# Wipe out over 20 microorganisms with only 1 step.

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These products represent the culmination of years of extensive customer and laboratory research, and are designed to clean and disinfect hard, nonporous surfaces in the clinical environment.

CaviWipes1 and CaviCide1 are low-alcohol surface disinfectants with a 1 minute contact time on all product labeled organisms, including TB.

#### CaviCide1 and CaviWipes1 offer the following:

• 1 minute contact time

Metrex

- 1-step cleaning and disinfecting\*
- Low alcohol formula (22.5%)
- Good material compatibility
- Conveniently packaged

CaviCide1 and CaviWipes1 are multi-purpose, 1-step disinfectant<sup>\*</sup> cleaners, and offer a broad spectrum of organism kill in only 1 minute at room temperature for more than 20 clinically relevant organisms including: TB (*Mycobacterium tuberculosis* var: *bovis* [BCG]), Multi-Drug Resistant (MDR) Acinetobacter baumannii, ESBL Escherichia coli, Klebsiella pneumoniae, MRSA, and Candida albicans.

CaviWipes1 contains durable, nonwoven, nonabrasive wipes presaturated with CaviCide1 surface disinfectant cleaner.



# Selecting a Surface Disinfectant

Disinfection of contaminated surfaces continues to be a challenging aspect of infection prevention and ensuring patient safety. Selection of the right disinfection products to meet each facility's needs requires research, thoughtful consideration, and a level of trust.

- When selecting a surface disinfectant for use in a clinical facility, be sure to evaluate the product efficacy contact times and organism claims on the product label, to make sure they will meet the institution's compliance needs.
- 2. If a surface disinfectant product label lists multiple kill times by organism, or has longer efficacy contact times, say 5-10 minutes, additional inservicing may be required to ensure the staff is adequately trained on the proper use of the product to be in compliance.
- 3. Make sure the manufacturing company that you partner with is both willing and able to provide you and your staff with (a) ongoing educational materials, wall charts and (b) inservicing to ensure the transition is seamless.

\*When no visible debris is present

- 4. In regards to addressing the need for having a level of trust that a product meets its label claims:
  - In the United States Environmental Pesticide Agency (EPA) and Canada (Health Canada), before a surface disinfectant can be marketed and sold: The formula must be subjected to rigorous laboratory testing using standardized protocols to demonstrate that it is efficacious against a selected group of microorganisms and meets other indicated product performance claims.
  - Finally, if after such rigorous scrutiny, these regulatory agencies are satisfied that the product performance claims have been fully demonstrated, approval to market and sell the product is granted.

# The Challenge: Following Labeled Instructions-for-Use vs. Faster Turnaround Time

Healthcare workers are faced with the challenge of complying with the need to follow manufacturer's instructions for use on surface disinfection contact times (typically greater than 2-3 minutes). They balance this with the ever increasing needs for faster turnaround in their respective facilities. When challenged by **The Joint Commission**, each facility must prepare a risk analysis document which addresses shorter contact times than stated on the labeled instructions for use.

Many facilities leverage recommendations from key opinion leaders which indicate adequate surface disinfection can be achieved from one application and allowing the surface to dry within one minute due to the lower pathogen load in typical clinical environments than what is required for EPA antimicrobial testing procedures.<sup>1</sup>

Product performance test results for contact times are used as the basis for manufacturers' developing instructions-for-use. Surface disinfectants indicate a contact temperature and time they are approved for on the product label. It is essential to abide by these parameters in order to achieve proper disinfection of a hard nonporous surface.

With the 1 minute CaviCide1 and CaviWipes1, clinical workers follow labeled instructions for use and be in compliance with the regulations (Figures 1 and 2):

# CaviWipes1<sup>™</sup> & CaviCide1<sup>™</sup> - Surface Disinfectants

CaviCide1

**TB** Mycobacterium tuberculosis var: bovis (BCG) (TB)

BACTERIA

Acinetobacter baumannii Multi-Drug Resistant (MDR) Acinetobacter baumannii ESBL Escherichia coli Klebsiella pneumoniae Pseudomonas aeruginosa Salmonella enterica Staphylococcus aureus Methicillin Resistant Staphylococcus aureus (MRSA) Methicillin Resistant Staphylococcus aureus (MRSA) Methicillin Resistant Staphylococcus aureus (MRSA) Vancomycin Intermediate Staphylococcus aureus (VISA) Vancomycin Resistant Enterococcus faecalis (VRE) Enterobacter cloacae Burkholderia capacia Carbapenem-Resistant Klebsiella Pneumoniae (CRKP) (CRE)

