

Urgo Sponsored Learning:

The Use of Evidence Support Hypochlorous Acid-Based Cleanser: What Is The Science? What Is The Evidence? And What Are The Clinical Usage Pearls?

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Wound Cleansing: Where Does It Fit In?

Wound cleansing is an important aspect in preparing the wound bed for healing. Appropriate wound cleansing can also lower the risk of wound infections. Wound cleansing is defined as “actively removing surface contaminants, loose debris, non-attached non-viable tissue, microorganisms and/or remnants of previous dressings from the wound surface and its surrounding skin.”¹ Adequate wound cleansing of chronic or hard-to-heal wounds can remove excessive exudate and debris from the wound and hydrate a desiccated wound bed.¹

Biofilm is the preferred form of bacterial life and is prevalent in chronic or hard-to-heal wounds. Biofilm can

delay wound healing and cause wound infections. Anti-biofilm management includes:

- Routine cleansing of the wound and peri-wound with an anti-biofilm solution
- Physical removal of the biofilm via regular cleansing with intent
- Retarding biofilm regrowth with advanced antimicrobial dressings
- Optimizing the health of the wound bed with debridement (including surgical)
- Promoting a wound healing environment with advanced dressings (e.g., protease modulators,

Oxidative Burst Pathway



- 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 killed by HOCl action**
- 6 Residual material is removed by exocytosis

extracellular matrices, negative pressure wound therapy)

How To Select An Appropriate Wound Cleaner

Traditionally, normal saline has been the wound-cleanser-of-choice. However, it is inadequate to address biofilm. According to the International Wound Infection Institute, practitioners should consider the following factors when selecting a wound cleanser:¹

- Assessment of the wound (e.g., etiology, location, and visible structures)
- Patient’s risk of wound infection
- Signs and symptoms of local wound or spreading infection
- Colonization with multi-drug-resistant organisms
- Efficacy and organism sensitivities of solution
- Goals of care
- Local policies and procedures

Additionally, when choosing a wound cleanser, practitioners should consider the cytotoxicity of the solution, and how the solution may affect the pH of the wound. Traditional antiseptics, such as povidone-iodine and hydrogen peroxide, are cytotoxic to the tissue of the wound bed and are not recommended as wound cleansers.² Solutions that are cytotoxic can hinder the wound healing process by affecting cells such as fibroblasts, keratinocytes, and white blood cells.³ pH is another important factor to consider in wound healing. Bacteria generally prefer a slightly more basic environment (see table⁴). Lower pH has been found to correlate with wound healing. An ideal wound cleansing solution should mimic the natural acid mantle of the skin.

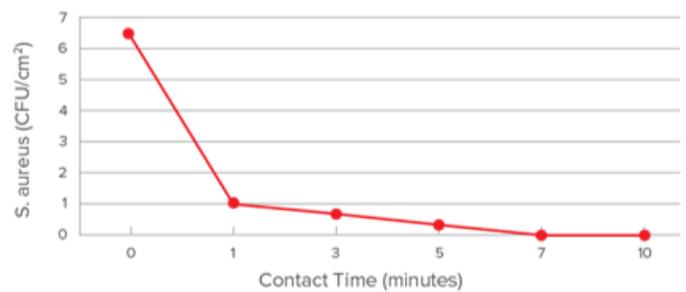
Wound-associated microorganisms	Optimum pH for growth
<i>Staphylococcus aureus</i>	7.0–7.5
<i>Enterococcus faecelis</i>	7.0–9.0
<i>Pseudomonas aeruginosa</i>	6.6–7.0
<i>Coagulase-negative staphylococci</i>	7.0–7.5
<i>Anaerobic bacteria</i>	6.0–7.0
<i>Escherichia coli</i>	6.0–7.0
<i>Klebsiella spp.</i>	5.5–7.0
<i>Candida spp.</i>	7.0–8.0

Hypochlorous Acid: An Ideal (and Natural) Wound Cleansing Solution

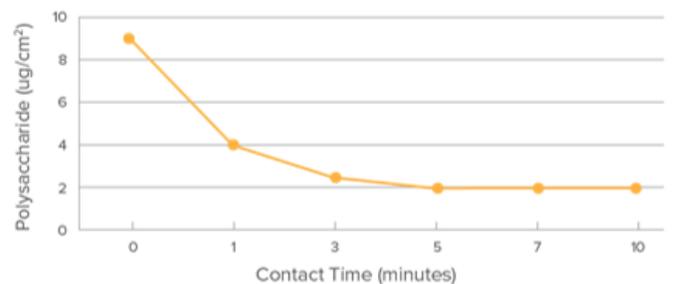
Hypochlorous acid (HOCl) is a naturally occurring antimicrobial substance in the human body. White blood cells, such as neutrophils, produce HOCl to combat pathogens.

