Non-Contact Ultrasound Treatments for Wounds

Effective: March 1, 2017

Next Review: February 2018
Last Review: February 2017

IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

Non-contact ultrasound treatment devices, which administer low frequency ultrasound with a saline mist, have been proposed for use in wound healing, including pain management and debridement, via the production, vibration, and movement of micron-sized bubbles in the saline and tissue.

MEDICAL POLICY CRITERIA

Non-contact low-frequency ultrasound is considered investigational for the treatment of all wounds.

NOTE: A summary of the supporting rationale for the policy criteria is at the end of the policy.

CROSS REFERENCES

1. Electrostimulation and Electromagnetic Therapy for the Treatment of Wounds, DME, Policy No. 83.09
BACKGROUND

Ultrasound (US) is defined as a mechanical vibration above the upper threshold of human hearing (greater than 20 KHz) and has been used primarily by physical therapists in the megahertz (MHz) range (1–3 MHz) for the treatment of musculoskeletal disorders. Recently, non-contact ultrasound treatment devices, which administer low frequency ultrasound in the kilohertz range via a saline mist, have been proposed for use in wound healing, including pain management and debridement. Their proposed mechanism of action is the production, vibration, and movement of micron-sized bubbles in the saline and wound tissue.

REGULATORY STATUS

Devices with 510(k) clearance from the US Food and Drug Administration (FDA) include the following:

- The MIST Therapy® System, a non-contact ultrasound device, which uses an ultrasound transducer or wand, by Alliqua Biomeidal (Langhome, PA).
- The Qoustic Wound Therapy System™ (formerly called model AR1000) by Arobella Medical LLC. In contrast to MIST system, the Qoustic system uses a contact probe to treat wounds.

EVIDENCE SUMMARY

The principal outcomes associated with treatment of wounds, particularly chronic wounds, are complete wound closure (either with or without surgical closure), improvement in the rate or quality of healing (such as the minimization of scarring), treatment of infection, and patient-centered outcomes such as improvements in function or mobility, and minimization of pain.\(^1\),\(^2\) Outcomes relating to the use of a non-contact low-frequency ultrasound device for the treatment of wounds are best understood when comparing use of a non-contact low-frequency ultrasound device to a sham device among patients with similar wound type (i.e., burn or chronic diabetic ulcer) receiving standardized wound care regimens. Therefore, data from adequately powered, blinded, randomized sham-controlled trials are required to control for bias and determine whether any treatment effect from non-contact low-frequency ultrasound devices provides a significant advantage over standard wound care.

SYSTEMATIC REVIEWS

Tricco (2015) published a systematic review (SR) evaluating how low-frequency ultrasound impacts healing of lower limb wounds.\(^3\) Eight randomized controlled trials (RCT) were identified, that evaluated high and low frequency ultrasound at a low frequency, using both contact and noncontact techniques. The authors concluded that low-frequency low intensity noncontact ultrasound (LFLINCU) may improve short-term health outcomes for venous stasis and diabetic foot ulcers, but larger RCTs, evaluating long-term effects are needed.

A 2011 SR identified five RCTs on non-contact ultrasound.\(^4\) One of these studies was unpublished, and two were older studies from the 1990s that involved the delivery of ultrasound while the wounded area was in a footbath. They conducted one pooled analysis of findings on efficacy of non-contact ultrasound. Two RCTs, the Ennis et al. study on MIST
therapy and one on ultrasound delivered during foot bathing were included. The studies included a total of 75 patients; the Ennis study contributed 55 of these. A pooled analysis found a significantly smaller proportion of non-healed wounds at three months in the non-contact ultrasound group compared to the control group (risk ratio [RR]: 0.74, 95% CI: 0.58 to 0.95). The limitations of the Ennis study (e.g., high dropout rate, baseline differences between groups) limit the ability to draw conclusions about the efficacy of treatment in the pooled analysis.

