COMMENTARY

Hypochlorous Acid: A Multipurpose New Addition to the Military Med Bag?

Adriana Campo, DO[a]

Background: A medical bag (med bag) in the military medical community contains medical supplies and equipment used to provide care on the battlefield or in noncombat field conditions. Though its contents are situation-dependent (eg, deployment, field exercise, physical fitness event), it generally contains items such as intravenous supplies, airway management tools, pain medications, bandages, tourniquets, splints, suture materials, and antiseptics.
Observations: Hypochlorous acid (HOCl) is approved by the US Food and Drug Administration for disinfecting surfaces and wound care. In the military, long foreign deployments and training exercises can last 6 months to 1 year. Short-term field exercises and outdoor physical fitness or training events are also common. Even at a duty station, conditions in a medical facility may be austere, and access to care may be limited. Some clinics may even have limited general medical staff, without nearby military specialists to consult. In these settings, HOCl may be beneficial not only as a disinfectant for field injuries but also off-label management of skin conditions.
Conclusions: HOCl may be a potent addition to military medicine in various settings, especially in austere environments or during long deployments.

Author affiliations can be found at the end of this article.
Correspondence: Adriana Campo (adcampo13@gmail.com)

Fed Pract. 2026;43(5). Published online May 20. doi:10.12788/fp.0702

Exogenously, hypochlorous acid (HOCl) is a powerful oxidizing agent formed from chlorine dissolved in water. Within the body, it is part of the immune response, created by activated leukocytes, which form HOCl from hydrogen peroxide and chloride. HOCl has been used as a disinfectant in wound care due to its antimicrobial properties via inhibition of DNA synthesis, protein synthesis, and decreased adenosine triphosphate production. It specifically targets bacteria by blocking bacterial cell wall synthesis and decreasing DNA replication.[1]

During the COVID-19 pandemic, HOCl was recommended by the US Environmental Protection Agency as a disinfectant.[2] HOCl can be purchased from a supplier, though its major limitation is its shelf life. The main environmental factors affecting its stability are sunlight exposure, temperatures > 25 °C, and air exposure. HOCl is stable and most potent when the pH falls between 3.5 and 5.5.[3] It is best stored in a cool, dark environment to maintain efficacy for 2 weeks. Rossi-Fedele et al found that when exposed to sunlight, chlorine reduction starts on day 4, whereas solutions kept in dark storage remained more stable, with this process starting after day 14.[4]

HOCl can also be made on-site via a machine, which ranges in price from a portable version costing < $200 to a large commercial option that can cost $7000 to $25,000. HOCl is produced by mixing noniodinated salt and water, and using electrolysis, which generally takes less than 10 minutes before it is ready for use.[2] Given the cost and nonreusable nature of disinfecting wipes, HOCl may be more worthwhile for economic and disposal purposes in the long term.

Different concentrations of HOCl are readily available commercially. Because topical application of 1% HOCl may cause skin irritation, solutions with lower concentrations have been developed including Vashe (0.03% HOCl; SteadMed), PhaseOne (0.025% HOCl solution; IHT), OCuSOFT (0.02% HOCl; OCuSOFT), Bruder (0.02% HOCl; Bruder Healthcare), Acuicyn (0.01% HOCl solution in dilute saline; Sonoma Pharmaceuticals), and Avenova (0.01% HOCl solution; NovaBay Pharmaceuticals).[5]

Aside from its surface utility, HOCl has been researched for its beneficial effects on skin. HOCl has been shown to be helpful intraoperatively and postoperatively in improving adverse effects (AEs) after hair restoration, including erythema and pruritus, and in optimizing healing by reducing inflammation, likely due to its antimicrobial properties and ability to promote oxygenation.[6] Bucko et al demonstrated that Microcyn scar gel (with HOCl) was a superior nonirritating, nontoxic method of not only improving scar appearance (vascularity, scar height, and pliability) but also reducing scar symptoms of pain and pruritus in comparison to 100% silicone scar gel (traditional application used to

improve scarring).[7] Zhang et al demonstrated that HOCl consistently improved symptom relief of blepharitis, including meibomian gland, eyelash, and eyelid redness, irritation, and appearance in comparison as well as were better tolerated in comparison to traditional recommendations of eyelid compresses and wash (tea tree oil, diluted baby shampoo, and topical antibiotics).[8] In children with moderate to severe atopic dermatitis, Majewski et al compared a traditional bleach bath with a body wash containing hypochlorite (NaOCl; hypochlorous acid in alkaline aqueous solution). The body wash proved to be more convenient (showering vs 10-minute bath) and significantly improved symptoms while reducing the need for topical corticosteroids (common treatment modality for atopic dermatitis).[9]

The skin is the body's primary defense against both dermatologic and respiratory infections. The face is especially vulnerable to microbes via airborne or environmental transmission, mechanical irritation, and touch. In the military environment, personal protective equipment (PPE) or uniform items may increase the risk of dermatologic conditions such as allergic or irritant dermatitis, infection, and friction blisters.

