

Urgo Medical Sponsored Learning: Pressure Injuries And The Use Of Hypochlorous Acid (pHA)-Based Cleanser: What Is The Science And What Are The Best Ways To Leverage This Technology With Maximal Effect?

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Is Standardization Possible In Wound Care?

Wound care is complex and requires a holistic and interdisciplinary approach. Often times, more clinicians involved in the care process translates to more opinions, subsequently leading to redundant or unnecessarily convoluted management plans. A survey of wound and ostomy care nurses (WOCNs) in the United States demonstrated that there are often more than four departments and more than four prescribers involved in wound treatment.¹ Almost half of the WOCNs surveyed reported four or more wound cleansers used in wound treatments.¹ So, the question is: is it possible to standardize wound care protocols, for example, wound cleansing? According to wound care clinicians,

standardization and evidence-based practice in wound care is achievable when there is compelling evidence and continuous clinician education.² Therefore, it is imperative to have best practice guidelines and recommendations for wound management strategies.

The Case For Hypochlorous Acid For Wound Cleansing

Hydrogen peroxide, sodium hypochlorite (e.g., Dakin's solution) and chlorhexidine have traditionally been used as wound cleansers. Recent studies and best practice guidelines no longer support the use of these products on open wounds as they have been found to damage tissues in the wound.³

Wound Care Treatment Plans in the U.S.



86%

Of WOCN's surveyed reported that **4+ departments** are involved in wound treatment¹



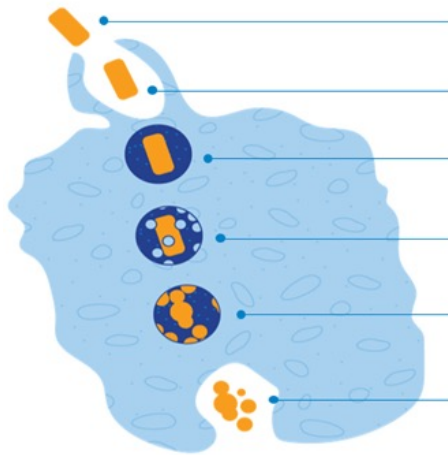
93%

Of WOCN's surveyed reported that **4+ prescribers** are involved in wound treatment¹



Almost $\frac{1}{2}$ of WOCN's surveyed reported that **4+ cleansers** are involved in wound treatment¹





- 1 Pathogen is targeted by chemotaxis
- 2 Neutrophil forms pseudopods to engulf pathogen
- 3 Neutrophil then forms a phagosome, which surrounds pathogen
- 4 Hypochlorous acid is generated
- 5 The pathogen is destroyed by HOCl action
- 6 Residual material is removed by exocytosis

Hypochlorous acid (HOCl), a naturally occurring reactive oxygen species (ROS), has been shown to be a suitable alternative for wound cleansing. Human neutrophils produce HOCl as part of the defense mechanism against bacteria. HOCl exerts its antimicrobial effect via oxidative burst.

Compared to sodium hypochlorite, HOCl has been found to be non-cytotoxic in *in vitro* and *in vivo* studies.⁴ HOCl is FDA-approved and does not cause irritation to tissues, such as the eyes or the skin.⁵ Though it is effective in killing bacteria, HOCl is much safer for fibroblasts and keratinocytes in the wound compared to traditional wound cleansers (i.e., Dakin's solution, hydrogen peroxide, povidone-iodine, chlorhexidine gluconate).⁵ HOCl has a pKa of 7.5, mimicking the normal pH of healthy, human skin. HOCl has almost twice the oxidation reduction potential (ORP) compared to hypochlorite (e.g., Dakin's solution) at equivalent concentrations.⁶ When compared to hypochlorite and hydrogen peroxide, HOCl has a much lower comparative minimum bactericidal concentration.⁷ HOCl can kill bacteria commonly found in wounds (i.e., *E. coli*, *P. aeruginosa* and *S. aureus*) at a significantly

lower concentration than hypochlorite and hydrogen peroxide. HOCl also has a much higher relative therapeutic index than hypochlorite and hydrogen peroxide.⁶ It has the best balance between effectively killing bacteria without harming healthy wound cells (e.g., fibroblasts).

Maximizing The Benefits Of Hypochlorous Acid (Vashe® Wound Solution)

The HOCl-soaked gauze is an effective method of wound cleansing. HOCl can remain stable for up to 20 minutes when poured onto a cotton gauze. Once it makes contact with the wound, HOCl rapidly biodegrades (within 30 seconds), rendering it safe as a wound cleanser. *In vitro* studies have found that Vashe® wound solution can effectively kill 99.999% of common bacteria and spores found in wounds in 15 seconds.^{8,9,10} Other studies have also demonstrated that a 5- to 10-minute soak with Vashe® can reduce bacterial colonies and proteins and polysaccharides associated with biofilm.

