl resistance control, antibiotic resistance and carrier quantitation were all acceptable.

ANALYSIS

The UV light generating device, Aseptix, demonstrated a >99.999% (>5.75 $\log_{10}$) reduction, >99.9999% (6.32 $\log_{10}$) and >99.9999% (>6.95 $\log_{10}$) reduction of *Clostridium difficile* – spore form on the test carriers located on the hospital bedrail following a 5, 10 and 15 minute exposure time, respectively, when tested at room temperature (20.3°C).

The UV light generating device, Aseptix, demonstrated a 99.99% (4.13 $\log_{10}$) reduction, 99.999% (5.06 $\log_{10}$) and >99.999% (5.86 $\log_{10}$) reduction of *Clostridium difficile* – spore form on the test carriers located on the hospital table following a 5, 10 and 15 minute exposure time, respectively, when tested at room temperature (20.3°C).

The UV light generating device, Aseptix, demonstrated a >99.9999% (>6.18 $\log_{10}$) reduction of Methicillin Resistant *Staphylococcus aureus* - MRSA on all test carriers following 5, 10 and 15 minute exposure times when tested at room temperature (20.3°C).

The UV light generating device, Aseptix, demonstrated a >99.999% (>5.17 $\log_{10}$) reduction of Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575) on the test carriers located on the hospital bedrail following 5, 10 and 15 minute exposure times when tested at room temperature (20.3°C).

The UV light generating device, Aseptix, demonstrated a >99.99% (4.40 $\log_{10}$) reduction, >99.8% (2.88 $\log_{10}$) reduction and a >99.99% (>4.82 $\log_{10}$) reduction of Vancomycin Resistant *Enterococcus faecalis* – VRE (ATCC 51575) on the test carriers located on the hospital table following a 5, 10 and 15 minute exposure time, respectively, when tested at room temperature (20.3°C).

PREPARED BY:

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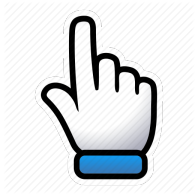
Microbiologist

1·17·14
Date

https://www.youtube.com/channel/UCIIACBgj9_u52KFIAACavXg <— haga clic aquí



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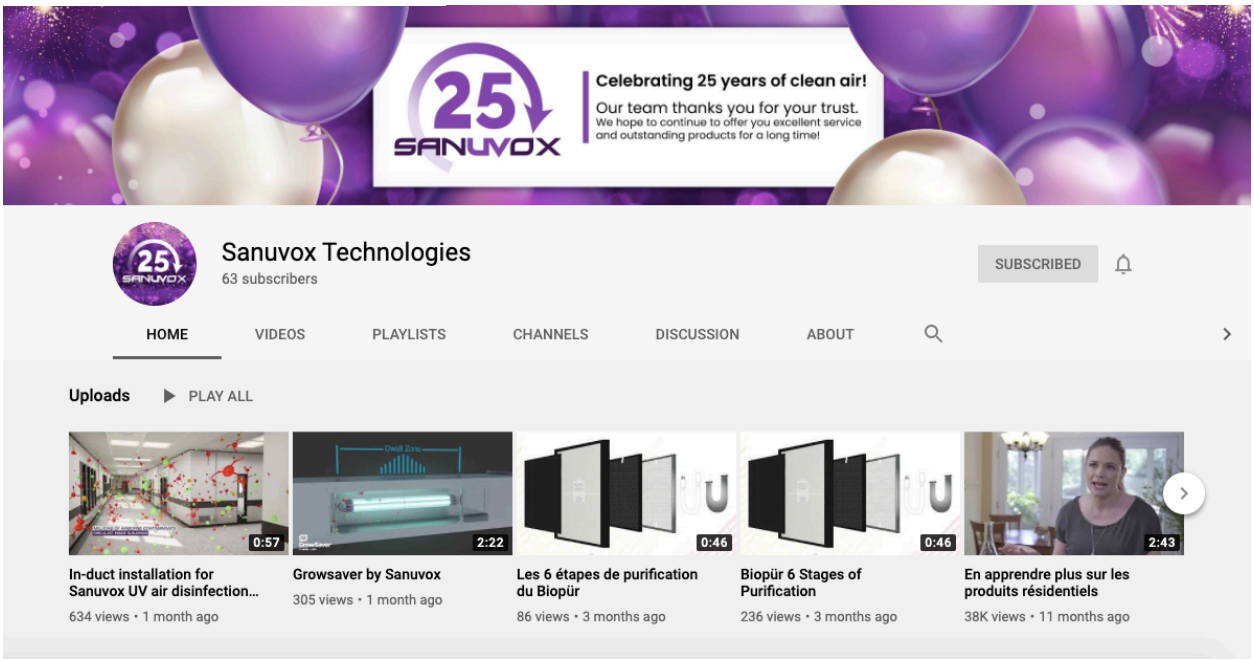

Sanuvox is the leading manufacturer of Ultraviolet, Air and Object purification. Providing solutions for almost any Indoor Air Quality (IAQ) issue. Sanuvox air treatment systems have been designed with maximum exposure in mind, in order to optimise the airborne disinfection rates within the duct and air handler system. Sanuvox products have set the benchmark in commercial, medical, military and residential installations, and has been widely proven to be the most effective system available. Sanuvox has designed and patented two different types of UV systems: UV Air Purification and UV Coil Cleaning. Every bio-contaminant needs a specific dose of UV microwatt energy for destruction. Sanuvox offers cost-effective systems that can address indoor air quality issues that filter and absorption media cannot.

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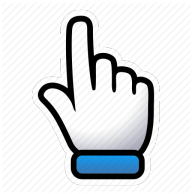

This video presents the ASEPT.2X, the mobile UV sterilization system specifically developed to perfectly sterilize patient and operation rooms in hospitals.

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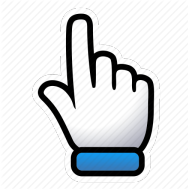
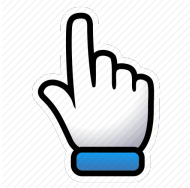


Desert Springs hospital in California is using ASEPT.2X mobile UV sterilization system to sterilize patient rooms with success.

https://youtu.be/RXVxQuK9uCo <— haga clic aquí



End. Final.

Thank you. Gracias.

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