In a literature review of 312 dermatologic articles published between 2002 and 2022, Singal and Lipner found that among deployed soldiers serving in hot and dry climates, dermatitis and eczematous conditions were the most common, whereas bacterial and fungal conditions were most common in hot and humid settings. In the nondeployed setting, dermatitis and eczematous, acne, and fungal infections were the most common skin conditions. This is reflected by the unique circumstances that service members face at home and while deployed, when they may be more vulnerable to developing new or worsening chronic skin conditions depending on the environment (access to shelter, humid vs dry environments), and decreased access or time for hygiene (shared quarters at home in barracks or on deployment). Occupation-related conditions also play a large role in military dermatologic conditions.[10]

Dever et al noted the unique risks and exposures in the environment itself (plants, arthropods) as well as uniform items (protective gear) that carry an increased risk of friction irritation and dermatitis. Occupational exposures commonly associated with irritant contact dermatitis include alcohols, oils, fuel, disinfectants, and solvents. Chemicals in military uniforms themselves (eg, formaldehyde resins, disperse dyes, and chromate-containing dyes) also have the potential to cause allergic contact dermatitis, which can be challenging to address given the emphasis on uniformity and standards.[11] PPE also may exacerbate rosacea and acne.

Some pathologies are associated specifically with bacteria, such as *Cutibacterium acnes,* as seen in acne vulgaris. Colonization of bacteria on the face may create biofilms that are difficult to detect, may be resistant to antibiotic therapy, and are implicated in other dermatologic conditions, such as persistent wounds, atopic dermatitis, and candidiasis.[12]

Biofilm and antibiotic resistance already pose a risk to patient care, but the unique environmental conditions and exposures of military settings can amplify this risk in the military population.[13] Using HOCl in austere environments or the field for wound care may help reduce microbial load and the subsequent need for systemic antibiotics which carry the risk of gastrointestinal AEs and resistance.[1]

An optimized healing rate would support operational objectives by enabling service members to remain on full duty and avoid medications, which may prevent them from special duty, such as aviation. Sakarya et al found that HOCl solution enhanced wound healing in contrast with povidone-iodine (PI), while a study by Dharap et al discussed how HOCl provided major improvement in ulcer wound size (and infection), as well as significant reduction of inflammation.[13]

Anagnostopoulos et al studied the efficacy of 0.01% HOCl vs other disinfectants (5% PI, 4% chlorhexidine gluconate [CHG] and 70% isopropyl alcohol [IPA]) against common skin organisms, including methicillin-susceptible *Staphylococcus aureus* and methicillin-susceptible

Staphylococcus epidermidis. The study found that HOCl had at least equal if not greater efficacy to PI, CHG, and IPA depending on the bacterial strain, demonstrating immediate bactericidal effects.[14]

Furthermore, HOCl has been shown to be useful in suturing and wound closure by reducing microbial load when soaked gauze is placed in wound beds prior to closure, while not harming surrounding tissue.[15] This would be especially advantageous for military health care when specialist follow-up would be delayed or to prevent infection risk while en route to higher care. Aside from its disinfectant strength, it's also well tolerated. HOCl studies on human tissue demonstrate its efficacy to prevent irritation and AEs while also preventing infection and promoting wound healing.

Gozukucuk and Cakiroglu studied the use of HOCl as a skin disinfectant before neonatal circumcision and demonstrated fewer adverse effects compared with the more commonly used PI. Neonates treated with PI prior to circumcision resulted in greater postoperative edema and increased duration of wound healing compared with infants treated with HOCl.[16] Furthermore, studies have shown that PI can lead to irritant dermatitis or chemical burns if not properly dried or if it becomes pooled because of occlusion dressings.[17]

Aside from its indicated use for infection or wound care, anti-inflammatory properties of HOCl also may be beneficial for off-label use in preventing flare-ups of chronic conditions as well as for treating symptoms while awaiting specialist evaluation. This might be the case during US-based training exercises, in remote locations without nearby dermatologists, or during virtual care because of internet constraints. For chronic conditions such as rosacea or atopic dermatitis, which research has shown are related to mast cell activation and degranulation and cytokine release, HOCl has been shown to reduce histamine, neutrophil-generated leukotrienes, in addition to interleukin-6 and interleukin-2 to improve symptoms by reducing inflammation.[18]

Limitations of HOCl to explore would be extending its shelf life, exploring its various forms (eg, spray, topical) and storage limitations, and training of the machine and materials needed to be made in-house if not purchased. There are also no official guidelines for clinicians to recommend HOCl to patients, and research should be expanded on its use in humans, though it generally is well tolerated without AEs. HOCl has the potential to be a potent, nontoxic, inexpensive tool in med bags or at austere clinics to help maintain a sterile space for procedures, prevent infection while rendering care, and help with exacerbations or prevent flare-ups of chronic conditions such as psoriasis, acne, and atopic dermatitis while specialist care is pending.