A 2010 Cochrane SR included eight RCTs comparing therapeutic non-contact low-frequency ultrasound (NLFU) to no NLFU for venous leg ulcers. All eight studies were determined to have unclear or high risks of bias, differences in follow-up duration and US regimens. Five of the six trials that evaluated high frequency NLFU reported healing at 7-8 weeks, with significantly more patients healed with NLFU compared to standard treatment (pooled RR 1.4, 95% CI 1.0 to 1.96). However, at 12 weeks follow-up, the between-group difference was no longer statistically significant (pooled RR 1.47, 95% CI 0.99 to 2.20). One RCT reported no evidence of effect on healing after three weeks of US treatment; however, the quality of this trial was rated as “poor.” Two trials of low-frequency US reported no significant difference in healing between treatment with versus without NLFU; however, both studies were determined to be significantly underpowered. The authors concluded that the RCTs on NLFU for venous leg ulcers were of poor quality due primarily to small size and heterogeneity in patient characteristics and treatment regimens.

RANDOMIZED CONTROLLED TRIALS

There is just one double-blind multicenter sham-controlled trial, which was included in the 2011 Voigt SR, as discussed above.

There have been a number of published unblinded RCTs comparing NLFU with standard wound care alone. All of the RCTs used MIST therapy and, other than two trials that did not report a funding source, all were industry funded. One study addressed diabetic foot ulcers, the population included in the Ennis et al. 2005 RCT, discussed above. Four RCTs included patients with venous leg ulcers and one RCT evaluated treatment of split thickness graft donor sites. All studies except one, on split thickness graft donor sites, included patients with non-healing wounds; eligibility criteria included wounds that had not healed after at least four weeks. Three studies reported that patients and providers were not blinded but outcome assessment was blinded. The other studies did not mention blinding. Standard care interventions varied somewhat but generally consisted of wound cleaning, noncontact dressings, compression and, if deemed necessary by providers, debridement. Two studies mentioned following national guidelines for the standard care intervention. Prather et al. did not describe the standard care intervention, and Beheshti et al. reported only that compression was used. Study characteristics and findings are summarized in Table 1 below.
<table>
<thead>
<tr>
<th>Study</th>
<th>Initial N</th>
<th>Final N</th>
<th>Wounds included</th>
<th>Interventions</th>
<th>Primary Outcome</th>
<th>Outcome Assessment</th>
<th>Single-Blinded</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>Beheshti et al (2014)</td>
<td>N=90</td>
<td>N=90</td>
<td>Venous leg ulcers (≥4 wk)</td>
<td>NLFU: 3×/wk until healed (same protocol for HFU)</td>
<td>Time to wound healing (months)</td>
<td>NR</td>
<td>NLFU + SOC: 5.70 (SD=1.57)</td>
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<td>SOC: Compression therapy (visit frequency not reported)</td>
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<td>HFU + SOC: 6.10 (SD=1.47)</td>
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<td>SOC: 8.13 (SD=1.40)</td>
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<td>3 groups: p&lt;0.001</td>
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<tr>
<td>Gibbons et al (2015)</td>
<td>N=81</td>
<td>N=74</td>
<td>Venous leg ulcers (≥30 d)</td>
<td>NLFU: 3×/wk for 4 wk</td>
<td>Percent wound area reduction at 4 wk</td>
<td>Yes</td>
<td>NLFU + SOC: -61% (SD=28.9%)</td>
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<td>SOC: 3×/wk for 4 wk</td>
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<td>SOC: -45% (SD=32.5%)</td>
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<td>p=0.002</td>
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<tr>
<td>Kavros et al (2007)</td>
<td>N=70</td>
<td>N=70</td>
<td>Nonhealing foot, ankle, or leg wounds (≥8 wk)</td>
<td>NLFU: 3×/wk for 12 wk</td>
<td>Proportion of patients with &gt;50% wound healing healed at 12 wk</td>
<td>NR</td>
<td>NLFU + SOC: 63%</td>
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<td>SOC: Daily visits</td>
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<td>SOC: 29%</td>
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<td>p&lt;0.001</td>
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<tr>
<td>Olyaie et al (2013)</td>
<td>N=90</td>
<td>N=90</td>
<td>Venous leg ulcers (≥4 wk)</td>
<td>NLFU: 3×/wk for 3 mo or until healed (same protocol for HFU)</td>
<td>Time to wound healing (months)*</td>
<td>NR</td>
<td>NLFU + SOC: 6.65 (SD=1.59)</td>
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<td>SOC: 3×/wk for 3 mo or until healed</td>
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<td>HFU + SOC: 6.86 (SD=2.04)</td>
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<td>SOC: 8.50 (SD=2.17)</td>
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<td>3 groups: p=0.001</td>
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<td>HFU vs NLFU: p not reported</td>
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<td>Prather et al (2015)</td>
<td>N=31</td>
<td>N=27</td>
<td>Split-thickness graft donor sites</td>
<td>NLFU: 1×/wk for 5 consecutive days (after 2-wk run-in period)</td>
<td>Time to wound healing (days)</td>
<td>Yes</td>
<td>NLFU + SOC: 12.1 (SD=6.0)</td>
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<td></td>
<td>SOC: 1×/wk for 5 consecutive days (after 2-wk run-in period)</td>
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<td>SOC: 21.3 (SD=14.7)</td>
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<td>p=0.04</td>
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<tr>
<td>White et al (2015)</td>
<td>N=36</td>
<td>N=36</td>
<td>Venous leg ulcers (≥6 wk)</td>
<td>NLFU: 3×/wk for 8 wk (after 2-wk run-in period)</td>
<td>Percent wound area reduction at 13 wk</td>
<td>Yes</td>
<td>NLFU + SOC: -46.6% (SD=38.1%)</td>
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</tbody>
</table>
All but one of the RCTs in Table 1 had statistically significantly better results on the primary outcome with NLFU compared with standard care. However, studies had methodological limitation. In terms of outcome assessment, complete healing is generally considered the most clinically relevant outcome; a 50% reduction in wound area over time and time to heal are also considered to be acceptable outcomes.[13] A reduction of less than 50%, or wound area reduction without a predefined cutoff is not considered acceptable. The largest number of trials included patients with venous leg ulcers. None of these RCTs had blinded outcome assessment and reported complete healing or one of the other acceptable outcomes as the primary outcome measure. Only one RCT in Table 1, on split thickness graft donor sites, met both of these criteria.[8] Another limitation of the body of evidence is that some of the standard care interventions involved fewer visits than the NLFU intervention and nonspecific effects of this differential in face-to-face contact could partially explain the difference in findings between intervention and control groups.

