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Can The Use of *Hypochlorous Acid Change Your Dressing Selection in Treating Chronic Wounds?

Introduction

With ever increasing attention on bioburden and emergence of resistant bacteria, our hospital clinic has encouraged a policy of culturing wounds at the time of presentation. Knowing that wounds contain biofilms that harbor bacteria, the dilemma arises then as to whether to treat with antimicrobial dressings or antibiotics when bacteria are identified. *Hypochlorous Acid is a innate and naturally occurring inorganic bactericidal compound. As a product of the neutrophilic oxidative burst that is part of our immune systems response within the phagolyposome, *Hypochlorous acid is a potent microbicidal agent. It has significant activity against a wide variety of aerobic, anaerobic, fungal and viral pathogens. *Hypochlorous acid has been shown to be effective within seconds of exposure to pathogens making it an attractive topical treatment in wound care. Bacterial resistance to antibiotics continues to be problematic as emergence of resistance is common. The topical use of broad spectrum antibiotics is not recommended due to the risk of allergic reaction, greater effect on endogenous microflora, induction of resistance, and reduced therapeutic efficacy.[1] Similarly, other topical antimicrobial agents have cytotoxic effects and impair wound healing.[2]
The ability to penetrate and degrade biofilm formation and the bioburden contained within is an advantageous effect in wound care.[3]
We review the effect the use of *hypochlorous acid on bioburden and biofilm as monitored in our clinic and compare that to the cost of antimicrobial dressing use.

Method

Prospectively, the effectiveness of *hypochlorous acid and its effect on wound bioburden was evaluated by qualitative culture at presentation and at week 2. Eighteen consecutive wounds were evaluated by modified culture technique. Sharp selective debridement was performed with a sterile curette to expose the granulation bed. The wound was irrigated with saline. Using a second sterile sharp curette, additional tissue was taken from the wound bed, placed on the culture swab and sent to lab. Both aerobic and anaerobic qualitative cultures were evaluated.
*Hypochlorous acid was measured with a syringe and applied at the time of dressing change an allowed to stay in contact with the wound surface for 10 minutes. Total of 5cc was typically used on the wound and then to wet the collagen dressing prior to application to the wound. Dressing changes occurred either 3 days/week, 5 days/week, or daily.

Wound Type	Application/Week	Initial Culture	Week 2 Culture
DFU	3	*Escherichia coli*	Normal Cutaneous flora
		MRSA	
		Pseudomonas aeruginosa	
DFU	3	*Pseudomonas aeruginosa*	Normal Cutaneous flora
		MRSA	
		Enterococcus faecalis	
DFU	3	*MRSA*	*MRSA*
DFU	3	*Enterobacter cloacae*	No Growth No Org
DLE	3	*Klebsiella pneumoniae*	Normal Cutaneous flora
		Enterobacter cloacae	
		Enterococcus faecalis	
		MRSA	
		Proteus mirabilis	
DLE	5	*Pseudomonas aeruginosa*	Normal Cutaneous flora
		Staphylococcus aureus	
DLE	5	*Escherichia coli*	No Growth No Org
		Staphylococcus aureus	
DLE	5	*Klebsiella pneumoniae*	No Growth No Org
		Streptococcus pneumoniae	
		Strep Group B	
DLE	3	*MRSA*	No Growth No Org
VLU	3	*Staphylococcus aureus*	No Growth No Org
VLU	3	*Enterobacter cloacae*	Normal Cutaneous flora
		Enterococcus faecalis	
VLU	3	*MRSA*	Normal Cutaneous flora
VLU	3	*MRSA*	No Growth No Org
Pressure ulcer	7	*Pseudomonas aeruginosa*	Normal Cutaneous flora
		Escherichia coli	
Presssure Ulcer	7	*MRSA*	Normal Cutaneous flora
		Escherichia coli	
		Enterococcus faecalis	
Pressure ulcer	7	*Proteus mirabilis*	No Growth No Org
		Enterococcus faecalis	
Pressure ulcer	7	*Pseudomonas aeruginosa*	Normal Cutaneous flora
Pressure ulcer	7	*Proteus mirabilis*	No Growth No Org
		Enterococcus faecalis	

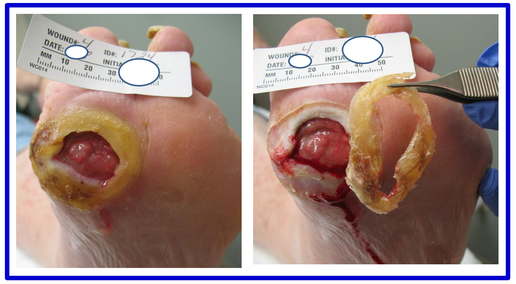
Results

*Hypochlorous acid worked well to control bioburden in this series of wounds. 17 of 18 wounds were found on culture to be pathogen negative at 2 weeks. In one wound MRSA persisted after 2 weeks of treatment. *Hypochlorous acid was effective against common aerobic and anaerobic pathogens cultured from this series of wounds.

Solution	Volume	Cost
Vancomycin 1% solution Topical	250cc	$20.73
Triple antibiotic solution	200cc	$19.55
Amphotericin B 0.005%	200cc	$10.30
Hypochlorous Acid	250cc	$16.75

Dressing	Cost
Silver Alginate 4x4	$11.00
Silver Collagen 2x2	$22.00
Silver Collagen 4x4	$22.00
Collagen 2x3	$16.75

Diabetic Foot Ulcer



Conclusions

*Hypochlorous acid application in this series of wounds effectively managed wound bioburden as measured by simple qualitative culture technique. Pathogens were detected after 2 weeks in one of 18 patients treated with *hypochlorous acid. In patients with VLUs and DFUs, *hypochlorous acid was used to wet the collagen dressing applied to the wound. *Hypochlorous acid was applied at the time of dressing change either 3, 5 or 7 days per week. Compared to other commonly used wound solutions used to control bioburden, *hypochlorous acid represents a cost savings compared to Vancomycin solution and Triple antibiotic solution without concerns of emergence of antibiotic resisitance. Adding Amphotericin B to have candida coverage would incrementally increase the cost of topical antibiotic treatment. Hypochlorous acid used with collagen dressings to treat VLUs can result in savings compared to other commonly used silver collagen dressings. Given that 50 treatments are contained in one 250 ml bottle, the use of Hypochlorous acid with collagen can amount to significant savings. Each dose of Hypochlorous acid costs $0.34. Added to the cost of collagen, it represents a savings of $10.66 for each dressing change. Hypochlorous acid is effective in clearing bioburden in chronic wounds. Hypochlorous acid use is not cytotoxic or known to interfere with wound healing as prolonged use of silver may be. The hypochlorous acid collagen dressing can be used beyond the 2 week time frame restriction of silver collagen without concern for the cytotoxic effects of silver on wound fibroblasts.

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