Author affiliations

[a]Naval Health Clinic Cherry Point, North Carolina

Author disclosures

The authors report no actual or potential conflicts of interest with regard to this article.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies. This article may discuss unlabeled or investigational use of certain drugs. Please review the complete prescribing information for specific drugs or drug combinations— including indications, contraindications, warnings, and adverse effects— before administering pharmacologic therapy to patients.

References

1. Natarelli N, et al. Hypochlorous acid: applications in dermatology. *J Integr Dermatol*. December 22, 2022. Accessed March 2, 2026. https://www.jintegrativederm.org/article/56663-hypochlorous-acid-applications-in-dermatology
2. Block MS, Rowan BG. Hypochlorous acid: a review. *J Oral Maxillofac Surg*. 2020;78:1461-1466. doi:10.1016/j.joms.2020.06.029
3. Menta N, Vidal SI, Friedman A. Hypochlorous acid: a blast from the past. *J Drugs Dermatol*. 2024;23:909-910.
4. Rossi-Fedele G, Dogramaci E, Steier L, et al. Some factors influencing the stability of Sterilox®, a super-oxidised water. *Br Dent J*. 2011;210:E23. doi:10.1038/sj.bdj.2011.143
5. Tran AQ, Topilow N, Rong A, et al. Comparison of skin antiseptic agents and the role of 0.01% hypochlorous acid. *Aesthet Surg J*. 2021;41:1170-1175. doi:10.1093/asj/sjaa322
6. Stough D. Topical stabilized super-oxidized hypochlorous acid for wound healing in hair restoration surgery: a real-time usage-controlled trial evaluating safety, efficacy, and tolerability. *J Drugs Dermatol*. 2023;22:1191-1196. doi:10.36849/JDD.7172
7. Bucko AD, Draelos Z, Dubois JC, Jones TM. A double-blind, randomized study to compare Microcyn scar management hydrogel, K103163, and Kelo-cote scar gel for hypertrophic or keloid scars. *Dermatologist*. 2015;23:113-122.
8. Zhang H, Wu Y, Wan X, et al. Effect of hypochlorous acid on blepharitis through ultrasonic atomization: a randomized clinical trial. *J Clin Med*. 2023;12(3):1164.

doi:10.3390/jcm12031164
9. Majewski S, Bhattacharya T, Asztalos M, et al. Sodium hypochlorite body wash in the management of Staphylococcus aureus-colonized moderate-to-severe atopic dermatitis in infants, children, and adolescents. *Pediatr Dermatol*. 2019;36:442-447. doi:10.1111/pde.13842
10. Singal A, Lipner SR. A review of skin disease in military soldiers: challenges and potential solutions. *Ann Med*. 2023;55:2267425. doi:10.1080/07853890.2023.2267425
11. Dever TT, Walters M, Jacob S. Contact dermatitis in military personnel. *Dermatitis*. 2011;22:313-319. doi:10.2310/6620.2011.11024
12. Nowbuth AA, Armstrong J, Cloete T, et al. A potential benefit of hypochlorous acid-facial sanitisation: a review. *Preprints*. 2021. doi:10.20944/preprints202107.0129.v2
13. Gold MH, Andriessen A, Bhatia AC, et al. Topical stabilized hypochlorous acid: the future gold standard for wound care and scar management in dermatologic and plastic surgery procedures. *J Cosmet Dermatol*. 2020;19:270-277. doi:10.1111/jocd.13280
14. Anagnostopoulos AG, Rong A, Miller D, et al. 0.01% hypochlorous acid as an alternative skin antiseptic: an in vitro comparison. *Dermatol Surg*. 2018;44:1489-1493. doi:10.1097/DSS.0000000000001594
15. Odom EB, Mundschenk MB, Hard KA, et al. The utility of hypochlorous acid wound therapy in wound bed preparation and skin graft salvage. *Plast Reconstr Surg*. 2019;143:677e-678e. doi:10.1097/PRS.0000000000005359
16. Gozukucuk A, Cakiroglu B. Comparison of hypochlorous acid and povidone-iodine as a disinfectant in neonatal circumcision. *J Pediatr Urol*. 2022;18:341.e1-341.e5. doi:10.1016/j.jpurol.2022.03.011
17. Borrego L, Hernández N, Hernández Z, et al. Povidone-iodine-induced postsurgical irritant contact dermatitis localized outside of the surgical incision area: report of 27 cases and a literature review. *Int J Dermatol*. 2016;55:540-545. doi:10.1111/ijd.12957
18. Del Rosso JQ, Bhatia N. Status report on topical hypochlorous acid: clinical relevance of specific formulations, potential modes of action, and study outcomes. *J Clin Aesthet Dermatol*. 2018;11:36-39.