Copper-Iodine Complex Solution as an Adjunct in Wound Management: Evidence of Bioburden Reduction and Accelerated Tissue Recovery

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Introduction

Copper-Iodine Complex Solution (CICS) is an FDA 510(k) cleared medical device indicated for wound management, cleansing, moisturizing, and debridement of acute and chronic dermal lesions, burns, and partial and full thickness wounds. As an antimicrobial preservative in solution, CICS has a proven broad-spectrum antimicrobial activity against bacteria, yeast, fungi, and viruses without inducing microbial resistance. Additionally, CICS has demonstrated persistent antimicrobial activity up to 72 hours. Free iodine (I_2), up to 250 ppm, acting in concert with copper ions, produces a synergistic effect that helps remove contamination withing the solution and assists in the cleansing, irrigating, and debridement of wounds. Iodine, as a drug, penetrates the cell wall of microorganisms causing damage of the cell membrane and cell death. Copper binds to cell structures, permeates cell membrane and promotes membrane lipid destruction. Leading to cell death. Copper also can disrupt the interface between the biofilm's extracellular polymeric substance (EPS) and allow for disruption of the attachment to the wound bed. Additionally, copper ions support angiogenesis and collagen synthesis in wound healing. CICS has been demonstrated to be non-cytotoxic, non-pyrogenic, non-irritating, and non-sensitizing to dermal tissue. CICS is intended for use by healthcare professionals for cleansing, irrigating, moistening, and debriding to remove wound debris from acute and chronic dermal lesions that are partial and full thickness wounds such as 1st and 2nd degree burns, stage I-IV pressure injuries, diabetic ulcers, stasis ulcers, abrasions and minor skin irritations, post-surgical wounds grafted and donor sites, in addition to moistening and lubricating absorbent wound dressings. This study evaluated its clinical effect on bioburden, odor, and pain control in chronic wounds of varying etiologies.

Materials and Methods

Five patients with open, chronic wounds underwent weekly CICS wound-care sessions between late September and late December 2025. The standardized protocol included:

1. Biofluorescent imaging (Kent SnapshotGlo) before and after treatment to assess bioburden.
2. CICS solution soak for 10 minutes.
3. Mechanical debridement with sterile gauze only (no sharp debridement).
4. CICS moistened Mepilex dressing applied for three days between visits.

At each follow-up, wound dimensions (L×W×D), odor score (0–3), pain (VAS 0–10), and fluorescence intensity were recorded.

Results

Of the five patients included in this series (mean age 62 years), three presented with diabetic foot ulcers (DFUs), one with a venous stasis ulcer, and one with a post-surgical wound infection. The group comprised both male and female patients with common comorbidities including diabetes mellitus, peripheral vascular disease, hypertension, and obesity, all contributing to delayed wound healing and increased bioburden risk. Wounds ranged from small partial-thickness ulcers to larger, colonized lesions exceeding 8 cm^3, including cases consistent with Pseudomonas contamination. Across all five patients, the mean wound volume reduction was 68 ± 25% over 3–5 weeks. Odor fully resolved by week 2–3, pain decreased by 25–50%, and fluorescence imaging confirmed progressive bioburden reduction post-soak and between visits. Tissue appearance improved steadily, with slough replaced by cleaner wound beds and development of healthy granulation and epithelial margins. No adverse reactions were reported such as cytotoxicity, irritation, sensitization, or discomfort.

Case 1: SN, 79-year-old Caucasian male with type II diabetes mellitus and congestive heart failure, Multiple chronic bilateral lower extremity ulcers of 4 months duration

- Significant bilateral lower extremity edema with hyperkeratosis
- Large, irregular chronic ulcers on both legs with exposed dermis
- Serous drainage, and regions of adherent slough
- Surrounding erythema and maceration
- Pain on palpation
- Suspicion for high bacterial bioburden due to odor, drainage, and slow progression

Given the chronicity, diabetic status, and lack of prior debridement, the wound was highly suspect for extensive surface bioburden, likely contributing to delayed healing.

Pre debridement picture - multiple ulcers of the leg

Post debridement - gentle scabbing with CICS and gauze followed by 10-minute dwell time of CICS.

Results

Case 2: TD, a 62-year-old Caucasian male is seen for ongoing wound care management of the left and right feet following traumatic injury sustained when he was struck by a motor vehicle beachside. Per the patient, the driver initially hit him and then inadvertently pressed the accelerator again before coming to a complete stop, resulting in multiple abrasions, contusions, and deep soft tissue trauma to both feet. He has DM Type II, Insulin dependent and presented for wound care.

Pre debridement picture (4th and 5th toes)

Post debridement - gentle scabbing with CICS and gauze followed by 10-minute dwell time of CICS.

Conclusion

Adjunctive wound management with CICS as a dwelling antimicrobial preservative in solution and irrigant has yielded positive outcomes in a small series. Utilization CICS in pre and post debridement and as a moist dressing consistently reduced microbial burden in the wound bed, odor, and pain, The copper-iodine synergy achieved dual success, mechanical biofilm disruption and sustained antimicrobial control providing an environment conducive to epithelialization and granulation. It was noted in all 5 patients that there was a significant improvement in the pre debridement and post debridement imaging for bioburden using the Kent Snapshot GLO system. Again, this was done with gentle , moist CICS gauze debridement, followed by irrigation to remove the debris with the CICS. Patients reported excellent comfort and tolerance, even those previously reactive to silver dressings. CICS attended to many of the factors we strive to improve in dealingwith optimizing wound bed preparation. CICS represents a safe, effective, and well-tolerated adjunct in chronic wound management. Further clinical studies are warranted to evaluate patient care initiatives for optimizing positive outcomes.

References

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