LOWER EXTREMITY REVIEW

OCTOBER 2026 · VOL 18 · NO 10

LERMAGAZINE.COM

# Collaborative Care for Better Outcomes



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# Long COVID's Effects on the Feet

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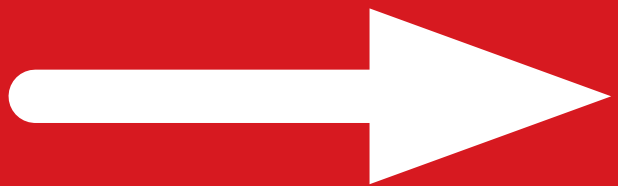
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## Lower Extremity Review

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# Lower Extremity Review Mission

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- Injury prevention is possible
- Diabetic foot ulcers can be prevented
- Collaborative care leads to better outcomes

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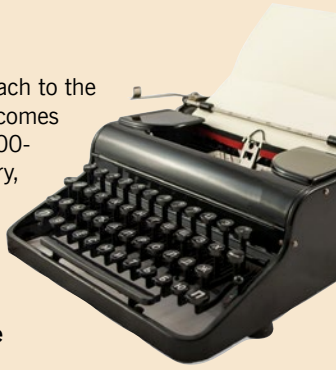
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# ShortTakes

OCTOBER 2026
8 STUDIES FOR QUICK REVIEW

## Four Minutes Daily Resistance Training Can Quadruple Fitness in Older Adults




Mobility disability is associated with functional decline in older adults. Resistance training (RT) improves mobility disability, but adherence to national RT guidelines is poor. Researchers evaluated the effects of a 12-week brief, home-based functional RT program, FAST (*Functional Activity Strength Training)*-2, on adherence and functional impairment in older, inactive adults ≥ 65 years of age, with pre-existing walking difficulty.

Eligible older adults were randomized using stratified assignment based on biological sex and age (65–72 and 73+) to either the FAST-2 intervention involving a 4-minute daily workout of four exercises lasting 30 seconds each or the delayed treatment control condition. Video coaching at baseline and at weeks 2, 4 and 8, provided feedback on a exercise form, modifications and progression. Daily email reminders were sent for workout completion, and to report exercise performance and rate perceived exertion. Performance and adherence feedback were emailed biweekly. Functional performance was measured by video using the Five-Times Sit-to-Stand (FTSTS) test, One-Legged Stance Test (OLST) and the 30-second chair stand test at baseline and at weeks 6 and 12.

Ninety-seven participants were randomized to either the FAST-2 treatment intervention (n = 44) or the delayed treatment control condition (n = 53). The linear mixed-effect model showed the intervention group decreased the FTSTS by 2.3 seconds (95% CI: 0.5–4.1, $P = 0.01$), increased OLST by 3.6 seconds (95% CI: 0.6–6.5, $P = 0.02$) and increased the number of chair stands by 4.2 repetitions (95% CI: 2.8–5.7, $P < 0.001$) more than the control group over 12 weeks. Intervention participants completed the workout 81% of the days. No significant adverse events were reported.

The 12-week FAST-2 intervention, including only 60-seconds of lower extremity exercises in older individuals with pre-existing walking difficulty, yielded improvement in functional performance.

**Source:** Dandekar S, Kurth J, Shang Y,et al. Brief daily functional strength training to improve functional performance in older adults with mobility disability: A randomized trial. *PLoS One*. 2026 Mar 12;21(3):e0336748. doi: 10.1371/journal.pone.0336748.

## Preoperative Pes Planus on Orthopedic Implant Removal After First MTP Joint Arthrodesis




First metatarsophalangeal (MTP) joint fusion is a frequently employed surgical treatment option for hallux rigidus and hallux valgus. Implant-related complications are common, necessitating further investigation into predisposing factors. The altered mechanics of pes planus may influence surgical outcomes; however, its direct impact on implant removal rates post-fusion remains unclear. Researchers retrospectively analyzed the TriNetX US Collaborative Network database to identify patients undergoing first MTP joint arthrodesis by ICD-10 and CPT coding, the data was stratified by preoperative pes planus status. Implant removal rates were compared between pes planus (PP) and non-pes planus (noPP) cohorts. Odds ratios (OR) were calculated to assess associations. Patients in the PP cohort exhibited significantly higher rates of subsequent hardware irritation (OR 1.30, 95 % CI 1.010–1.675), and hardware removal (OR 1.27, 95 % CI 1.007-1.604) compared to patients in the noPP cohort. Findings highlight patients with preoperative pes planus have significantly increased likelihood of implant irritation, removal, and reoperation following first MTP joint arthrodesis surgery. Biomechanical alterations associated with pes planus likely contribute to accelerated implant wear and compromise

fusion stability leading to higher rates of future surgery.

**Source:** Dyke W, Bank N, Lauck B, et al. Impact of preoperative pes planus on orthopaedic implant removal following first metatarsophalangeal joint arthrodesis: A retrospective analysis. *J Foot Ankle Surg*. 2025; 64, 507-510

## Peroneal Muscle Size and Quality Changes after Rehab in Patients with CAI



CUSTOMIZED STEP APPARATUS USED FOR BIPEDAL STANCE ULTRASOUND IMAGING, WITH REAL-TIME IMAGE DISPLAYED ON THE ULTRASOUND MONITOR.

Peroneal muscles are the primary stabilizers against ankle inversion movements associated with lateral ankle sprains. Individuals with chronic ankle instability (CAI) demonstrate peroneal muscle deficits including decreased strength, slower nerve conduction velocity, and reduced cross-sectional area. Ultrasound (US) imaging provides a valid, cost-effective method to assess peroneal muscle size and quality following rehabilitation.

Twenty-six patients with CAI (age: 21.9 ± 3.5 years; 18 females, 8 males) completed an 8-session, 4-week impairment-based rehabilitation program addressing range of motion, balance, strength, and functional performance deficits with emphasis on peroneal activation exercises. US imaging assessed peroneal muscle cross-sectional area (CSA) in side lying and bipedal stance positions and echogenicity (a measure of muscle quality) in bipedal stance for both limbs before and after rehabilitation. Paired t-tests were used to compare pre- and post-rehabilitation values.

Significant ($P < 0.01$) increases in CSA were observed in the trained limb during side lying (3.44 ± 0.99 to 3.72 ± 0.98 $cm^2$) and bipedal stance (3.46 ± 1.05 to 4.31 ± 0.98 $cm^2$) positions. Similar CSA increases occurred in the untrained limb. Echogenicity significantly decreased in the trained limb (70.2 ± 9.91 to 65.7 ± 8.68, $P = 0.01$), indicating improved muscle quality, with no significant changes in the untrained limb.

An 8-session, 4-week impairment-based rehabilitation program resulted in significant peroneal muscle CSA increases in patients with CAI, with cross-education effects observed in the untrained limb. Muscle quality, as measured by echogenicity, improved in the trained limb, supporting neuromuscular benefits of targeted rehabilitation. Impairment-based rehabilitation should be incorporated into CAI management programs.

**Source:** Jaffri A, Koldenhoven R, Lempke A, Park J, Hart J, Hertel J, Saliba S. Peroneal muscle size and quality changes after impairment-based rehabilitation in patients with chronic ankle instability. *Int J Sports Phys Ther.* 2026 Sep 1;21(9):843-851. doi: 10.26603/001c.167120.

## Deltoid Ligament Injury: Thinking Beyond the Ankle–Expert Opinion




Deltoid ligament (DL) injuries are common in ankle trauma, yet their optimal management remains debated. Most trauma literature considers DL injury as an isolated ankle problem, whereas foot-and-ankle specialists view the ankle and the foot as a complex problem. This disconnect leaves a critical knowledge gap that these researchers' work aims to address. It is well known that every post-traumatic collapsing foot deformity involves a DL injury, but not every DL necessarily progresses to such a deformity. Researchers introduce the concept of the DL as a tri-articular stabilizer within the medial ankle ligament complex, contributing to the stability of the tibio-talar, subtalar (ST), and talo-navicular (TN) joints. Neglecting this broader stabilizing role may lead to irreversible foot sequelae, such as post-traumatic plano-valgus or plano-abductus deformities. Therefore, DL injuries should be systematically recognized in both acute and chronic settings, whether treated conservatively or surgically. Researchers synthesize current anatomical, biomechanical, and clinical evidence together with our experience to outline key diagnostic principles and therapeutic considerations for the management of DL injuries.

**Source:** Fleury C, Acker A, Dubois-Ferrière V, Assal M. Deltoid ligament injury: thinking beyond the ankle–an expert opinion. EFORT Open Rev. 2026 Sep 1;11(9):930-938. doi: 10.1530/EOR-2025-0268

## Corticosteroid Injection Practices for Common Foot and Ankle Conditions



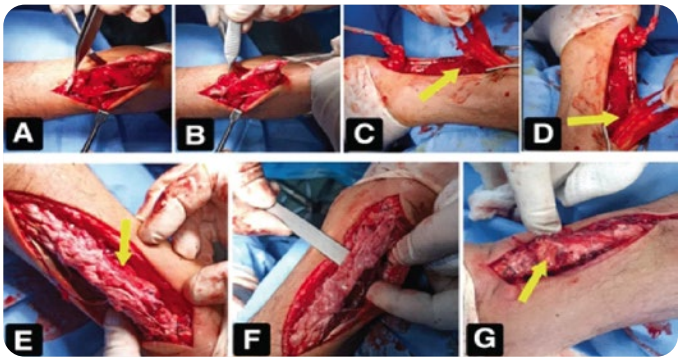

Corticosteroid injections are commonly used to manage foot and ankle conditions. There is limited evidence guiding corticosteroid selection, dosing, imaging guidance and injection techniques. This study aimed to describe current corticosteroid injection practices among Australian podiatrists and podiatric surgeons.

A descriptive cross-sectional survey was distributed via REDCap to Australian podiatrists and podiatric surgeons endorsed to prescribe scheduled medicines. The questions were developed using an iterative process and focused on demographic and professional characteristics, administrative factors and injection practices for plantar fascia, intermetatarsal and intra-articular injections. The survey was conducted between January 2025 and April 2026 and reported according to the Consensus-Based Checklist for Reporting of Survey Studies (CROSS). Descriptive statistics were used to summarize injection practices for plantar fascia, intermetatarsal and intra-articular injections.

Forty-five people participated in the study, and 33 completed the survey in full. Most participants were endorsed podiatrists (64%), with the remainder being podiatric surgeons (33%). Participants reported administering a mean maximum of three corticosteroid injections per patient annually and recommending a mean interval of three months between injections. Betamethasone 5.7 mg/mL was the most common corticosteroid across all injection sites and was frequently combined with ropivacaine or bupivacaine. Ultrasound guidance was used by 50% of participants for plantar fascia injections, 39% for intermetatarsal injections and 46% for intra-articular injections. Symptom relief was perceived to last between 3 and 6 months, whereas adverse effects were recalled to be infrequent and most commonly included steroid flare and post-injection pain.

**Source:** Couesnon CB, Cotchett M, Blood N, Whittaker GA. Corticosteroid injection practices of australian podiatrists for common foot and ankle conditions. *J Foot Ankle Res.* 2026 Sep;19(3):e70214. doi: 10.1002/jfa2.70214.