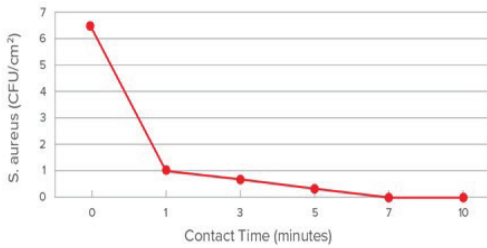
More recently, HOCl has been used in combination with negative pressure wound therapy (NPWT). Instillation

Organism	Time to kill	% Reduction
MRSA	15 seconds	99.999%
VRE	15 seconds	99.999%
<i>Escherichia coli</i>	15 seconds	99.999%
<i>Acinetobacter baumannii</i>	15 seconds	99.999%
<i>Bacteroides fragilis</i>	15 seconds	99.999%
<i>Candida albicans</i>	15 seconds	99.999%
<i>Enterobacter aerogenes</i>	15 seconds	99.999%
<i>Enterococcus faecium</i>	15 seconds	99.999%
<i>Haemophilus influenzae</i>	15 seconds	99.999%
<i>Klebsiella oxytoca</i>	15 seconds	99.999%
<i>Klebsiella pneumoniae</i>	15 seconds	99.999%

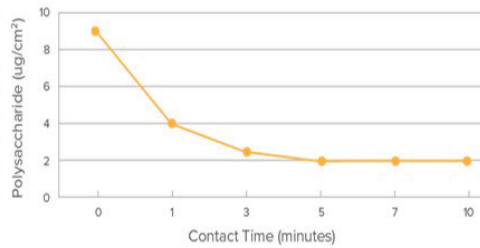
Organism	Time to kill	% Reduction
<i>Micrococcus luteus</i>	15 seconds	99.999%
<i>Proteus mirabilis</i>	15 seconds	99.999%
<i>Pseudomonas aeruginosa</i>	15 seconds	99.999%
<i>Serratia marcescens</i>	15 seconds	99.999%
<i>Staphylococcus epidermidis</i>	15 seconds	99.999%
<i>Staphylococcus haemolyticus</i>	15 seconds	99.999%
<i>Staphylococcus hominis</i>	15 seconds	99.999%
<i>Staphylococcus saprophyticus</i>	15 seconds	99.999%
<i>Streptococcus pyogenes</i>	15 seconds	99.999%
<i>Staphylococcus aureus</i>	15 seconds	99.995%
<i>C. difficile</i> endospores	15 seconds	99.93%

PRESENTATION DIGEST

Effect of Hypochlorous Acid on adherent colonies of *S. aureus* Bacterial Numbers



Effect of Hypochlorous Acid on Polysaccharide Levels Within *S. aureus* slime

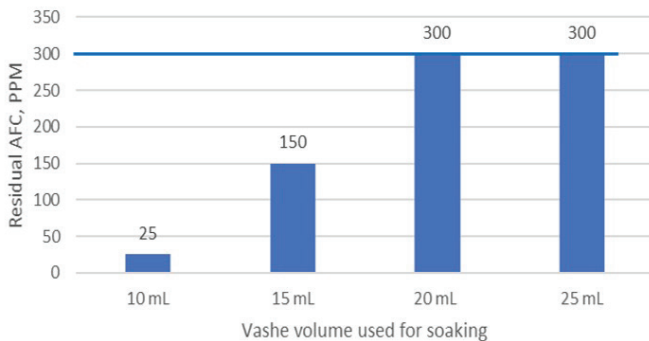


Effect of Hypochlorous Acid on Protein Levels within *S. aureus* slime



with HOCl aids with reducing bacterial bioburden and oxidative debridement of the wound. HOCl oxidation helps degrade, soften or eliminate necrotic tissue in the wound bed.¹¹ Consensus guidelines for the use of wound antiseptics recommend a soak of 3-10 minutes with an oxidative antiseptic (e.g., HOCl) to cleanse and debride a wound.¹⁰ This a relatively new concept known as oxidative debridement. 20 to 25mL of Vashe[®] should be used on a woven cotton gauze sponge (4x4) to achieve maximum effects.

Vashe AFC consumption with 5 min by woven gauze sponges (4x4), 100% cotton NON21424



A Sample Vashe[®] Packing Protocol for Local Wound Management:

1. Cleanse wound(s) with Vashe[®] (Soak for 15 minutes).
2. Apply barrier spray to peri-wound skin
3. Fill wound(s) with Vashe[®]-soaked gauze
4. Cover with low-adherent adsorbent dressings
5. Change dressings daily and as needed.

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graduated from the University of Ottawa's nursing school in 2012 and began her career in an acute care surgical unit that specialized in general, urology and plastic surgery. Butt then earned her Wound, Ostomy and Continence Certification from the WOC Institute and Master of Clinical Science in Wound Healing from Western University in 2014 and 2018, respectively. Since 2015, Britney has been working as a clinical nurse specialist lead for wound, ostomy and continence care at North York General Hospital, where she provides direct patient care for complex cases, ongoing education and develops and implements hospital policies about wound management and pressure injury prevention and management.

Gregory Schultz PhD was a Professor Emeritus of Obstetrics and Gynecology at the University of Florida where he served as the Director of the Institute for Wound Research for 32 years. A major focus of Dr Schultz's more recent research had been on understanding the role that bacterial biofilms play in stimulating chronic inflammation that leads to highly elevated levels of proteases in wounds that impair healing.

Editor's Note: We are saddened to report that Dr. Gregory Schultz passed away unexpectedly on April 12, 2024. Wound Care Canada extends its condolences to his family and colleagues.



To access the full presentation click here: <https://drive.google.com/file/d/1CMn-0RFIHzaPppBIB-ReZ-8G5AogPiqLU5/view?usp=sharing>

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