> FUNGI Trichophyton mentagrophytes Candida albicans

> > VIRUSES

Hepatitis B Virus (HBV) Hepatitis C Virus (HCV) Herpes Simplex Virus Type 1 Herpes Simplex Virus Type 2 Human Immunodeficiency Virus (HIV-1) Human Coronavirus (not associated with Severe Acute Respiratory Syndrome or SARS) Influenza A, H3N2 Virus Norovirus Pandemic 2009 H1N1 Influenza A Virus Rotavirus

#### CaviWipes1

**TB** Mycobacterium tuberculosis var: bovis (BCG) (TB)

BACTERIA Multi-Drug Resistant (MDR) Acinetobacter baumannii ESBL Escherichia coli Klebsiella pneumoniae Pseudomonas aeruginosa Salmonella enterica Staphylococcus aureus Methicillin Resistant Staphylococcus aureus (MRSA) Methicillin Resistant Staphylococcus aureus (MRSA) Methicillin Resistant Staphylococcus aureus (MRSA) Vancomycin Intermediate Staphylococcus aureus (VISA) Vancomycin Resistant Enterococcus faecalis (VRE) Enterobacter cloacae Burkholderia capacia Carbapenem-Resistant Klebsiella Pneumoniae (CRKP) (CRE)

> PATHOGENIC FUNGI Candida albicans

VIRUSES Hepatitis B Virus (HBV) Hepatitis C Virus (HBV) Herpes Simplex Virus Type 1 Herpes Simplex Virus Type 2 Human Immunodeficiency Virus (HIV-1) Human Coronavirus (not associated with Severe Acute Respiratory Syndrome or SARS) Influenza A, H3N2 Virus Pandemic 2009 H1N1 Influenza A Virus

Figure 1. CaviCide1 - 1 Minute Efficacy Claim

Overview of Chemical Agents Used in Hard, Non-porous Surface Disinfection

There are several different types of antimicrobial agents that can be used to achieve hard non-porous surface disinfection. Agents may include (a) physical - e.g. heat or steam, (b) chemical or (c) a combination of both.The chemical agents can affect microorganisms through different mechanisms, such as disruption of the bacterial cell wall and outer membranes. Other chemical agents function as chelators which prevent the organism from replicating. Selection of surface disinfectant chemicals is a complex subject as one must take into consideration where the product will be used, what organisms are being targeted, the desired contact time, what surfaces will the product be used on, and target temperature range for use. Figure 2: CaviWipes1 - 1 Minute Efficacy Claims



#### Table 1. General Categories of Surface Disinfectants

Chemistry Category	Example(s)	Activity		
Surface-Active Agents (Surfactants)	Quaternary Ammonium Compounds	The quaternary ammonium compounds are widely used as disinfectants. Membrane active agents. The bactericidal action of the quaternaries has been attributed to the inacti- vation of energy-producing enzymes, denaturation of essential cell proteins, and dis- ruption of the cell membrane.		
Alcohols	Ethyl Alcohol, Isopropyl Alcohol, N-propanol Alcohols exhibit rapid broad-spectrum antimicrobial activity against vegetative bacter cluding <i>Mycobacteria</i> ), viruses, and fungi, bu sporicidal.			
Halogen-Releasing Agents	Sodium Hypochlorite (Bleach), Chlorine Dioxide	Chlorine- and iodine-based compounds are the most significant antimicrobial halogens used in the clinical environment and have been traditionally used for both antiseptic and disinfectant purposes. Halogen-releasing agents pos- sess bactericidal and virucidal activities and at higher concentrations can be sporicidal.		
Oxidizers	Hydrogen Peroxide	Hydrogen peroxide works by producing destructive hydroxyl free radicals which can attack vital microorganism cell components. Hydrogen peroxide is active against a wide range of microorganisms, including bacteria, yeasts, fungi, viruses, and spores.		
	Peracetic Acid and Hydrogen Peroxide	The combination of peracetic acid and hydrogen peroxide can inactivate all microorganisms except bacterial spores in a short amount of time. At higher concentrations peracetic acid and hydrogen peroxide are sporicidal.		
	Peracetic Acid (Peroxyacetic)	Peracetic acid has rapid action against all microorganisms and enhances removal of organic material.		
Phenols	Phenol	Phenolic-type antimicrobial agents have long been used for their antiseptic, disinfectant, or preservative properties. Phenols also have antifungal and antiviral properties.		

### **Cleaning Evaluation - A Comparative Overview of Surface Disinfectant Products**

A common belief is that surface cleaning and surface disinfection are synonymous. However, these two terms represent unique and independent functions in the clinical environment to prevent infectious cross contamination.

Cleaning represents the removal of visible soil contamination and gross debris consisting of such things as blood, mucous and other body fluids from environmental surfaces and fomites. Disinfection, on the other hand, is the process used to kill infectious organisms on these surfaces with the intent of preventing cross contamination.