## Biological Augmentation During Acute Achilles Tendon Repair




INTRAOPERATIVE SEQUENCE: (A AND B) COMPLETE RUPTURE WITH SEVERELY FRAYED "MOP-END" TENDON ENDS; (C AND D) MACERATED AND POORLY DEFINED RUPTURE MARGINS; (E AND F) KRACKOW LOCKING-LOOP REPAIR WITH CIRCUMFERENTIAL POLYPROPYLENE SUTURE REINFORCEMENT AND OVERLYING PRESERVED VIABLE LOCAL SOFT-TISSUE SUTURED OVER THE REPAIRED TENDON AS A BIOLOGICAL ONLAY AUGMENTATION LAYER; (G) LAYERED WOUND CLOSURE. YELLOW ARROWS INDICATE THE VIABLE LOCAL SOFT TISSUE (BIOLOGICAL ONLAY AUGMENTATION LAYER): (C AND D) THE TISSUE IDENTIFIED IN SITU BETWEEN THE REPAIRED TENDON AND THE POSTERIOR TIBIAL SURFACE BEFORE MOBILIZATION; (E AND G) THE REPAIR SITE FOLLOWING BIOLOGICAL AUGMENTATION WITH THE PRESERVED VIABLE LOCAL SOFT TISSUE.

Acute Achilles tendon rupture may present intraoperatively with severely frayed and macerated tendon ends ("mop-end"), which can compromise primary repair strength and increase the risk of gap formation.

Case report: A 43-year-old male sustained a right Achilles tendon rupture during recreational football. Ultrasound confirmed a complete rupture. Open surgical repair was performed 6 days after injury. Intraoperatively, both tendon ends were severely frayed with a classic "mop-end" appearance. Repair was performed using the Krackow locking-loop technique with non-absorbable polypropylene sutures, reinforced with a circumferential running polypropylene suture. A viable interposed local soft tissue, consistent with traumatically avulsed tissue arising from the distal gastrosoleus musculotendinous complex, was identified. Rather than discarding this tissue, the tissue was preserved and sutured directly over the repaired tendon, where it served as a biological onlay augmentation layer—a strategy researchers termed "opportunistic biological augmentation," defined here as the preservation and utilization of viable local soft-tissue encountered intraoperatively that would conventionally be discarded.

At 3-year follow-up, the patient achieved full return to competitive football with no pain or functional limitation. The Achilles Tendon Total Rupture Score was 100/100. Krackow repair with circumferential suture reinforcement combined with preservation of viable local soft tissue may

provide additional biological support for healing in selected cases with poor tendon tissue quality, while avoiding donor-site morbidity and additional tissue harvest.

**Source:** Albeshlawy AAA. Opportunistic biological augmentation during acute achilles tendon repair: a novel surgical concept with three-year follow-up-a case report. *J Orthop Case Rep*. 2026 Sep;16(9):367-373. doi: 10.13107/jocr.2026.v16.i09.8096.

## Lateral Plantar Angioplasty/Reverse Sural Flap Reconstruction for Heel Limb Salvage




Diabetic foot ulcers complicated by peripheral arterial disease are associated with poor wound healing and an increased risk of amputation. Heel wounds are particularly difficult to reconstruct because of their weight-bearing function and limited soft-tissue coverage. While revascularization is commonly performed for critical limb ischemia, limited evidence guides its use prior to reconstructive surgery in patients with preserved in-line arterial flow. A 58-year-old woman with insulin-dependent diabetes mellitus presented with a chronic infected plantar heel ulcer with exposed calcaneus and suspected osteomyelitis. Vascular imaging demonstrated preserved in-line flow to the foot through the dorsalis pedis artery but chronic occlusion of the distal posterior tibial and plantar arteries. Given the planned reverse sural flap reconstruction and the high perfusion demands of a weight-bearing plantar flap, a multidisciplinary team performed targeted plantar angioplasty despite adequate baseline limb perfusion. Endovascular intervention of the superficial femoral, posterior tibial, and plantar arteries improved distal plantar perfusion without complications, allowing the patient to proceed with planned soft-tissue reconstruction. This case highlights a reconstructive approach in which revascularization optimized flap perfusion rather than restored limb viability. In selected patients with complex plantar heel defects, angiosome-directed revascularization may deliver additional perfusion to support reconstructive success when flap survival is the primary goal. In carefully selected patients, targeted plantar revascularization may be considered before complex heel reconstruction, emphasizing the importance of multidisciplinary planning in limb salvage.

**Source:** Sheppard MN, Mehta P, Duah K, et al. Lateral plantar angioplasty and reverse sural flap reconstruction for complex heel limb salvage. *Cureus.* 2026 Aug 13;18(8):e114460. doi: 10.7759/cureus.114460.

## Hinge Position and Wedge Orientation in Zadek Osteotomy Across Different Foot Morphologies



The Zadek osteotomy (ZO) is a surgical option for insertional Achilles tendinopathy. By modifying the position of the posterior calcaneal tuberosity, ZO may reduce posterosuperior calcaneal prominence, mechanical conflict at the Achilles insertion, and tensile stress on the tendon.

A weightbearing computed tomography (WBCT)-based virtual simulation was performed on 60 asymptomatic feet, categorized as cavus (n = 20), neutral (n = 20), or planus (n = 20). Nine ZO configurations were modeled by combining three hinge positions (posterior, A; mid-tuberosity, B; anterior, C) with three wedge inclinations. Pre- and post-simulation measurements were compared for calcaneal inclination angle (CIA), talocalcaneal angles, hindfoot moment arm (HMA), hindfoot alignment angle (HAA), Fowler-Philip (FP) angle, X/Y ratio, and plantar fascia (PF) length.

Wedge inclination showed no significant influence on any variable ($P \approx .99$). Hinge position markedly affected sagittal alignment. Hinges B and C significantly reduced CIA (hinge B -0.5° [95% CI -0.66° to -0.4°]; hinge C -2.1° [95% CI -2.26° to -1.96°], both $P < .001$). Hinge B showed the largest reduction in FP angle (-7.6° [95% CI -8.63° to -6.59°], $P = .16$) and produced the greatest increase in X/Y ratio (+0.57 [95% CI +0.46 to +0.68], $P = .007$). In the pre- to post-simulation analysis, HMA increased slightly with hinge B ($P = .03$), and PF length increased only with hinge C ($P < .001$). Subgroup analysis revealed that cavus feet exhibited the greatest sagittal correction.

ZO significantly affected the Fowler-Philip angle, the primary radiographic outcome. These changes occurred predominantly in the sagittal plane while sparing coronal and axial alignment.

**Source:** Gardini G, Carfì C, Grün W, et al. The impact of hinge position and wedge orientation in zadek osteotomy across different foot morphologies: a virtual surgical simulation study. *Foot Ankle Orthop.* 2026 Aug 27;11(3):24730114261472894. doi: 10.1177/24730114261472894.








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# When Long COVID Walks into the Office: Recognizing Foot and Ankle Manifestations

A Patient walks into the office with generalized foot pain. Taking a history, you learn the patient has fatigue, or myalgias in other muscles, or feels weak all the time. What are the usual diagnoses?



**By Mikel D. Daniels, DPM, MBA,** President and Chief Medical Officer, WeTreatFeet Podiatry




Long COVID has changed how I approach foot and ankle pain in these patients. I no longer believe we can safely evaluate lower-extremity symptoms without at least considering its potential role. When patients tell me their feet "haven't been right" since having COVID, I don't dismiss the comment. I treat it as a meaningful clinical clue. This does require some outside-the-box thinking, and we all need to start taking a deeper dive.

In my own practice, the pattern has become hard to ignore. Since the start of the pandemic, I have seen an increasing number of patients who present with burning feet, dysesthesias, swelling, color changes, or stubborn tendon and fascia pain that doesn't go away. Histories indicate this began during a SARS-CoV-2 infection, or within months afterward. Some of them are diabetic. Many are not. Early on, I caught myself trying to fit these complaints into familiar boxes: classic length-dependent diabetic neuropathy, idiopathic neuropathy, garden-variety plantar fasciitis, overuse tendinopathy. But then the timeline and the risk factors just didn't fit in that box. Heel pain was random, not first thing in the morning. Tendons would throb at random times, not just with use or just at rest. Bilateral symptoms that were not symmetrical and with varying degrees of severity. By themselves, a normal day in the office. However, traditional treatments didn't work.

As the Long COVID literature has matured, those clinical observations have started to make more sense. We now have evidence that persistent spike protein, immune dysregulation, microclot formation, and small fiber neuropathy exist in Long Covid patients. These are no longer fringe theories, but recurrent findings in subsets of patients with post-acute COVID-19 syndrome. The lower extremities sit right at the intersection of those mechanisms. They are at the end of the vascular tree, packed with small sensory and autonomic fibers, and loaded with muscles and tendons that

**“Since the start of the pandemic, I have seen an increasing number of patients who present with burning feet, dysesthesias, swelling, color changes, or stubborn tendon and fascia pain that doesn’t go away.”**

decondition quickly. So, it should not surprise any of us that the feet and ankles are often where Long COVID quietly shows itself first

I want to discuss this as a physician and lower extremity clinician, not as a virologist, and certainly not as someone claiming to have all the answers. The truth is that I look at the feet as an early-warning system, and my core message is simple. Going forward, we have to recognize the role of Long COVID in foot and ankle pain and dysfunction, or we are going to miss a meaningful piece of the puzzle in a lot of patients.

## Long COVID by the Numbers, and Why That Matters for Feet

Long COVID prevalence estimates vary, but across large U.S. data sets the numbers are not small. A 2024 national survey estimated that roughly 17.8 million adults in the United States had experienced Long COVID. This represents close to 7% of the adult population. A 2026 analysis of nearly 458,000 patients across multiple health systems reported a prevalence closer to 16%, which extrapolates to the order of 50 million Americans with potentially persistent symptoms. Other cohort and registry studies suggest that at least 10% of people infected with SARS-CoV-2 develop symptoms that persist for months or longer beyond the acute phase.

From a lower extremity standpoint, the exact percentage is less important than the order of magnitude. Tens of millions of people with a chronic post-viral condition means that every foot and ankle practice, every wound center, every PT clinic, and every primary care office will encounter Long COVID patients. If even a fraction of those patients has symptoms in the distal lower extremity, that becomes our problem whether we claim it or not.

## How Long COVID Reaches the Feet: What the Science Suggests

To understand why the feet are so commonly involved, I had to step back and look at the proposed mechanisms. The details are still evolving, and some of this remains controversial, but several themes in the literature keep repeating.

- The issue of persistent spike protein and viral remnants can’t be ignored. Multiple studies have found circulating spike protein in subsets of Long COVID patients. These are even months after the initial infection, and often in the absence of ongoing viral replication. One explanation is the presence of tissue reservoirs, particularly in the gut and possibly other immune-active sites, that continue to shed antigen. This is not universally accepted, and the direct clinical implications are still being worked out, but it does offer a plausible source of chronic immune stimulation.
- The microvascular story. SARS-CoV-2 uses the ACE2 receptor to enter cells, and ACE2 is richly expressed on endothelial cells throughout the vascular tree. Endothelial injury and dysfunction are now widely described in acute COVID. Several groups have reported “amyloid-like” fibrin microclots in plasma that appear resistant to normal fibrinolysis, along with evidence of a persistent thrombo-inflammatory state. If you think about the smallest capillaries in the feet, where perfusion is already most vulnerable, the idea that microclots and endothelial dysfunction could impair oxygen and nutrient delivery is not a stretch.
- Most relevant for what I see in the exam room, is the nervous system. There is now fairly strong evidence linking Long COVID to small fiber neuropathy. A large 2025 analysis of 977 Long COVID patients found that over half reported neuropathic symptoms, and among those who underwent skin biopsy (not everyone did), more than half had confirmed small fiber neuropathy affecting both epidermal sensory fibers and autonomic fibers. Importantly, many of these patients did not have the usual risk factors we would expect for neuropathy, such as diabetes or heavy alcohol use.

Other cohort and histologic studies have reinforced that association. Several groups have documented reduced intraepidermal nerve fiber density, abnormal autonomic sweat fiber function, and microneurographic evidence of unmyelinated fiber dysfunction in Long COVID cohorts. Some patients also exhibit elevated anti-ganglioside antibodies, suggesting an autoimmune component similar in flavor to other post-infectious neuropathies. Not every study agrees on prevalence or mechanism, but taken together, the data make it very hard to ignore.