**NONRANDOMIZED STUDIES**

A number of nonrandomized studies described experiences of MIST therapy-treated wound patients.[14-30] Although these studies contribute to the body of knowledge by providing direction for future research, evidence from these studies does not permit conclusions due to methodological limitations, such as non-random allocation of treatment and lack of appropriate control groups.

**PRACTICE GUIDELINE SUMMARY**

**ASSOCIATION FOR THE ADVANCEMENT OF WOUND CARE**

The 2012 Association of the Association for the Advancement of Wound Care (AAWC) guideline on treatment of venous ulcers stated that low-frequency ultrasound treatment requires additional evidence before it can be considered an appropriate treatment.[31]

In 2010, the Association for the Advancement of Wound Care (AAWC) published a guideline on care of pressure ulcers.[32] Non-contact ultrasound therapy was included as a potential second-line intervention if first-line treatments did not result in wound healing, although the strength of the evidence supporting this decision was low (Level C), indicating a lack of sufficient studies on this topic.

**SUMMARY**
There is not enough research to show that non-contact low-frequency ultrasound improves health outcomes for the treatment of wounds. In addition, no practice guidelines recommend non-contact low frequency ultrasound, for wound healing. Therefore, the use of non-contact low-frequency ultrasound is considered investigational for the treatment of all wounds.

REFERENCES


33. BlueCross BlueShield Association Medical Policy Reference Manual "Non-Contact Ultrasound Treatment for Wounds." Policy No. 2.01.79

### CODES

<table>
<thead>
<tr>
<th>Codes</th>
<th>Number</th>
<th>Description</th>
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<tr>
<td>CPT</td>
<td>97610</td>
<td>Low frequency, non-contact, non-thermal ultrasound, including topical application(s), when performed, wound assessment, and instruction(s) for ongoing care, per day</td>
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</tbody>
</table>

**HCPCS**

**Date of Origin:** April 2008