- Cleaning precedes disinfection as recommended by the CDC.
- Cleaning is mandated prior to disinfection in the presence of blood borne pathogens, such as: HIV-1, HBV, and HCV.
- In order to disinfect a surface, the solution must be in direct contact with the surface without interference from soils or visible gross debris.
- Soils encountered in clinical applications, such as blood and mucus, tend to have high concentrations of proteins and fats which can interfere with the surface disinfectant liquids by preventing contact with the surfaces which require disinfection. When this situation occurs, the surface is not fully wetted with the disinfectant, thus protecting the microorganisms from inactivation.
- Surface cleaners/disinfectants are available in ready-to-use sprays and pre-saturated wipes or concentrates (which require dilution prior to use) to meet the various clinical needs in a facility.
- The ideal surface cleaner/disinfectant would be able to satisfy the requirements of the end user (offer short efficacy contact times, superior cleaning, and convenient packaging) in order to facilitate compliance during inspections.

Some of these products have been tested in the presence of 5% soil, and are approved to offer a **1-step disinfection process** in which simultaneous cleaning and disinfection of a noncritical surface or item occurs.<sup>2</sup> Examples of where 1-step cleaning and disinfection may be used (assumes no visible gross debris or contamination from blood, mucous, or other body fluids are present) are shown as follows:

Fax Machines Hand Rails IV Poles Stretchers Faucets Computers/keyboards/mouse Door Knobs Bed Railings Gurneys Physical Therapy (PT) Equipment Surfaces Workstations Wheelchairs Walkers Spine Back Boards Tables Telephones Stethoscopes Blood Pressure Cuffs Defibrillators Chairs

## **Comparative Surface Disinfection Spray Cleaning Evaluation**

A comparative cleaning evaluation was conducted using CaviCide1 and CaviCide versus a high alcohol (63.25%) competitive spray surface disinfectant product. In this trial, a blood-based fatty soil was affixed to stainless steel test coupons, allowed to dry and weighed. Next, these coupons were subjected to a standardized soil removal protocol and then were weighed again at the conclusion of the trial (Figure 3).

#### Images of the Quantitative Cleaning Test : Fatty Blood Soil





Mixing the fatty blood soil.

Air curing the fatty blood soil to the test coupons.





Test coupons immersed in test liquid test articles with uniform agitation. Test coupons after soaking in test articles and air dried.

Figure 3: Surface Disinfection Spray Cleaning Evaluation \*data on file

# **Discussion of Results**

In this evaluation, CaviCide1 demonstrated (a) <u>equivalent</u> cleaning performance when tested against CaviCide; and (b) <u>significantly better soil removal</u> over that of the high alcohol spray product. Note: The high alcohol product tested in this evaluation contains 63.25% isopropyl alcohol and appeared to bind soil to the test coupons, thus not effectively removing the blood-based soil during the cleaning study. It has been previously reported in literature that high alcohol concentrations bind proteins to surfaces.<sup>3</sup> This effect was also observed in the presaturated wipes cleaning evaluation (see discussion below).

## **Comparative Surface Disinfection Wipes Cleaning Evaluation**

A comparative cleaning evaluation was conducted using CaviWipes1 and CaviWipes versus four competitive brands of surface disinfectant wipes. Side-by-side comparative trials (using CaviWipes as the reference) were conducted using weighted test "sleds" to control variables such as pressure, texture and wipe

area on glazed tiles (Figure 4).\*

These tiles were coated with predosed amounts of clotting whole blood. Two sleds were pushed in parallel across the soiled tile surface using a pneumatic linear actuator cylinder to remove the human variability from the process.



presses it onto the tile surface. Sleds are not attached to each other or the pusher arm.

Figure 4: Surface Disinfection Wipes Evaluation Test Platform

\*data on file

Before Wiping Tile	After One Wipe	Paired Test Wipe Products	
		CaviWipes 1 Low alcohol (22.5%)+ quat	GOOD
		CaviWipes (Reference) Low alcohol (17.2%) + quat	GOOD
		CaviWipes 1 Low alcohol (22.5%)+ quat	GOOD
		Wipe Product A High alcohol (63.25%) + quat	POOR
<b>S</b>		CaviWipes 1 Low alcohol (22.5%)+ quat	GOOD
	A CAL	Wipe Product B High alcohol (55.0%) + quat	POOR
		CaviWipes 1 Low alcohol (22.5%)+ quat	GOOD
	and the second	Wipe Product C Intermediate alcohol (41.6%) + quat	POOR
		CaviWipes 1 Low alcohol (22.5%)+ quat	GOOD
		Wipe Product D Hydrogen peroxide (0.5%)	GOOD

Figure 5: Results from Surface Disinfection Wipes Cleaning Evaluation

\*data on file

Legend				
Wipes Product	Product Chemistry			
А	High alcohol (63.25%) + quat			
В	High alcohol (55.0%) + quat			
С	Intermediate alcohol (41.6%) + quat			
D	Hydrogen peroxide (0.5%)			

## **Discussion of Results**

CaviWipes1 was judged to offer superior cleaning performance in this evaluation over those of both the high alcohol wipe products and the intermediate level alcohol wipe products tested (Figure 5).