The musculoskeletal side also needs to be addressed. Studies have reported that sometimes years after infection, a significant minority of Long COVID patients report persistent myalgias and arthralgias, sometimes a years after infection. There are studies that

indicate structural changes in key lower extremity muscles, including the tibialis anterior and gastrocnemius. Some patients have concomitant post-viral fatigue and exercise intolerance. When those muscles change, gait changes, plantar pressure shifts, and tendons see loads they were not conditioned to handle. All of that can land in the foot and ankle as pain, even before we get to explicit neuropathy.

Again, none of these mechanisms are completely settled science. There is active debate about how often viral remnants persist, how directly microclots contribute to symptoms. Questions remain about what proportion of neuropathy in these patients is truly COVID-specific versus unmasking other conditions?

## The Symptom Patterns I Listen for Now

In day-to-day practice, I have gradually built a mental checklist for possible Long COVID involvement whenever a patient presents with lower extremity symptoms that feel "out of proportion" or poorly explained. The details vary, but the themes are fairly consistent with what has been reported in the literature.

Burning feet and length-dependent dysesthesias are at the top of the list. Patients describe electric shocks, pins and needles, or a deep burning pain that is often worse at night and not clearly linked to a mechanical trigger. Sometimes there is allodynia, or a mix of numbness and pain. Objectively, the exam can be frustrating. Monofilament may be normal or only mildly abnormal. Larger fibers may test fine. Yet the patient is clearly uncomfortable, and the distribution is classic for small fiber involvement.

Color changes and temperature asymmetry raise another flag. I have seen toes with intermittent livedo-like patterns, patchy erythema, or purplish discoloration that waxes and wanes, similar to CRPS symptoms. Sometimes in nerve conduction studies it looks like traditional pernio. Others resemble the "COVID toes" I saw in the hospitalize COVID patients during the pandemic. Histopathologic studies of these lesions have shown vascular and perivascular inflammation. So differential diagnoses include autoimmune vasculitis, hypersensitivity reactions, or infections disease. Nothing that is specific to SARS-CoV-2.

Swelling and dependent edema—particularly in patients who also report orthostatic symptoms—may offer another piece of the puzzle. Soft-tissue complaints can also present in unexpected ways. When musculoskeletal deconditioning, inflammatory changes, and altered pain processing from a systemic post-viral syndrome converge in the same patient, standard diagnostic algorithms often fail to capture the full clinical picture.

## Putting This Together Into a Practical Approach

Recognizing possible Long COVID involvement does not mean that every patient with foot pain after 2020 has Long COVID. I remind myself of that often. It does mean that I take a more structured history and I am quicker to ask specific questions when the story feels even slightly suspicious.

I routinely ask about the timing of symptom onset relative to any known COVID infection. I want month and year if they remember it. I ask whether the symptoms began during the acute illness, within the first three months afterward, or later. I ask about the character of the pain in plain language first. I ask whether the symptoms climb up the leg, whether they are worse at night, and whether anything clearly relieves or worsens them.

I also ask targeted systemic questions. Fatigue that feels disproportionate to activity level, post-exertional "crashes," brain fog, palpitations, exertional tachycardia, and non-specific shortness of breath. All of these make me think harder about a broader Long COVID picture. I want to know about prior work-ups or tests like nerve conduction studies? Any skin punch biopsy? Any vascular imaging? Many of these patients have seen multiple clinicians by the time they reach a podiatry or lower extremity clinic, and our job often involves collecting and analyzing scattered data, rather than starting from scratch.

On exam, I look at light touch, vibration, temperature, and monofilament testing, with an awareness that small fiber symptoms can precede clear large-fiber or monofilament changes. I look for subtle asymmetry in color, capillary refill, skin texture, hair distribution, and sweating. I check pulses and, when indicated, order objective vascular studies if indicated. Gait analysis, range of motion, and palpation of typical pain generators still matter. Long COVID does not exempt patients from "ordinary" pathology. It may even layer on top of it

## Where I think the Controversy and Uncertainty Really Sit

While the association between Long COVID and neuropathic or vascular symptoms is now well described, there is still real uncertainty about causality in individual patients. Ongoing debate about the relative importance of different mechanisms still exist. Some patients may have had subclinical neuropathy that COVID unmasked. Others may have independent autoimmune processes that

DANIELS

**"Recognizing possible Long COVID involvement does not mean that every patient with foot pain after 2020 has Long COVID. "**

happen to co-occur. Some will have neuropathic symptoms with normal biopsy and no clear structural explanation. We do not have a blood test that says, "This is Long COVID neuropathy," so getting to a definitive diagnosis is difficult.

There is also controversy around treatments. Various nutraceutical and pharmacologic protocols have been proposed in preclinical or small human studies, but robust randomized trials are limited. Equally important to note is that long-term safety and efficacy data isn't prevalent. I am careful not to over-promise here. When I talk with patients, I distinguish clearly between established standards of care for neuropathic pain, vascular disease, and musculoskeletal conditions versus emerging strategies that still need confirmation

## What This Means for Our Everyday Practice Going Forward

For me, the practical takeaway is not that Long COVID replaces our usual differentials. It is that it joins them. When a patient with diabetes presents with a new ulcer and a history of Long COVID with neuropathic symptoms, I assume their neurovascular reserve may be more complicated than usual. When a non-diabetic patient presents with burning feet that began after COVID, I do not shrug and call it idiopathic just because nerve conduction study is normal. I consider small fiber involvement, I think about biopsy, and I counsel them that we may be dealing with a post-viral neuropathy that requires time, symptom management, and sometimes specialty input.

In the rehab setting, I have become more careful with exercise progression in patients with clear post-viral fatigue or post-exertional symptom exacerbation. A standard approach that would be appropriate for plantar fasciitis can backfire in a patient with Long COVID who then crashes for two days after a mildly aggressive session. I find that pacing, lower-intensity start points, and close symptom monitoring are safer for many of these patients. That is not unique wisdom; it is consistent with broader Long COVID rehab principles

Most importantly, I have stopped viewing these patients as "difficult" or "mystery" cases when their symptoms resist simple explanations. The biology is complex. The science is still catching up. But their experience is valid, and our exam findings often have more to tell us when we look at them through a Long COVID lens. We do not need to label everything as Long COVID. We do need to recognize that it is here to stay, and that it will continue to walk into our offices in the form of foot and ankle pain. If we do not train ourselves to see it, we will miss opportunities to understand our patients, and to build care plans that reflect the true complexity of what they are living with.

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*Dr. Daniels earned his Doctor of Podiatric Medicine from Temple University and an MBA in Healthcare Administration, combining clinical expertise with business strategy to deliver efficient, patient-centered care. His work focuses on complex reconstructive procedures, diabetic limb salvage, sports injuries, and minimally invasive techniques designed to accelerate recovery.*

*A Fellow of the American College of Foot and Ankle Surgeons and the American Professional Wound Care Association, Dr. Daniels also consults for biomedical technology firms and serves as a principal investigator in clinical research. His insights have appeared in Forbes, Parade Magazine, and CNN, and through his writing and mentorship, he continues to advance innovation.*

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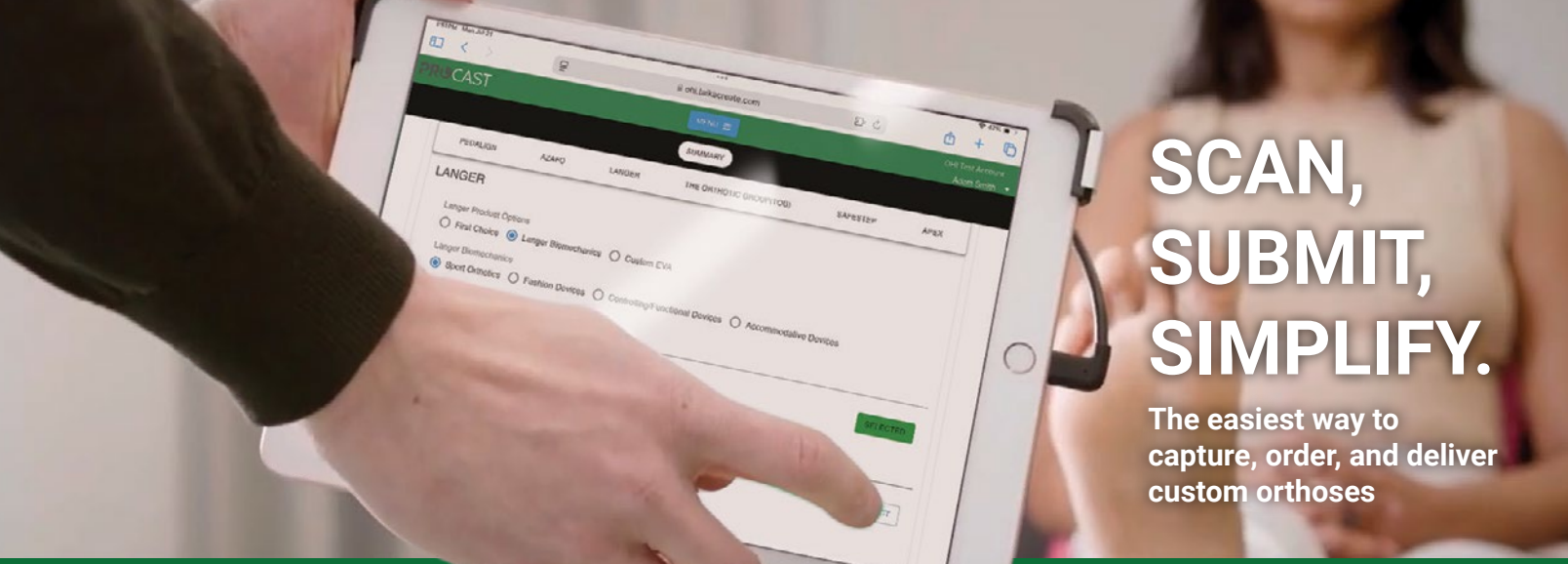
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# Beyond the Squeeze: Why Offloading Pressure Isn't Enough to Save the Diabetic Foot

In the quiet halls of the Gillis W. Long Hansen's Disease Center in Carville, Louisiana, the legendary Dr. Paul Brand once faced a clinical mystery.



By Dr. Dennis Janisse




He was conducting a study with a hypothesis that seemed like a mathematical certainty: total bed rest should heal a foot ulcer faster than any other intervention. By removing the variable of weight-bearing pressure entirely, the skin should have had the perfect environment to repair itself.

But the data began to fail. Results were inconsistent, and wounds that should have been closing remained stubbornly open. The breakthrough didn't happen in a lab; it happened during a midnight walk through the infirmary. As Dr. Brand moved through the darkened wards, he discovered the culprit: the "bed rest" patients were getting up to use the bathroom unprotected.

Those few steps—taken without the "orthopedic jail" of a Total Contact Cast (TCC) to provide absolute immobilization—were enough to negate weeks of progress. This realization fundamentally changed our understanding of diabetic foot care. It proved that even minimal movement can be catastrophic if we ignore the horizontal forces acting on the skin. To truly save the diabetic foot, we must look beyond the squeeze of vertical pressure and address the silent, internal trauma of shear.

