



BY JARROD SHAPIRO, DPM

Off-Weighting: What Does the Evidence Show?

Studies show that non-removable casts are best.

Practice Perfect is a continuing every-issue column in which Dr. Shapiro offers his unique personal perspective on the ins and outs of running a podiatric practice.

Why is it that in modern medicine, there are still some of us who cling to outdated ideas?

Off-weighting the diabetic neuropathic ulcer is one of those things. What is most unfortunate is that the evidence supporting the various aspects of ulcer treatment is well-established.

For example, it's well known and supported in the medical literature that allowing a foot ulcer to dry out is not conducive to healing. This is one of the reasons wet to dry dressings are a thing of the past. Similarly, appropriately off-weighting a neuropathic ulcer is a well-established standard of care. Let's be clear: there are appropriate off-weighting methods for DFUs, and allowing a patient to wear shoes is NOT one of them.

Not to split hairs, but far too many times the patient's prior physician was treating with regular (sometimes prescription) shoes and off-weighting pads. In 2016, all of us should understand what the evidence says about various off-weighting methods. To that end let's take a look at some of the literature and what it says about various off-weighting methods.

Before we go through the evidence,



here's a non-exhaustive list of commonly used off-weighting methods:

- Wheelchair
- Crutches
- Walkers
- Roller devices
- Prescription shoe with plastizote insole (+/- addition of felt or other padding techniques)
 - Custom molded foot orthoses
 - Post-operative shoe (including various modified versions)
 - Felt-to-foam dressing in post-operative shoe
 - CROW boot
 - Removable cast walker (RCW)
 - Non-removable cast walker (NRCW)
 - Total contact cast (TCC)

- Surgical off-weighting (we'll avoid discussing this one and stick with the non-surgical methods).

In fact, of all of these methods, the only two effective off-weighting devices for most circumstances are the non-removable cast walker and the total contact cast.

In 1997, Fleischli and associates compared the effectiveness in pressure reduction of five different off-weighting methods (TCC, RCW, half-shoe, felt-to-foam dressing, and rigid-soled post-op shoe) in 26 diabetic patients with forefoot neuropathic ulcerations (19 ulcers under the forefoot and seven under the hallux).

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They evaluated plantar pressures using an in-shoe pressure measurement system while patients walked in each of the five modalities. Not surprisingly, they found a significant difference in peak plantar pressures with increasing pressures as follows: RCW, TCC, half shoe, felt-to-foam, post-op shoe. The amount of pressure reduction between methods was also significant, with the following decreased pressures from the baseline:²

- RCW 85%
- TCC 76%
- Half-shoe 66%
- Felt-to-foam 48%
- Post-op shoe 36%

This study looked at a relatively small number of patients, though by crossing over the patients into each modality, they essentially used the group as its own control. This strengthens the quality of the study and makes it more valid for discussion.

Now pressures are one thing, but how do off-weighting methods compare for actual patient outcomes? In 2001, Armstrong and associates studied the effectiveness of total contact casts, removable cast walkers, and half-shoes for ulcer healing. They prospectively randomized 63 diabetic patients with neuropathic ulcers to one of each of these options. The researchers

performed weekly wound debridement and ulcer care and tracked wound size by planimetry. Their primary outcome was the percentage of wound healing at 12 weeks: 89.5% (total contact cast), 65.0% (removable cast walker), and 58.3% (half-shoe). Among those patients with healing at 12 weeks, those in the TCC healed faster than those in the half-shoe (33.5 ± 5.9 days versus 61.0 ± 6.5 days, respectively).¹

Not convinced by just a couple of studies? Even if one is a prospective randomized controlled trial, maybe

the cast shoe was similar to TCC in time to healing and healed ulcers, but they only included three studies versus 20 studies about TCC. Given our above information about plantar pressure reduction and clinical effectiveness, it's fair to argue that the cast shoe would likely fare much more poorly in a greater number of studies.