When higher alcohol (>50%) surface disinfectant products come into contact with blood soil, they do not remove the blood soil from the test surfaces. These observations suggest that this binding may occur across a variety of materials, even when manufactured with smooth surfaces, consistent with previously published literature.<sup>4</sup>

CaviWipes1 consistently cleaned and removed the clotting blood soil in each experiment and demonstrated <u>equivalent</u> cleaning performance to both: (a) the reference product, CaviWipes, and (b) the hydrogen peroxide wipes product tested.

## **Overview of Compatibility Testing**

CaviCide1 solution was found to be compatible with the materials shown below. Materials were exposed to 14 days (336 hours) of continuous contact with CaviCide1 with no effect unless otherwise noted. This contact time equates to 20,160 applications of CaviCide1 based on the product contact time.CaviCide1 and CaviWipes1 are classified as low alcohol (22.5%) surface disinfectants and offer materials compatibility with the following materials in Figure 6 shown below:

#### CaviCide1 and CaviWipes1 Compatibility

CaviCide1 and CaviWipes1 are compatible with the following materials:

Acrylic PVC Polypropylene Epoxy counter tops Chrome Plated Brass Naugahyde Formica (black) Glass<sup>3</sup> Stainless Steel Polystyrene Neoprene<sup>1</sup> High density polyethylene (HDPE) Silicone Formica (white) Brass<sup>2</sup> Copper<sup>4</sup> EPO TEK 353

#### Figure 6: Overview of CaviCide1 and CaviWipes1 Materials Compatibility

\*data on file

Notes:

- 1 slight darkening when compared to control
- 2 slight lightening when compared to control

3 areas of spotting observed

4 areas of discoloration

## **Comparative Surface Disinfection Compatibility Evaluation**

In addition to evaluating CaviCide and CaviCide1, several competitive products were included in the study. This included (a) a low pH 0.5% hydrogen peroxide spray, (b) 0.65% bleach spray, and (c) a 62% high alcohol spray product. The results are presented in Table 2 below where green represents compatibility with a test surface and red indicates a lack of compatibility with the test surface.

• CaviCide1 and CaviCide offer <u>superior</u> materials compatibility as compared to that demonstrated by (a) the low pH 0.5% hydrogen peroxide spray, (b) the 0.65% bleach spray and the (c) 62% high alcohol spray products when tested against the surfaces indicated in Table 2.\*

# **Compatability Summary**

Test Surface	CaviCide Low Alcohol (17.2%)	CaviCide1 Low Alcohol (22.5%)	Low pH Hydrogen Peroxide (0.5%) Product Spray	0.65% Bleach Spray	High Alchohol (62%) Product Spray
Acrylic					
Polyatryne					
PVC					
Neoprene					
Kraton G					
Silicone					
EPO TEK 353					
Naugahyde					
Formica (White)					
Formica (Black)					
Aluminum					
Brass					
Carbon Steel					
Chrome Plated Brass					
Copper					
Nickel Plated Brass					
Stainless Steel					
Glass					

Table 2: Overview of Competitive Surface Disinfectant Product Materials Compatibility

# Conclusions

The prevention of health care associated infections (HAIs) is top of mind for clinicians around the globe. When selecting a surface disinfectant for use in a facility:

- Evaluate the product contact times and organism efficacy claims on the product label to make sure they will meet the institution's needs. This is an important point to consider when it comes to ensuring procedural compliance.
- Select a trusted surface disinfectant manufacturing partner who will provide you and your staff with the technical support and education required to ensure the transition is seamless.

CaviCide1 and CaviWipes1 are low alcohol, multi-purpose, 1-step disinfectant cleaners which offer materials compatibility, superior cleaning, and a broad spectrum of organism kill in only 1 minute at room temperature. Metrex Sales Consultants will provide inservicing and educational materials to ensure staff have the support they need to drive compliance within the facility.

#### References

Indicates product compatible with test surface

Shows degradation

<sup>1.</sup> http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection\_Nov\_2008.pdf page 32

<sup>2.</sup> http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection\_Nov\_2008.pdf page 102

<sup>3.</sup> Prior, A., et al. Alcoholic fixation of blood to surgical instruments-a possible factor in the surgical transmission of CJD? J Hosp Infection 58 78-80 (2004)

<sup>4.</sup> Prior, A., et al. Alcoholic fixation of blood to surgical instruments-a possible factor in the surgical transmission of CJD? J Hosp Infection 58 78-80 (2004)