## Friction is a Rub, but Shear is Scissors

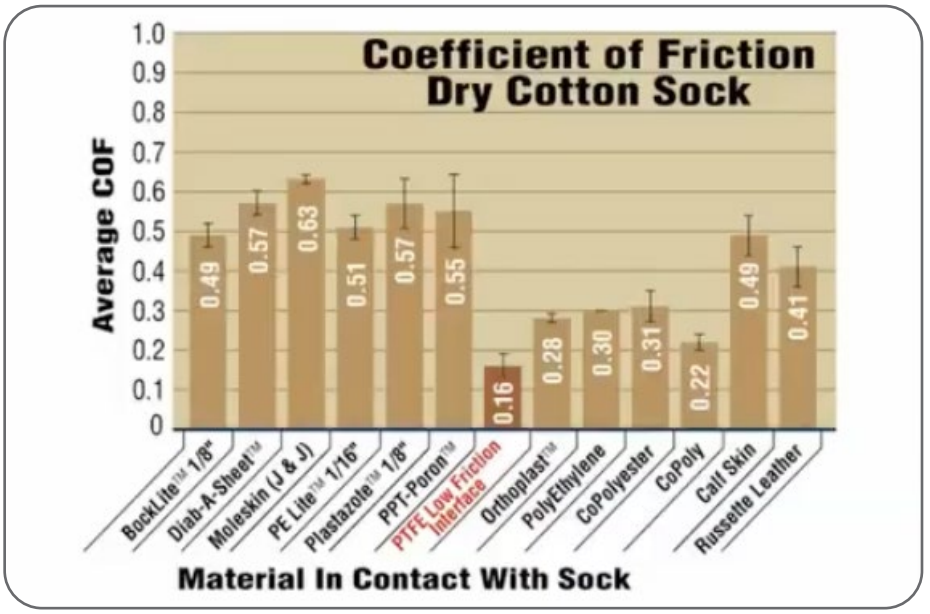
In clinical practice, "friction" and "shear" are often used as synonyms but treating them as interchangeable is a mechanical mistake. Friction is the surface-level resistance to motion between two bodies—it is the "rub" you feel when you slide your hands together. Shear, however, is far more insidious. It is the internal force that occurs when the skin stays gripped to a

THIS ARTICLE IS A SUMMARY OF PRESENTATION GIVEN BY DENNIS JANISSE, "STRATEGIES TO REDUCE SHEAR FOR THE DIABETIC FOOT" FROM THE GLOBAL DIABETIC FOOT CONFERENCE ON AUGUST 9, 2025. TO VIEW THE FULL PRESENTATION WITH QUESTIONS AND ANSWERS—AND SEE THE AGENDA FOR THE PROGRAM, VISIT HTTPS://DIABETES.LEREXPO.COM/. CONTINUING EDUCATION CREDITS ARE AVAILABLE FOR THIS AND MANY OF THE LEREXPO PROGRAMS.

surface while the underlying skeleton continues to move.

If friction is the rub, shear is the scissors. It is the force that "clips" or "trims" the internal tissue layers, leading to the mechanical breakdown that precedes blisters and ulcers.

The danger lies in the relationship between the two: shear happens *because* the friction at the surface is too high. When the skin is "stuck" to an insole or a sock, the internal tissues are stretched and distorted as the bone moves forward during gait. In a patient with loss of protective sensation, these scissor-like forces cause significant internal damage long before an open wound ever appears.




## The "Hole" Fallacy and the Danger of Window Edema

When a "hot spot" or ulcer appears, the instinctual, yet flawed, reflex is to "donut" the wound—cutting a hole in the orthotic to provide relief. While this technically removes vertical pressure from the center of the wound, it creates a phenomenon known as "window edema."

Because there is a total lack of counter-pressure within the void of the hole, the unsupported skin quickly fills with fluid (edema). This creates a destructive cycle:

- The skin herniates into the hole, becoming swollen and engorged.
- The edges of the hole create new, high-pressure borders against the swollen tissue.
- As the patient walks, this fluid-filled "window" of skin rubs intensely against the sharp margins of the relief.

Instead of providing a sanctuary for healing, the hole becomes a site of intense friction and shear at the margins, often enlarging the wound or preventing the edges from closing.

## The Plastazote Paradox

In the world of pedorthics, Plastazote #1 is often considered the gold standard. It is beloved for its ability to provide a dynamic floor reaction imprint. Because it compresses easily, it acts as a diagnostic tool; when a patient returns for a follow-up, the clinician can see exactly where the foot is bottoming out.

However, Plastazote presents a paradox: it is soft, but it is sticky at a microscopic level.

- **Plastazote coefficient of friction:** 0.57
- **Low-friction interface materials:** 0.16

This is where the "Plastazote Paradox" can endanger a patient. A soft material that grips the skin can be more damaging than a harder material that allows it to slide. Because Plastazote has such a high coefficient of friction, it holds the skin in place while the bones of the foot move inside, creating the very shear forces we are trying to avoid.

## The "Mailman's Secret": The Power of 2 Socks

One of the most effective ways to manage the "pistoning" and "twisting" forces of walking is a surprisingly low-tech solution. There was a case of a mailman who continued to deliver mail for years on a professional route—even after undergoing amputations of his second metatarsal and great toe. His secret? He always wore 2 pairs of socks.

The logic is a masterclass in sacrificial mechanics:

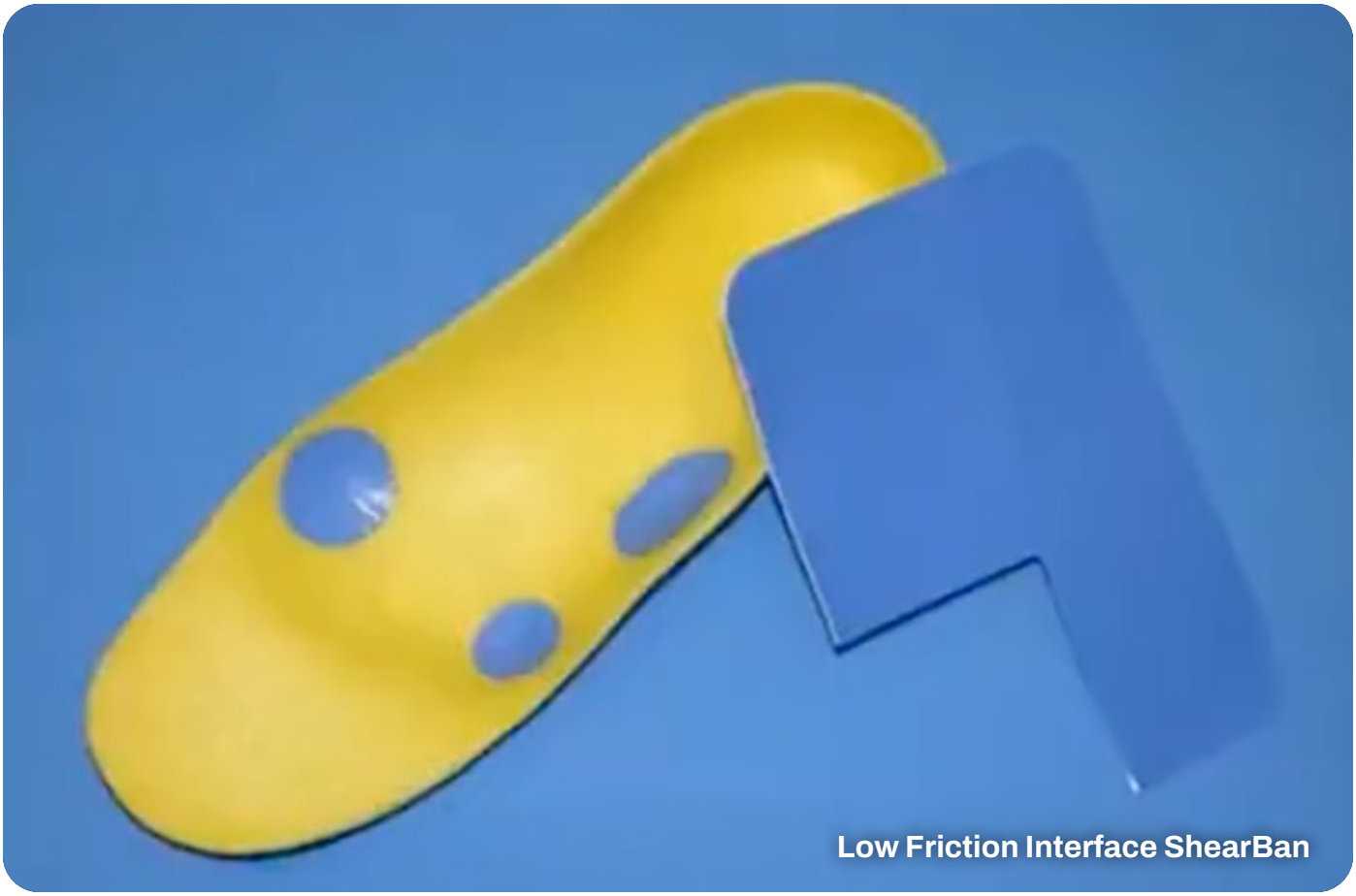
- By wearing 2 layers, the friction is sacrificed at the interface between the 2 socks.
- The inner sock stays stationary against the skin, while the outer sock moves with the shoe.
- The rub occurs between fabric layers rather than against living tissue.

This simple strategy mimics high-end medical interfaces by ensuring that the shear forces are absorbed by the hosiery, sparing the skin from internal tearing.

## Proactive Protection with Low-Friction Interfaces

We should not wait for the skin to break to act. Proactive management involves identifying "hot spots"—areas of red, warm skin—and applying low-friction interfaces before an ulcer forms.

A breakthrough in this area was developed by Marty Carlson in Minneapolis: a material known as ShearBan. This low-friction interface is a proactive tool that allows the foot to glide during high-impact movements.




For clinicians, it includes a built-in "wear indicator": the material is blue on top and white underneath. When the blue layer wears away to reveal the white, it is a clear clinical signal that the material needs replacement.

Low-friction interfaces are transformative across various pathologies:

- **The Athlete:** A basketball player with chronic, game-ending blisters can find immediate relief by covering the orthotic with a low-friction interface, allowing the foot to glide during high-impact pivots.
- **The RA Patient:** Patients with rheumatoid arthritis and claw toes often suffer from painful calluses at the tips of the digits. By placing a low-friction material under the toes, the calluses often disappear—even if the toes continue to "claw" during gait—because the rub component has been removed.
- **The Diabetic/Charcot Foot:** For patients with scar tissue (which lacks the mobility of healthy skin) or bony prominences, adding a low-friction layer proactively prevents the re-ulceration that often follows the buildup of a protective callus.

"Better wisdom is red skin equals a rub area or friction area as well and that leads to more options and better solutions."

## Moving Toward a 2-Vector Approach

To advance the standard of care for the diabetic foot, we must adopt a 2-vector approach to biomechanics. We can no longer afford to focus solely on the vertical vector of pressure while ignoring the horizontal vector of shear.

While offloading pressure remains a pillar of treatment, it is only half the battle. By managing the friction at the interface—whether through Marty Carlson's specialized materials, the mailman's double-socking method, or by avoiding the donut hole fallacy—we provide the skin the stable, low-shear environment it needs to remain intact.

If we are only measuring pressure, what invisible forces are we allowing to undermine our healing? ler

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# The 2026 Wound Care Tornado: Five Surprising Realities for Mobile Practitioners





**By Windy Cole,** DPM, CWSP, FACCWS, FFPM RCPS (Glasg) and **Martha R. Kelso,** RN, CWHS, DAPWCA, HBOT

The current landscape of healthcare regulation is no longer a series of predictable updates. It has evolved into a "tornado" of shifting policies, reimbursement challenges, and administrative complexity.