Now, maybe you're convinced that TCC is the best off-weighting method for diabetic plantar ulcers, but your next thought is, "I don't have time in my busy practice to apply these casts

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you need more convincing with other studies? In a joint publication of the APMA and the Society for Vascular Surgery, Cavanagh and Bus provided a review of the evidence.³ For time's sake take a look at the chart from their study (Figure 1).

In a total of 37 studies, it is clear that the proportion of healed ulcers is greatest in the TCC and RCW groups, time to healing is least with these same modalities, and the range of healing is less with TCC and RCW treatment.³ Now, you may argue that

on a weekly basis." One would agree completely with that thought. Luckily, Dr. Armstrong saved us from TCCs with the advent of what he calls the Instant Total Contact Cast (iTCC), which is simple and fast to apply.

What's so impressive about this modality is that it is as effective as the TCC in healing DFUs. Katz and associates performed a prospective, randomized, controlled study in which 41 patients were placed into either an iTCC or standard TCC. They found healing within 12 weeks occurred in 94% of patients with the iTCC and 93% with the TCC (when those lost to follow-up were excluded). Healing rates were similar between the two groups. They also found lower costs with the iTCC as well as decreased application and removal times.⁴

It's time to universally adopt this new paradigm. No foot with an ulcer should be allowed to remain in a shoe. Instead they should be iTCC'd. **PM**

References

¹ Fleischli J, Lavery L, Vela S, et al. Comparison of strategies for reducing pressure at the site of neuropathic ulcers. *J Am Podiatr Med Assoc.* 1997;87(10):466-472.

² Armstrong D, Nguyen H, Lavery L, et al. Off-Loading the Diabetic Foot Wound. *Diabetes Care.* June 2001;24(6):1019-1022.

³ Cavanagh P and Bus S. Off-loading the Diabetic Foot for Ulcer Prevention and Healing. *J Am Podiatr Med Assoc.* Sept

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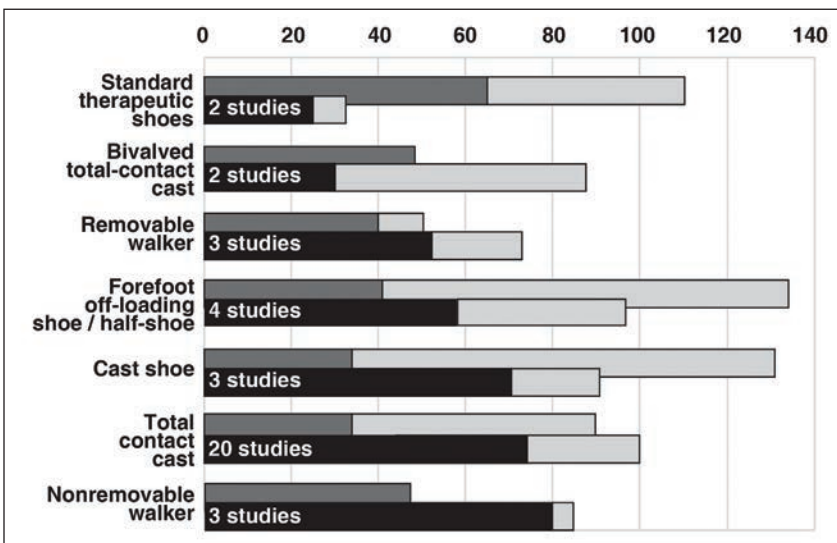


Figure 1: Histogram showing the proportion of healed ulcers expressed in percentages (black bars) and time to healing expressing in number of days (dark gray bars) for different off-loading modalities used to treat noncomplicated neuropathic plantar foot ulcers in diabetic patients. The light gray bars show the range in the proportion of healed ulcers or time to healing found in different studies.



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2010;100(5):360-368

⁴ Katz I, Harlan A, Miranda-Palma B, et

al. A Randomized Trial of Two Irremovable Off-Loading Devices in the Management of Plantar Neuropathic Diabetic Foot Ulcers. Diabetes Care. March 2005;28(3):555-559.

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