DISINFECTION DIGEST
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Efficacy of Improved Hydrogen Peroxide Against Important Healthcare-Associated Pathogens
(Rutala, W.A et al. ICHE 2012;33:1159-1161)

Abstract

There is evidence to support that environmental contamination plays a significant role in the spread of VRE, MRSA, *Clostridium difficile* and *Acinetobacter*. These organisms have been shown to survive on environmental surfaces for days and even months causing a need for fast, safe and effective disinfectant technologies. Daily disinfection of patient care areas is often achieved in the health care environment using a one-step EPA registered hospital disinfectant such as a QUAT, however, a relatively new yet proven technology known as Accelerated Hydrogen Peroxide® (AHP®), has become a market leading chemistry that is the perfect balance between safety and efficacy.

Background

Improved hydrogen peroxide based products have been recently introduced into the health care market for the disinfection of non-critical environmental surfaces and patient equipment and high-level disinfection of semi-critical medical equipment. Low levels of non-ionic and/anionic surfactants combined with an acidic pH speed up the antimicrobial activity as well as improve cleaning efficiency. Improved HP also referred to as "accelerated" or "activated" has the lowest EPA toxicity category, meaning it is virtually nontoxic and is not an irritant.

Study

This study was designed to test the efficacy of 2 improved hydrogen peroxide products against 3 standard HP products and 1 quaternary ammonium compound (QUAT). To determine product efficacy, 3 relevant pathogens were tested; a community-acquired methicillin-resistant *Staphylococcus aureus* strain (MRSA; USA300), vancomycin-resistant *Enterococcus* (VRE; ATCC 51299) and multidrug-resistant (MDR) *Acinetobacter baumannii*. The products used for the test were Clorox Healthcare Hydrogen Peroxide Cleaner Disinfectant (Clorox), undiluted; and Oxivir TB (Diversey, an Accelerated Hydrogen Peroxide (AHP) product under license from Virox Technologies Inc also available under the brand names of PREempt, INTERVention, Accel TB and OPTIM 33TB (SciCan)), undiluted; A456-II a QUAT (Ecolab) at 1:256; and hydrogen peroxide (Owens and Minor) at undiluted (3.0%), 1.4% and 0.5%. Each disinfectant was tested at a 1 minute contact time with 5% fetal calf serum. All were tested at a 1 minute contact time to mirror realistic contact times despite what the label may have suggested.

Results

It was determined that improved HP is superior to standard HP at the same concentrations for disinfection of environmental surfaces. As shown in the following table, the two improved HP products had similar effectiveness (>6$\log_{10}$ reduction within 30 seconds) against the organisms tested and were considerably more superior to HP at all 3 concentrations. The QUAT was also shown to be significantly superior to standard HP. Finally, the improved HP products were either significantly superior or just as effective as the QUAT.

Table 1: Bactericidal Activity of Disinfectants ($\log_{10}$ Reduction) at a 1 Minute Contact Time with and without Soil Challenge

Organism	Oxivir TB (0.5% H_2O_2)	0.5% H_2O_2	CHHPCD (1.4% H_2O_2)	1.4% H_2O_2	3.0% H_2O_2	A4567-II (QUAT)
~10^6 inoculum, 1 minute contact time, no soil challenge						
MRSA	> 6.62	< 4.04	> 6.54	≤ 4.04	≤ 4.04	5.55
VRE	> 6.34	≤ 3.61	> 6.13	≤ 3.61	≤ 3.61	4.58
MDR A. baumannii	> 6.76	≤ 4.28	> 6.76	≤ 4.28	≤ 4.28	> 6.76
~10^6 inoculum, 1 minute contact time, 5% soil challenge						
MRSA	> 6.72	Not tested	> 6.72	Not tested	≤ 4.24	≤ 4.24
VRE	> 6.26	Not tested	> 6.26	Not tested	≤ 3.78	≤ 3.78
MDR A. baumannii	> 6.56	Not tested	> 6.56	Not tested	≤ 4.08	> 6.56

Conclusion

The role of the environment in transmission of important healthcare-associated pathogens as well as the ability of these pathogens to persist in the environment for days to months has been well documented. In keeping with current infection prevention and control guidelines, environmental surfaces in patient rooms should be cleaned and disinfected on a regular basis using an EPA registered disinfectant. Quaternary Ammonium Compounds are widely used for such purpose, however, are unable to achieve the required level of kill when using a more realistic contact time of 1-minute and fair significantly worse in the presence of a soil load which puts into question the concept of a 1-step cleaner disinfectant.

Standard HP is one of the oldest disinfectants, but as the study highlights does have limitations. Improved hydrogen peroxide products such as Accelerated Hydrogen Peroxide (AHP) although relatively new to the healthcare market has shown time and time

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again that it is a superior technology that provides an exceptional level of disinfection at a faster rate, is safe to use, and is environmentally sustainable.

Implications for AHP

As the healthcare industry continues to push for greener and less toxic cleaners and disinfectants, AHP continues to be an industry leader that has been and continues to be supported by its pillars of strength.

AHP Disinfectants are One-Step Disinfectant Cleaners

•AHP has proven cleaning efficiency resulting in lower costs and faster results as well as added confidence that disinfection can occur

AHP Disinfectants provide the perfect balance between safety and efficacy

•AHP is designed to be easier on employees and occupants resulting in protocol compliance

•AHP provides a HMIS rating of "0", the safest allowed by the EPA. Handling the product without the usual personal protective equipment means less cost and downtime

AHP Disinfectants are environmentally sustainable

•AHP's active ingredient, hydrogen peroxide, breaks down into water and oxygen leaving no active residues

•AHP is formulated to ensure that it will not negatively impact indoor air quality

AHP Disinfectants have realistic contact times

•Short contact times ensure surfaces remain wet for the required contact time, providing comfort and confidence that disinfection has occurred

AHP Disinfectants are compatible

•AHP formulations are tested to ensure compatibility that preserve your investments in equipment, furniture and building surfaces by reducing corrosion and wear