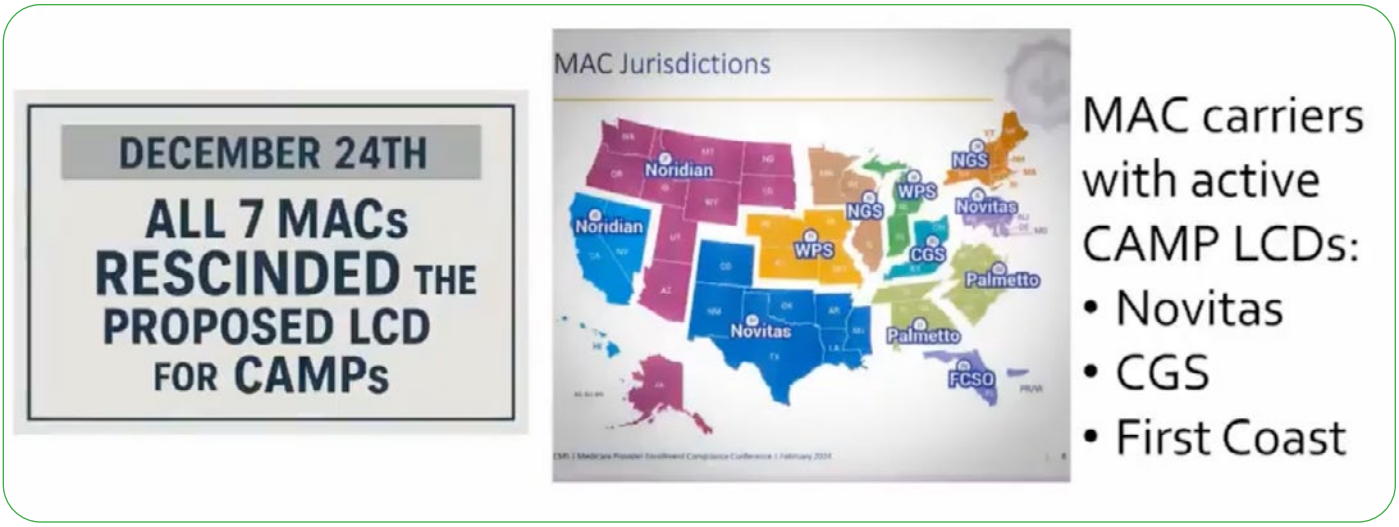



For mobile wound care practitioners, the outlook for 2026 remains promising, provided they pivot from a volume-based mindset to a meticulous, documentation-driven business model. As veterans of regulatory compliance and mobile clinical operations, we outline the essential realities for surviving and succeeding in the coming year.

## 1. The Ghost of Regulations Past: The Rescinded LCDs and the AI Watchdog

In a surprising reversal on December 24, the seven Medicare Administrative Contractors (MACs) rescinded the highly restrictive proposed Local Coverage Determinations (LCDs) for cellular and acellular matrix-like products (CAMPs). While this provided temporary relief, it also forced the industry to revert to existing coverage policies. For providers practicing in Novitas, CGS, and First Coast jurisdictions, current LCDs remain the primary guide for coverage and documentation. In other regions, such as WPS territories where LCDs have retired, clinicians must rely heavily on

THIS ARTICLE SUMMARIZES DR. COLE'S PRESENTATION, "CAN MOBILE WOUND CARE SURVIVE AND THRIVE IN 2026" FROM WOUND TALK WITH DR. WINDY COLE ON FEBRUARY 10, 2026. TO VIEW THE FULL PRESENTATION WITH THE QUESTION-AND-ANSWER SESSION AND TO SEE THE AGENDA FOR UPCOMING PROGRAMS, VISIT HTTPS://WOUNDTALK.LEREXPO.COM/. CONTINUING EDUCATION CREDITS ARE AVAILABLE FOR THIS AND MANY OF THE LEREXPO PROGRAMS.




demonstrating medical necessity for every application.

The introduction of the WISER model adds another layer of scrutiny through AI-assisted review processes. Interestingly, Site of Care 12 (Home) is currently excluded from the model, despite longstanding concerns about fraud and abuse in home-based services. However, the growing use of federal AI platforms presents another challenge: data security. Clinicians and staff may be required to provide personal information during registration processes, creating potential identity theft and privacy risks that traditional liability policies may not fully address.

*"Medicare was breached at least three times last year. It's not a far stretch to think that our federal government can't be breached from a HIPAA standpoint. If you are one of those people who had to give out your personal data [to register with WISER], please make sure you are checking your credit report frequently."*
**—Martha R. Kelso**

## 2. The "Race to the Bottom": Navigating the New $127 Reality

The Physician Fee Schedule (PFS) has fundamentally reshaped the economics of CAMP utilization. Regardless of the site of service, Medicare reimbursement has moved toward a standardized payment of approximately $127.14 per square centimeter. This shift creates a "race to the bottom," where financial incentives increasingly favor lower-cost products rather than outcome-driven product selection.

Additionally, reimbursement variation based on Geographic Practice Cost Index (GPCI) adjustments may create geographic barriers to care. Providers in lower-cost regions may receive substantially less reimbursement than colleagues performing the same service in higher-cost areas, despite facing many of the same operational expenses.

To maintain financial viability, clinicians must account for several automatic reductions in reimbursement:

- **15% Advanced Practice Provider Reduction:** Nurse practitioners and physician assistants receive 85% of the physician allowable rate.
- **20% Medicare Cost Share:** Medicare pays 80% of the allowable amount, with the remainder collected from the patient or secondary insurance.
- **~2% Sequestration Reduction:** An additional reduction applied to Medicare payments.

*"The cheaper the graft, the bigger the profit. But it doesn't necessarily mean that we're using the quality grafts. We've really taken a machete to an issue that only needed a scalpel."*
**—Martha R.Kelso**

## 3. From Dead Time to Billable Time: The Mobile Efficiency Hack

In mobile wound care, windshield time remains one of the greatest threats to profitability. To succeed in 2026, many practitioners are transitioning from traditional Evaluation and Management (E/M) models to time-based billing strategies.

When appropriately documented, clinicians may capture qualifying time spent on activities such as clinical phone calls, care coordination, communication with pharmacists, and discussions with facility staff. These services can add meaningful value to patient care while improving operational efficiency.

Importantly, qualifying billable activities must occur on the same date of service as the patient encounter. Administrative planning, chart reviews, or other work completed the night before generally cannot be incorporated into the following day's visit.

High-efficiency mobile practices are also investing in "trunk-to-bed" technologies, including near-infrared spectroscopy (NIRS) and bacterial fluorescence imaging. These tools provide actionable bedside information and when appropriately documented,




may contribute to the overall complexity and time associated with patient management when appropriately documented.

*"To me, the most expensive part of your practice is that windshield time."*
**—Martha R. Kelso**

## 4. The Death of Wastage and the Wedge Advantage

Medicare's heightened focus on utilization has effectively ended reimbursement for routine product wastage. Clinicians are expected to closely match graft size to wound dimensions and carefully justify any excess product use. Many providers aim to minimize product beyond the wound margins and thoroughly document any clinically necessary overage.

In addition, grafts are expected to function as wound coverings. Practices such as rolling, tucking, or layering multiple products may not meet coverage requirements unless clearly supported by medical necessity and payer policy.

To help offset declining CAMP-related revenue, many mobile practitioners are expanding their use of bedside biopsies. While punch biopsies remain common, wedge biopsies often provide larger and more representative tissue samples, which may improve diagnostic yield. Depending on payer policy and geographic location, wedge biopsies may also be reimbursed at higher rates than punch biopsies.

Successful biopsy programs require close communication with pathologists before specimen collection. Understanding preferred tissue handling techniques and storage media is essential, as improper specimen preservation can compromise diagnostic accuracy.

Clinicians must understand and follow applicable Medicare policies, LCDs, and documentation requirements to reduce audit exposure and recoupment risk.

## 5. Conclusion: The Onus Is on the Clinician

The 2026 regulatory environment represents a shift from administrative oversight to clinician-led accountability. Medical necessity should be viewed not only as a coverage requirement but also as a critical risk-management strategy. Documentation should clearly describe the patient's condition, the rationale for treatment, and the clinical risks associated with non-treatment, including infection, hospitalization, limb loss, or other serious complications when clinically appropriate.

At the same time, mobile wound care providers have an opportunity to influence future policy. By conducting research, publishing case studies, presenting posters, and generating real-world evidence on advanced therapies delivered in the home setting, clinicians can help shape future coverage decisions and reimbursement policies.

*"It's up to us as clinicians to lead the charge. We don't want the regulators and the administrators to lead the charge. It should really be us."*
**—Windy Cole**

*Windy Cole, DPM, CWSP, FACCWS, FFPM RCPS (Glasg) is a double board-certified podiatric physician and internationally recognized wound care expert with more than 25 years of clinical experience in limb preservation and advanced wound management. She serves as Adjunct Professor and Director of Wound Care Research at Kent State University College of Podiatric Medicine and is Chief Research*

*Officer for Capsicure Clinical Research Organization.*

*As the founder of Cole Collaborative Consulting, Dr. Cole partners with biotech and medical device companies to develop evidence-generation strategies, strengthen market access pathways, and deliver high-quality scientific and medical communications.*

*A leader in the integration of emerging technologies into wound care, Dr. Cole has directed numerous clinical trials and contributes her expertise to advisory boards across the biotech and medical device sectors, providing insight on FDA strategy, clinical trial oversight, medical monitoring, and protocol development with real-world implementation.*

*A sought-after speaker at national and international symposia, she is dedicated to advancing patient outcomes through evidence-based practice, interdisciplinary collaboration, and innovation in the management of complex, hard-to-heal wounds.*

*Martha R. Kelso is an internationally recognized wound care expert, healthcare executive, and pioneer in advanced wound care innovation, with more than 30 years of experience shaping clinical practice, reimbursement strategy, and patient-centered care across the continuum. Her work has redefined wound care protocols, influenced billing and compliance frameworks, and advanced a more integrated, outcomes-driven approach to patient care and advocacy. She continues to lead efforts focused on evidence-based practice, improved outcomes for complex patient populations, and integrating emerging technologies into clinical decision-making.*

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# Medication-Induced Fall Risk and Podiatric Interventions



**By Robert G. Smith,** DPM, MSc, R.Ph




## Learning Objectives

Participants completing this course will be able to:

1. **Identify** and understand pharmacovigilance and adverse effects reported for the 200 most frequently prescribed and dispensed therapeutics associated with fall-induced injuries;
2. **Evaluate** comparisons of recently published investigations and literature concerning odds ratios for predicting fall injuries and the implications for the podiatric physician; and
3. **Provide** practical strategies to prevent fall injuries resulting from modifiable extrinsic factors through patient education and appropriate interventions.

