



Evaluation of sporicidal activities of selected environmental surface disinfectants: Carrier tests with the spores of *Clostridium difficile* and its surrogates

(AJIC 2010; 38:718-722)

Abstract

Clostridium difficile is an increasingly common nosocomial pathogen whose spores are very resistant to disinfectants. For disinfection to occur, it is important for a product to keep the surface wet for the entire disinfection contact time as noted on the label in order to achieve the claimed disinfection activity. Accelerated Hydrogen Peroxide® (AHP®) is a relatively new yet proven technology that was tested for its efficacy against *C.difficile* spores. AHP was the only chemistry that was able to achieve the contact time as specified on the label when used under real world conditions. Additionally, AHP Technology has gained a reputation for being one of the most effective and safest disinfection technologies on the market.

Background

The emergence of *C.difficile* as a major nosocomial pathogen points to the need for safe and effective environmental sporicides for infection prevention and control. Although bleach has been suggested as an efficient means of killing *C. difficile* spores it has a number of workplace safety concerns. Additionally, it is well known that the activity of disinfectants is time dependent and the rate of evaporation of the active ingredient will influence its ability to produce the desired level of kill. The objective of this research study was to investigate the level of sporicidal action that can be obtained by domestic bleach and Accelerated Hydrogen Peroxide before the surface dries.

Study

Sporicidal efficacy of domestic bleach at concentrations of 500ppm and 5000ppm and a commercially available 4.5% Accelerated Hydrogen Peroxide (AHP) Ready-to-Use product were evaluated at contact times of 1 minute, 5 minutes and 10 minutes. Domestic Bleach at 500ppm did not provide any significant reduction against spores at any of the contact times tested. At 5-minutes Bleach at 5000ppm showed slightly more efficacy than the 4.5% AHP solution. Neither solution achieved the required 6-Log reduction needed to achieve sporicidal label claims unless the full 10-minute contact was achieved.

As current cleaning-disinfection practices allow only time for a surface to be wiped once and allowed to air dry Bleach at 5000ppm was compared to the 4.5% AHP Sporicidal Gel to determine what the actual wet contact time would be in real world applications. To account for differences in surfaces, the drying times for both products were tested on a variety of surfaces (laminated countertop, interior and exterior surfaces of the toilet bowl, Ceramic tiles and Porcelain

sink). The 4.5% AHP Sporicidal Gel spread uniformly on both vertical and horizontal surfaces and remained wet for longer than the required 10-minute contact time to achieve sporicidal disinfection where as the Bleach solution dried within 4 minutes. It was also observed that the bleach solution did not spread uniformly on toilet bowl or ceramic tile and tended to form small droplets. The inability of a disinfectant to spread uniformly on a surface can be related to the absence of detergency properties and may result in inadequate or incomplete disinfection of the entire applied surface.

Conclusion

Management of *Clostridium difficile* requires a multifaceted approach. Published literature agrees that thorough cleaning of environmental surfaces is of utmost importance as a way of removing a substantial number of spores from the surface. As illustrated by this study, the germicidal efficacy of a product is dependent upon contact (wet dwell) time. To achieve the required 6-Log reduction to achieve sporicidal label claims, both products tested required a 10-minute contact time. The study also highlighted the importance of detergency properties of a product to ensure even distribution of the disinfectant on the surface. While a product's ability to kill is important, we must be realistic in assessing the resources, both time and human, as well as how products are utilized by the environmental services department. A chemistry that has proven cleaning efficacy, the ability to kill spores in realistic contact times and also the ability to kill within the length of time the product takes to dry will enhance a facilities' success in eradicating spores.

Implications for AHP

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 formulations are effective at killing and stopping the spread of *C.diff*ⁱⁱⁱ

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 Disinfectants are environmentally sustainable

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



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- AHP is formulated to ensure that it will not negatively impact indoor air quality and has been approved as an asthma-safe product

AHP Disinfectants have realistic contact times

- Contact times ensure surfaces remain wet for the required contact time, providing comfort and confidence that disinfection has occurred
- AHP has been proven through peer reviewed studies to reduce HAIs

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

ⁱ The Oxivir TB Formulation of Accelerated Hydrogen Peroxide (AHP) is Effective for Killing Clostridium Difficile Spores on Toilet Seat Surfaces. CJIC Vol 22, No. 1, Spring 2007, pg 49

ⁱⁱ Use of a daily disinfectant cleaner instead of a daily cleaner reduced hospital-acquired infection rates. AJIC 43 (2015) 141-6