HOCl has been found to be effective against multi-drug resistant bacteria, viruses, fungi, and spores. It exerts its effects rapidly (within seconds) and has been

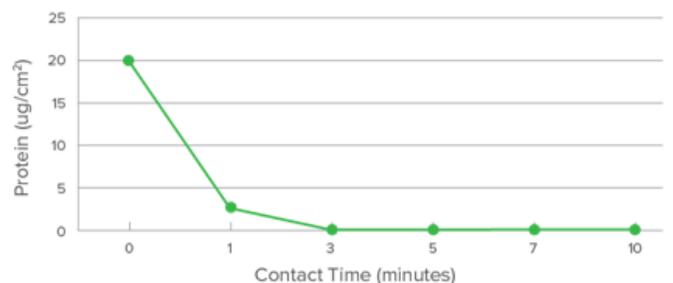
Effect of Hypochlorous Acid on adherent colonies of *S. aureus* Bacterial Numbers



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



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



demonstrated to eradicate 99.999% of these pathogens in 15 seconds. It can also penetrate and disrupt the polysaccharide/protein matrix of bacterial biofilm, rendering it an effective anti-biofilm agent. Prolonged exposure of HOCl has been found to be more effective in mechanically penetrating and removing bacterial biofilm. Additionally, HOCl is non-cytotoxic and does not cause damage to the healing tissues in the wound. It has a higher therapeutic index than sodium hypochlorite and hydrogen peroxide.⁵

Biocompatibility and Toxicity Data for Vashe Wound Therapy

Animal Model	Results
Eye Irritation (Rabbit)	No ocular irritation
Skin Sensitization (Guinea Pig)	No skin sensitization, no delayed- contact hypersensitivity
Primary Dermal Irritation (Rabbit)	No dermal irritation, no erythema or edema
Acute Oral Toxicity (Rat)	No oral toxicity (LD50>5g/kg)
Cell-Based Assay	
Bacterial Mutagenicity	Non-mutagenic
Cytotoxicity	Biocompatible with fibroblasts and keratinocytes

Sampson CM, Sampson MN. Hypochlorous acid: A safe and efficacious new wound therapy. Poster presented at: World Union of Wound Healing Societies; 2008; Toronto, Ontario, Canada. 2. Data on file with Urgo Medical North America.

Comparative Cytotoxicity Testing of Hypochlorous Acid and Commonly Used Wound Irrigants Against Human Dermal Fibroblasts and Keratinocytes (n=5 per group, p<0.01)

Wound Irrigant	Results	Grade
Hypochlorous Acid (@ 4 times the normal % of Vashe Wound Solution)	Pass	0
Saline (0.9% NaCl, pH 5.0)	Pass	0
Dakin's Solution (0.25%)	Fail	3
Dakin's Solution (0.5%)	Fail	3
Chlorhexidine gluconate (4%)	Fail	3
Hydrogen peroxide (3%)	Fail	3
Povidone iodine (7.5%)	Fail	3
Povidone iodine (10%)	Fail	3

Block SS. Disinfection, sterilization, and preservation. Philadelphia: Lea & Febiger; 2000

Pearls From Consensus And Clinical Practice Guidelines

1. All chronic wounds should be assumed to be contaminated or infected with bacteria.

Most patients with chronic, hard-to-heal wounds have complex medical histories and are usually of advanced age. These factors can contribute to compromised immunity. All chronic wounds and hard-to-heal wound should be assumed to be contaminated or infected with bacteria (especially biofilm).

2. Wound cleansers should be effective in disrupting biofilm.

Presence of biofilm in chronic, hard-to-heal wounds delays wound healing and can cause wound infections. Addressing biofilm is an important factor in initiating and supporting wound healing. Saline or water flushes are inadequate to remove biofilms. The wound (and the peri-wound tissues) must be cleansed intently with an anti-biofilm cleanser to prepare the wound bed for healing.² The wound cleanser must be able to effectively kill biofilm and planktonic (free-floating) bacteria without causing damage to the tissue in and around the wound.⁵

3. Minimize harm.

As previously mentioned, traditional wound antiseptics such as hydrogen peroxide, sodium hypochlorite, povidone-iodine, and chlorhexidine, are cytotoxic and no longer recommended as wound cleansers. Contrarily, HOCl is non-cytotoxic and is an effective anti-biofilm agent.

4. Patient-centered care: Wound care is not a transaction but an interaction.

Wound care is not a transaction, but a patient interaction.² Health-care practitioners must take a holistic approach and always put the patient at the centre of their management plans. Comprehensive management, including odour management and pain control are important aspects of wound care practitioners must not forget. Promoting the patient's health, immunity and holistic wellbeing is crucial to wound care and patient care in general.¹



Why Choose Hypochlorous Acid (HOCl) As A Wound Cleanser? Think About The MICROBes

- **M**inimal irritation
 - HOCl is non-cytotoxic and non-irritating/gentle to the skin.
- **I**nfection prevention
 - HOCl is a naturally occurring antimicrobial agent that the body produces. It is effective in eradicating bacteria, viruses, fungi, and spores. Wound cleansing with HOCl can reduce wound bioburden and aid wound healing.
- **C**ellular healing
 - HOCl is non-cytotoxic and does not cause damage to cells and tissues that are healing.
- **R**educe inflammation
 - By reducing the wound bioburden, HOCl can reduce inflammation, leading to less pain, swelling, and discomfort or the patient.
- **O** odour control
 - HOCl can reduce and control unpleasant odour associated with infected wounds
- **B**iofilm disruption
 - HOCl can penetrate and disrupt bacterial biofilm.

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To access the full presentation, click here: <https://drive.google.com/file/d/1i0pQaFc9wv7ppKcoH1yPkB9Y-G0vArSwQ/view>

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