## Medication-Induced Fall Risk and Podiatric Interventions

### Introduction

Wild et al. defined "fall" as "an unintentional change in position resulting in coming to rest at a lower level or on the ground."[1] Falls and fall-induced injuries among older individuals represent a worldwide problem with substantial clinical and public health implications. More than 14 million U.S. adults aged 65 years or older report falls annually, leading to significant morbidity, mortality, and healthcare expenditures. Farley reported that more than 41,000 individuals older than 65 years died from falls.[2,3] Furthermore, the Centers for Disease Control and Prevention (CDC) indicates that more than 1 in 4 older adults fall each year, resulting in 3.6 million emergency department visits, 1.2 million hospital stays, and $80 billion in medical costs.[4] Notably, the mortality rate for falls among older adults in the U.S. has more than tripled over the past 30 years, while death rates due to falls have decreased in other high-income countries.[2,5] This surge in fall-related deaths in the U.S. reflects a new phenomenon.[2] Falls may occur when healthcare professionals fail to assess underlying risk factors that contribute to these events. Moreover, podiatric physicians and surgeons

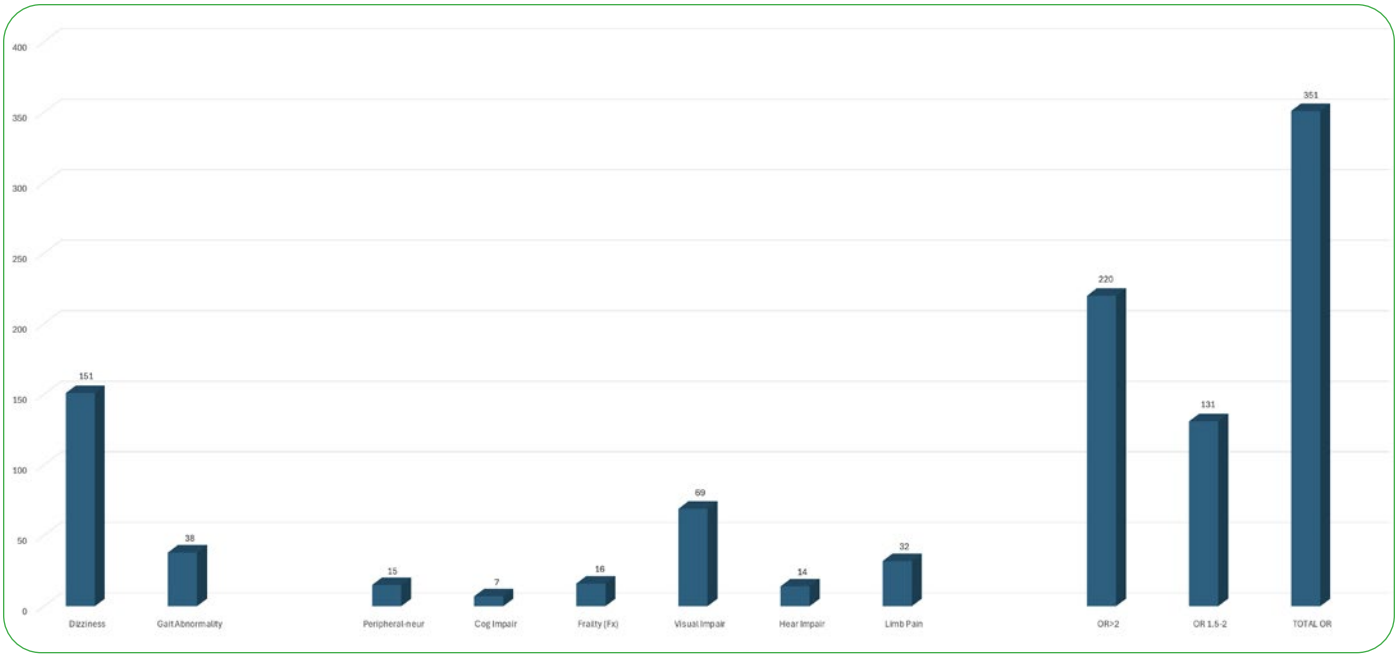
## Table 1: Fall Risk Increasing Medications and Odds Ratios (95% CI)

| | Woolcott et al, 2009 | | Seppala et al, 2018 | | Colón-Emeric et al, 2024 | |
|---|---|---|---|---|---|---|
| **Participants** | **79,081** | | | | **2,322,278** | |
| | **Odds Ratio** | **CI 95%** | **Odds Ratio** | **CI 95%** | **Odds Ratio** | **CI 95%** |
| **Antihypertensives** | 1.24 | 1.01-1.50 | | | 1.38 | 1.19-1.56 |
| **Diuretics** | 1.07 | 1.01-1.14 | 1.36 | 1.17-1.57 | 1.58 | 1.52-1.65 |
| **Beta-Blockers** | 1.01 | 0.86-1.17 | 0.88 | 0.80-0.97 | 0.96 | 0.87-1.06 |
| **Sedatives-Hypnotics** | 1.47 | 1.35-1.62 | | | 2.05 | 1.95-2.15 |
| **Neuroleptics/ Antipsychotics** | 1.59 | 1.37-1.83 | 1.54 | 1.28-1.85 | 2.3 | 1.24-4.26 |
| **Antidepressants** | 1.68 | 1.47-1.91 | 1.57 | 1.43-1.74 | 1.48 | 1.24-1.77 |
| **Benzodiazepines** | 1.57 | 1.43-1.72 | 1.42 | 1.22-165 | | |
| **Narcotics-Analgesics** | 0.96 | 0.78-1.18 | 1.42 | 0.91-2.23 | 1.51 | 1.15-1.91 |
| **NSAIDs** | 1.12 | 1.01-1.44 | 1.09 | 0.96-1.23 | 1.31 | 1.11-1.55 |
| **Antiepileptics** | | | 1.55 | 1.25-1.92 | 2.55 | 1.84-3.52 |
| **Digoxin** | | | 2.06 | 1.56-2.74 | 2.06 | 1.56-2.74 |
| **Polypharmacy** | | | 1.75 | 1.27-2.41 | | |

recognize that falls following foot and ankle surgeries are a common concern, particularly in the first six weeks postoperatively.[6,7] Studies have shown that a significant percentage of patients experience falls during this period.[6,7] Individuals with chronic foot pathologies may have an increased risk due to decreased power, deformity, or neuropathy.[6] Alexander et al. asserted that patients with hindfoot pathology had the highest risk of falling preoperatively.[6] Additionally, they observed that patients with forefoot and hindfoot pathologies experienced the most falls before surgery.[6] Research has documented that postoperatively, patients with midfoot pathologies had the highest frequency of falls, with 35% experiencing at least one fall within the two-week period after surgery.[6] The midfoot cohort also experienced the most falls postoperatively, averaging 0.50 falls. Finally, all patients completed a Johns Hopkins fall risk assessment preoperatively, with scores of 6.32, 4.70, and 6.96 for forefoot, midfoot, and hindfoot pathologies, respectively.[6]

While fall injuries can have multiple and diverse etiologies, they generally share similar risk factors and frequently result from the cumulative effects of impairments across multiple systems. Therefore, podiatric physicians need an analytical approach to addressing this complex problem, considering the most likely causes, contributing factors, and associated comorbidities of falls. Colón-Emeric et al. observed in their review that falls result from age-related physiological changes compounded by multiple intrinsic and extrinsic risk factors.[8] Podiatric physicians have a duty to recognize that major modifiable fall risk factors among all their patients, especially older adults, include gait and balance disorders, orthostatic hypotension, sensory impairment, medications, and environmental hazards.[8] Because the causes of fall events and injuries are complex, there is an emerging need to identify the risk of drug-induced falls. Smith reported that adverse effects associated with the 200 most frequently prescribed medications in 2000 could cause fall injuries.[9] The research aimed to document 448 adverse effects that were identified and organized into 13 broad categories representing drug-induced changes in the nervous, circulatory, and muscular systems.[9] These changes were reported for 157 of the medications reviewed (92.9%) and could result in fall injuries.[9] The accompanying list of medications intended to serve as a ready reference for podiatric physicians and other healthcare professionals when monitoring and counseling patients regarding the potential for medication-induced fall injuries, which are especially common in the elderly population.[9] The published research, narrative, and accompanying list are now 25 years old, which may be considered outdated since both prescribing and dispensing therapeutics is constantly evolving. Given the author's specific focus on pharmacovigilance for podiatric physicians, the present narrative aims to summarize current research, 25 years after the

**Figure 1: Number of Medications with Fall Risk Adverse Effects (N=177)**




original publication, on the 200 most frequently prescribed medications in 2023 that may cause fall injuries, including medications designated as Fall-Risk-Increasing Drugs (FRIDs).[10] The methodology and results will be presented through data, definitions, determinants, and literature comparisons in both narrative and graphical formats. Second, strategies and tools will be introduced to assist podiatric physicians in proactively preventing medication-induced fall injuries. Finally, the role of the podiatric physician within the multidisciplinary, interprofessional team in preventing fall injuries will be highlighted, with emphasis on the significance of multifaceted podiatric interventions.

## Process

***Definitions:***

Pharmacovigilance is the science and activities related to the detection, assessment, understanding, and prevention of adverse effects or any other drug-related problems, aimed at ensuring patient safety and optimizing the benefits of pharmaceutical products.

Frailty is a clinically recognizable state of increased vulnerability resulting from age-associated decline in reserve and function across multiple physiological systems, such that the ability to cope with every-day or acute stressors is compromised.

Sarcopenia is the age-related decline in skeletal muscle mass concomitant with decreased strength and/or function.

FRIDs are medications that can significantly elevate the risk of falls, particularly in older adults, and include various classes of drugs such as sedatives, antidepressants, and antipsychotics.[11,12] These medications are associated with an increased likelihood of falls and fall-related injuries and may cause side effects such as dizziness, sedation, confusion, and orthostatic hypotension, all of which contribute to fall risk.[11,12]

Odds ratio (OR) for fall risk has been extensively studied, with various factors contributing to the risk of falls. In a pharmacovigilance study, a total of 208,849 reports were considered, with 34,840 fall events and 1,898 drugs detected as being associated with fall incidence in older patients.[11] Zhou et al. reported that many drugs were associated with a high risk of falls and emphasized that the risk of drug-induced falls should be considered when optimizing drug therapy in clinical practice. As lower extremity specialists, podiatric physicians may lead the interprofessional team in preventing fall injuries by employing risk avoidance strategies, including identifying medications that may increase fall risk. The key findings are as follows:

Osteoporosis medications: Patients using these medications have significantly higher odds of sustaining more severe injuries from a fall (OR = 3.02, 95% confidence interval (CI): 1.21–7.53).[11–13]

Frailty: Frailty is associated with a higher risk of falls and has a prevalence of 7%–12% in community-dwelling adults aged ≥ 65 years.[11,12]

Drug-induced fall risk: Many drugs are associated with a high risk of falls in older patients, with neurological drugs being the most significant group.[11–13]

Multiple risk factors: The greater the number of risk factors, the greater the likelihood of falling. Healthcare providers can reduce fall risk by addressing or minimizing modifiable risk factors.[11–13]

***Determinants:***
The medications selected for review were the 200 most frequently prescribed drugs in 2023, listed by generic name according to the ClinCalc DrugStats Database, which collects data from three billion outpatient prescription fills per year.[14] A literature review was conducted to identify adverse effects attributed to these medications that may cause patient fall injuries and their prevalence rates. The data obtained were primarily qualitative and based on reports in the current compendium, recent journal articles, drug package inserts, and an electronic database.[9,15–20] Current literature sources were consulted to resolve conflicting information presented in the reference materials. Risk factors for falls can be intrinsic or extrinsic to the patient.[8] The common intrinsic risk factors for fall injuries, stratified by OR as described by Colón-Emeric et al., were used to develop categories for major and moderate risk factors.[8] According to Colón-Emeric et al., major risk factors (OR > 2) for two or more falls within 6–12 months are generally related to neurologic diseases—peripheral neuropathy, cognitive impairment, gait abnormality, and dizziness—which were selected as reportable categories.[8] Furthermore, other moderate risk factors (OR > 1.5) included visual and hearing impairment, pain, and frailty.[8] These eight risk factors were used to categorize drug-related adverse effects associated with the 200 most frequently prescribed and dispensed medications for 2023. Both low and high body mass index (BMI) are hypothesized to increase fall risk because of associated sarcopenia, while obesity may also increase fall risk through impaired postural stability and deconditioning due to decreased physical activity.[8]

***Data:***
The 200 most frequently prescribed medications for 2023 were reviewed for the adverse effects in eight categories associated with the potential to induce fall injuries. During the review, duplicate single-ingredient products were identified because some medications were listed as combination products. The investigator reviewed and counted these medications within the total of 200 medications listed by generic name.[13]

The adverse effects were classified into eight categories: four categories associated with an OR > 2 for dizziness, gait abnormality, peripheral neuropathy, and cognitive impairment and four categories associated with an OR of 1.5–2 for frailty, visual impairment, hearing impairment, and limb pain. Six medications were identified as having a specific "Fall or Fall Injury" warning listed as an adverse effect in their drug monographs: Methocarbamol, Oxybutynin, Pramipexol, Sacubitril-Valsartan, Sildenafil, and Zolpidem. The numbers of medications with at least one of the four categories associated with OR > 2 were as follows: dizziness (N = 151, 85.3%), gait abnormality (N = 38, 21.5%), peripheral neuropathy (N = 15, 8.5%), and cognitive impairment (N = 7, 3.95%). The numbers of medications with at least one of the four categories associated with ORs of 1.5–2 were as follows: frailty (N = 16, 9.03%), visual impairment (N = 69, 38.9%), hearing impairment (N = 14, 7.9%), and limb pain (N = 32, 18.1%) (Figure 1). Many of the reviewed medications had overlapping adverse effects across categories associated with ORs > 2 and ORs of 1.5–2. The total combined odds risk ratios were N = 351 among the 181 medications presenting at least one of the eight potential adverse effects associated with fall or fall injuries. The categories associated with ORs > 2 accounted for N = 220 (62.7%), while those associated with ORs of 1.5–2 accounted for N = 131 (37.3%). Furthermore, some medications had combined ORs in both OR categories (OR > 2 and OR of 1.5–2), with some presenting four or five of the eight selected potential adverse effects. The medications identified with four potential adverse effects were Alprazolam, Bupropion, Citalopram, Duloxetine, Oxycodone-Acetaminophen, Paroxetine, Ramipril, Risperidone, Ropinirole, Sertraline, Tadalafil, Topiramate, Tramadol, Valproate, and Venlafaxine. The medications identified with five potential adverse effects were Ciprofloxacin, Naproxen, Quetiapine, and Sildenafil. No fall- or fall-injury-related adverse effects were identified for 11.5% (n = 23) of the medications. The distribution of the number of medications with their respective number of fall risk adverse effects is presented in Table 1. Among the 151 medications in the dizziness category, nine had upper limits percentages of experiences ranging from 22% to 41%. Additionally, among the 69 medications that were within the visual impairments category of most adverse effects, particularly "blurred vision" has upper limit percentages of experiences ranging from 2% to 27%. Interestingly, 105 of the medications reviewed in the present investigation were also included in Smith's 2000 survey.[9]

***Literature Comparisons:***
Woolcott et al. conducted an investigation aimed at updating a previously completed meta-analysis regarding the association of medication use and falling, including relevant drug classes and new studies completed since the previous meta-analysis.[21] They identified, through a systematic search of English-language articles published from 1996 to 2007, studies that were completed on patients older than 60 years that examined the association between medication use and falling.[21] They conducted a meta-analysis to determine the impact of nine medication classes on falls in older adults and determined that the use of sedatives and hypnotics, antidepressants, and benzodiazepines demonstrated a significant association with falls in older adults.[21]

Eckles' review of fall risk and podiatric intervention presents important facts and statistics in narratives and graphical formats.[2] The review discusses the epidemiology of fall injuries, postural and gait changes associated with fall risk, obesity, footwear, foot pain, and medications as intrinsic and extrinsic fall-risk factors.[22] Woolcott et al.'s FRIDs and ORs are presented graphically.[22] The assumption that podiatric physicians seldom prescribe medications identified by Woolcott et al. may no longer be true, given the ever-expanding role of podiatric residents and podiatric physicians.[21,22]

O'Neil et al. conducted a study aimed at evaluating specific medications and patient characteristics as risk factors for falling in a large tertiary care hospital.[23] This investigation was a case-control study comparing demographic, health, mobility, and medication data for 228 patients who fell between June 29, 2007, and November 14, 2007, against 690 randomly selected control patients.[23] The team used logistic regression to identify fall risk factors.[23] This study identified medications and patient characteristics associated with an increased risk of falling in the hospital.[23]

Seppala et al. conducted a systematic review and meta-analysis.[24] They searched Medline, PsycINFO, and Embase using key search concepts and terms "falls," "aged," "medication," and "causality."[24] Studies included in their review investigated nonpsychotropic and noncardiovascular medications as risk factors for falls in participants aged ≥ 60 years or participants with a mean age ≥ 70 years.[24] A meta-analysis was performed using the generic inverse variance method, pooling unadjusted and adjusted OR estimates separately.[24] They concluded that the two medication classes of opioids and antiepileptics, along with polypharmacy, were significantly associated with an increased risk of falling in the meta-analyses.[24] In a separate meta-analysis, Seppala et al. concluded that antipsychotics, antidepressants, and benzodiazepines are consistently associated with a higher risk of falls. It remains unclear whether specific subgroups, such as short-acting benzodiazepines and selective serotonin reuptake inhibitors, are safer in terms of fall risk.[25] For completeness, the systematic review and meta-analysis of cardiovascular drugs conducted by de Vries et al., within the EUGMS task and finish group on fall-risk-increasing drugs, which included Seppala et al., is also included.[26] These authors concluded that loop diuretics were significantly associated with increased fall risk, whereas beta-blockers were significantly associated with decreased fall risk.[26] Digitalis and digoxin may increase the risk of falling, while statins may reduce it.[26]

Colón-Emeric reviewed risk assessment and prevention of falls in older community-dwelling adults.[8] For each fall-prevention intervention, they used search filters developed by the Canadian Agency for Drugs and Technologies in Health to search PubMed, CINAHL, Embase, MEDLINE, and Scopus for English-language articles published after the most recent Cochrane Systematic Review search (January 1, 2018, or 2019) through June 21, 2023. They limited the search to meta-analyses of studies conducted in community-dwelling older adults and randomized clinical trials published after the most recent meta-analysis.[8] They identified intrinsic risk factors for falls in older adults by OR category, which were used in the present study because of their ease of comparison and relevance when reviewing medication-induced adverse effects.[8,9] They concluded that multifactorial risk reduction based on a systematic clinical assessment for modifiable risk factors may reduce fall rates among those at high risk.[8] These findings provide the rationale for the present analysis. Comparisons of odds ratios from medication adverse effects that may cause falls and fall injuries from the above literature are presented in Table 2.

## Practical Strategies for Podiatric Interventions

### Medication Strategies

Medication reconciliation is vital for preventing adverse events such as falls. Typically, medication reconciliation occurs during care transitions, such as admission or discharge, where medication changes usually occur among patients with polypharmacy. Therefore, podiatric physicians should consider conducting medication reconciliation periodically to reduce the risk of falls among their older patients. Medication reviews have been identified as a key component of fall prevention. Podiatrists, with the assistance of pharmacists, work together to accurately identify all medications currently taken by the patient and consider the appropriateness of each medication, potential or actual adverse drug reactions, and adherence issues. When a medication is identified as nonessential or not indicated, discontinuation should be considered.[12] The podiatrist may consider the investigation by Sorock et al. of the association between changes in six medication categories and the risk of falling among nursing home residents.[27] The risk of falls was significantly elevated within three days of a central nervous system (CNS) medication change, including the initiation of a new medication, a dosage change, an as-needed medication, or medication discontinuation.[27] The risk of falls increased 3.4-fold (95% CI, 1.2–9.5) within 1–3 days following a change in any CNS medication.[27] Prescribers of benzodiazepines should be aware that impaired balance, both centrally and peripherally, and delayed reaction time may increase fall risk, particularly during the first 15 days of treatment or following a dose increase.[13] The Beers Criteria for Potentially Inappropriate Medication Use in Older Adults, published by the American Geriatrics Society, provide guidance on medications that may be inappropriate

for older adults. The AGS 2023 BEERS Pocket Guide provides a useful resource for podiatric residents and physicians.[19]

Another factor that may influence medication-induced falls is poor medication adherence, which may occur in as many as 40%–50% of community-dwelling elders.[12] Lower extremity specialists should be aware of factors that may affect medication adherence, including forgetfulness, lack of interest or knowledge, medication expense, complexity in medication regimens, and limited access to healthcare providers.[12] Computerized drug alerts are expected to reduce fall-related injuries in older patients. However, prescribers may ignore most alerts because they believe the benefits of the drugs outweigh the risk.[12]

### Podiatry Evaluations and Interventions

It is recognized that many elderly individuals wear suboptimal footwear, creating an early opportunity for assessment and intervention. Individuals who go barefoot or wear slippers are noted to have an increased risk of imbalance and falls. Footwear also plays a role in the development of foot pain, which is linked to fall risk. Ill-fitting footwear is common among older people and is strongly associated with forefoot pathology and foot pain.[28] These findings highlight the need for footwear assessment in managing foot problems in older individuals.[28] Podiatric physicians recognize that painful feet, regardless of the cause, may alter gait and increase fall risk. Indeed, foot pain is an independent and statistically significant factor for falls, even after accounting for age and other physiological factors, as reported by Menz.[28] A person with foot pain may experience decreased stride length, changes in base of gait, increased sway, increased postural stiffness, and aversion tactics. All of these may contribute to or be independent risk factors for falls.[22,29]

Podiatrists diagnose and treat a wide range of problems affecting the feet, ankles, and lower limbs, as foot problems are independent risk factors for falls in older individuals.[30] Wylie et al. searched multiple electronic databases without language restrictions for randomized or quasi-randomized controlled trials evaluating podiatry interventions in individuals age 60 years or older to determine whether these interventions prevent fall injuries.[30] The review found that multifaceted podiatry interventions and multifactorial interventions involving referral to podiatry significantly reduced fall rates.[30]

Myers et al. tested their hypothesis that evaluations by podiatrists would lower the incidence of falls.[31] They conducted a retrospective chart review of a cohort of patients with diabetes mellitus aged 65 years or older who visited a primary care office between January 1, 2019, and June 30, 2019. The patients were divided into those who had undergone podiatrist evaluations and those who did not.[31] Their primary objective was to compare fall events and comorbid medical conditions between the two groups.[31] They further compared the associations between risk factors among patients who experienced falls and those who did not.[31] Additionally, they found that among their study population, patients who experienced falls had higher frequencies of certain comorbidities than those who did not, including coronary artery disease, peripheral arterial disease, dementia, congestive heart failure, carotid stenosis, and syncope.[31] They concluded that among elderly patients with diabetes mellitus, there was no significant difference in the incidence of falls between patients who had undergone podiatrist evaluations and those who did not.[31]

Podiatrists employ various methods to assess an individual's risk of falling. These include:

- **Comprehensive Foot Examination:** Identifying deformities, skin conditions, and structural abnormalities in the feet.
- **Gait Analysis:** Evaluating walking patterns to identify any abnormalities that could contribute to instability.
- **Balance Tests:** Conducting specific tests to measure balance and strength, such as the Timed Up and Go test.
- **Medical History Review:** Discussing existing medical conditions, medications, and previous falls.

Podiatrists offer various treatments aimed at improving foot health and stability, including:

- **Orthotics:** Custom-made shoe inserts can help correct foot alignment and enhance comfort, reducing the likelihood of falls.
- **Footwear Recommendations:** Guidance on selecting appropriate footwear that provides adequate support and reduces the risk of slipping.
- **Physical Therapy:** Collaborating with physical therapists to develop strength-training and balance-improving exercises.
- **Treatment of Foot Conditions:** Addressing conditions such as bunions or diabetic foot ulcers, which can impede mobility.
- **Patient Education:** Educating patients on foot care, footwear choices, and how to manage their environment to minimize the risk of falls.

## Conclusion

Within fall-prevention teams or services, the role of podiatrists can be further enhanced by training other clinical staff to recognize medical factors, such as medication-related adverse effects that influence postural stability, gait, and balance. Podiatrists should also promote greater awareness of podiatry services and emphasize

their roles and responsibilities in fall-injury prevention. Further strategies are needed to enhance the role of podiatrists in fall prevention.

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# What Contributes to Tendon Thickness After Stroke—A Commentary

"A Foot Forward for Optimum Health" is a column designed to enlighten the old guard in a new way about lower extremity impairment as it pertains to foot drop. The intent is to challenge evidence-based research and practice so that it addresses real world issues shaped by social determinants of health. For every common issue is an uncommon response that will provide insight to improve health outcomes by putting one foot forward at a time-efficiently and effectively.



By Dr. Jennifaye V. Brown

April, August, and December are months reserved to address comments made to articles written for "A Foot Forward for Optimum Health". However, I did not have any comments from May, June and July and I wanted to make some comments and pose clinical questions from the article titled, "Changes in Lower Extremity Tendon Thickness After Stroke Rehab (Balance and Outcomes)" in the series "From The Literature" for June 2026.

Ultrasound has been used in the past to assess muscle thickness post-stroke;[1-6] however, just because a muscle is thicker in girth does not automatically mean there is an increase in strength isometrically, eccentrically and concentrically needed for functional mobility. Therefore, it is imperative to train a muscle and load it with resistance in the functional pattern of use, despite increase tendon thickness.

After reading the article,[7] I was concerned that there was no description of the paretic lower extremity long-term typical resting position or during weightbearing such as standing. If the knee is extended and the ankle is in plantarflexion from an extensor synergy pattern or increase tone in the quadriceps and posterior leg compartment muscles or weakness in the tibialis anterior, these impairments may perhaps cause an increase in tendon thickness due to the shortening of the muscle and tension applied to the musculotendinous junction.




Ultrasound assessments were done in a non-weight-bearing position and specifically for the quadriceps tendon, the knee was flexed to 30˚ in supine and for the Achilles tendon, 0˚ or neutral dorsiflexion in prone. Of the 20 sessions of therapy, I would like to have known the percentage of activities in non-weight bearing versus weight bearing. The musculoskeletal system adapts to load after a stroke.[8-9]

My last comment is the use of the Berg Balance Scale (BBS) to assess balance. It has been known that stroke survivors over rely on the less-affected lower extremity for stability during testing often driving up test scores and masking the risk of falls.[10-11] The crucial "...finding was a within-patient increase in quadriceps tendon thickness over the 4-week inpatient period,"[7(05)] may be attributed to the inability to bend the knee using the hamstrings or increased tone in the quadriceps. However, one has to judge how the stroke survivor was achieving balance and stability during the BBS to state that there is "modest" association of balance improvement as thickness increased in the quadriceps tendon.

Based on clinical knowledge, skill and insights, it is imperative that we scrutinize the research for its applicability to patient/client rehabilitation care. I know a lot of "strong" stroke survivors with a 5 out of 5 on the manual muscle test for the quadriceps (knee extensors), but they

cannot navigate stairs step over step up or down.[12] Go figure...it out!?!

*Jennifaye V. Brown, PT, MSPT, PhD, NCS, CAPS is an American Physical Therapy Association 4-time 10-year board certified neurologic physical therapist in Charleston, South Carolina, specializing in stroke rehabilitation, specifically gait analysis and treatment, AFO design, and the redesign of lived spaces allowing individuals with disAbilities to age in place. She is the author of the book, Brace Yourself: Everything You Need to Know About AFOs After Stroke. Visit her YouTube channel @jvbneuropt for more information regarding stroke rehabilitation.*

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# The New AI Playbook for Specialty Practices: Why Podiatry Clinics Are Embracing End-to-End Automation

For many podiatrists, the workday doesn't end when the last patient leaves. It continues through documentation, claim reviews, prior authorizations, patient messages, billing questions, and a growing list of administrative tasks that have become as much a part of practice as diagnosing plantar fasciitis or treating diabetic foot ulcers.



**By Hersh Solanki,** Chief Business Officer, Athelas




For many podiatrists, the workday doesn't end when the last patient leaves. It continues through documentation, claim reviews, prior authorizations, patient messages, billing questions, and a growing list of administrative tasks that have become as much a part of practice as diagnosing plantar fasciitis or treating diabetic foot ulcers.

While artificial intelligence has captured headlines for its ability to generate clinical notes, documentation represents only one piece of a much larger operational puzzle. Independent specialty practices are beginning to recognize that the greatest opportunity for AI is transforming the entire workflow that surrounds every patient encounter.

Across healthcare, practices are confronting rising labor costs, staffing shortages, increasingly complex payer requirements, and mounting pressure to do more with fewer resources. Podiatry practices face many of these same challenges, while balancing high patient volumes, routine procedures, chronic disease management, imaging, durable medical equipment (DME), and frequent interactions with Medicare and commercial payers. Every additional administrative step slows operations, delays reimbursement, and diverts valuable staff time away from patient care.

As a result, many practice owners are rethinking how technology fits into their businesses. Rather than adding another standalone application to solve a single problem, they are looking for integrated AI platforms that automate workflows from patient intake through reimbursement. The goal is to reduce friction throughout the entire patient journey while improving financial performance.

## Administrative Work Has Become a Practice Growth Challenge

The operational demands placed on independent practices have steadily increased over the past decade. Documentation requirements have expanded. Insurance verification has become more complicated. Prior authorization processes continue to evolve. Clinical accuracy remains essential to protecting reimbursement, while denied claims require significant staff time to investigate and appeal.

These administrative responsibilities affect nearly every member of the practice. Front-desk teams manage scheduling, eligibility verification, and patient communications. Clinical staff document encounters and coordinate follow-up care. Billing specialists navigate submission requirements, payer edits, and collections. Practice owners often find themselves overseeing operational issues long after clinic hours have ended.

The cumulative effect is substantial. Administrative work consumes time that could otherwise be devoted to seeing patients, expanding services, or growing the practice. Hiring additional personnel can help, but labor shortages and increasing wage pressures have made staffing both more difficult and more expensive. Many independent practices simply cannot continue scaling by adding people every time operational demands increase.

Technology has traditionally promised relief, yet many practices have discovered that digital transformation often introduces new complexity. A separate scheduling system, standalone scribe, billing software, patient messaging platform, revenue cycle solution, and analytics dashboard may each solve one problem while creating additional workflows between systems.

Instead of simplifying operations, disconnected technology frequently requires staff to manually transfer information, reconcile data, and navigate multiple applications throughout the day. In many practices, employees spend as much time managing software as they do managing patients.

## Moving Beyond AI as a Documentation Tool

The first wave of AI adoption in healthcare focused primarily on ambient documentation. By listening to conversations between clinicians and patients, AI-generated notes significantly reduced time spent completing charts after appointments. For many providers, this represented an important first step toward reducing administrative burden.

But documentation alone does not resolve the downstream work that follows every encounter.

Once a visit concludes, claims must be prepared and submitted. Insurance information must be validated. Missing documentation may trigger delays or denials. Patients require appointment reminders, follow-up instructions, billing communications, and responses to portal messages. Each handoff introduces another opportunity for delays, manual work, or human error.

This broader perspective is changing how specialty practices evaluate AI investments. Rather than asking whether technology can generate notes, practice leaders are asking whether it can reduce administrative work across the entire care continuum.

Increasingly, the answer lies in automation that connects clinical documentation, operational workflows, and revenue cycle management into a single, coordinated process.

When information flows seamlessly from patient scheduling through clinical documentation, billing, collections, and patient engagement, staff spend less time duplicating work or correcting errors. Providers can focus more fully on patient care, while administrative teams shift their attention from repetitive tasks to higher-value activities that require human judgment.

For independent podiatry practices operating with lean teams and growing financial pressures, that operational efficiency is emerging as a competitive advantage. As reimbursement becomes increasingly tied to accurate documentation, efficient workflows, and financial performance, practices that modernize their operations will be better positioned to remain independent, improve the patient experience, and invest in future growth.

In that sense, AI is no longer just changing how podiatrists document visits. It is beginning to reshape how successful practices operate from the moment a patient schedules an appointment until the final reimbursement is received.

The transition to end-to-end automation is also changing how practices think about the revenue cycle. For years, revenue cycle management was viewed primarily as a back-office function, something that happened after the patient visit. Today, leading practices recognize that reimbursement begins well before a clinician enters the exam room.

Every step in the patient journey has the potential to influence financial performance. Incomplete insurance verification, missing demographic information, insufficient documentation, or delayed claim submission can all result in denied claims, payment delays, or unnecessary administrative work. While each issue may seem minor in isolation, together they create significant financial leakage that can be difficult for practices to identify, let alone resolve.

AI is helping close those gaps by automating routine administrative processes and ensuring that information flows consistently across the practice. Eligibility can be verified before appointments are confirmed. Patient intake forms can be completed digitally and incorporated directly into the clinical workflow. Claims can be reviewed automatically before submission to identify potential errors or omissions

that might otherwise lead to denials.

Rather than relying on staff to manually monitor dozens of administrative checkpoints throughout the day, practices are increasingly using AI to surface exceptions that truly require human attention. This shift allows employees to spend less time chasing paperwork and more time solving higher-value problems, assisting patients, and supporting clinicians.

For podiatry practices, where procedures, imaging, diabetic foot care, wound management, orthotics, and DME often involve complex, payer-specific requirements, reducing preventable errors can have a meaningful impact on cash flow. Even small improvements in first-pass claim acceptance can translate into faster reimbursement and fewer hours spent on rework.

## Integration Is Becoming More Valuable Than Individual Features

As AI capabilities continue to expand, many practices are discovering that the biggest challenge is no longer finding technology. It is managing too much of it.

Over the past decade, specialty practices have adopted a growing collection of digital tools. One platform manages scheduling. Another handles patient messaging. Documentation may happen in one application while billing occurs in another. Revenue cycle reporting often lives somewhere else entirely. Each product may perform its intended function well, but together they can create fragmented workflows that require constant coordination.

This fragmentation has real operational consequences. Staff members frequently re-enter the same information across multiple systems, reconcile inconsistent data, or move between applications throughout the day to complete a single workflow. Every additional handoff increases the possibility of delays, errors, or duplicated effort.

The industry is now moving toward a different model: integrated platforms that connect clinical, administrative, and financial workflows within a single ecosystem.

When scheduling, documentation, billing, patient communication, and revenue cycle management operate together, information captured during one stage of care can automatically support the next. Insurance information entered during scheduling becomes available during registration. Completed encounters flow directly into billing workflows with fewer manual steps.

The result is greater consistency across the practice. Staff members spend less time navigating technology and more time engaging with patients. Practice leaders gain better visibility into operational performance because information resides within a unified system rather than across multiple disconnected platforms.

For independent practices with limited administrative resources, this simplification can be just as valuable as the AI capabilities themselves.

## Successful AI Adoption Starts With Workflow, Not Technology

Despite growing enthusiasm around artificial intelligence, implementation success depends both on the sophistication of the software and on how well it aligns with existing workflows.

Practices sometimes approach AI as though it will immediately solve every operational challenge. In reality, technology performs best when deployed to eliminate repetitive, well-defined tasks rather than compensate for inconsistent processes or unclear responsibilities.

Successful implementations typically begin by identifying the administrative bottlenecks that consume the most staff time. Is documentation delaying clinicians after clinic hours? Are claim denials increasing because of documentation inconsistencies? Is the front office overwhelmed by manual appointment reminders, insurance verification, or patient phone calls? Understanding where inefficiencies exist helps practices prioritize automation where it will have the greatest impact.

Equally important is involving staff throughout the implementation process. Administrative teams and clinicians are often the first to identify workflow challenges that leadership may not fully appreciate. Engaging employees early, providing adequate training, and clearly communicating how automation supports rather than replaces their work can significantly improve adoption.

The most effective implementations also establish measurable goals from the outset. Instead of evaluating AI based on novelty, practices should assess whether it reduces documentation time, shortens reimbursement cycles, decreases claim denials, improves appointment completion rates, or reduces after-hours administrative work. These operational metrics provide a clearer picture of return on investment than technology features alone.

Viewed this way, AI becomes less about replacing human effort and more about enabling clinicians and staff to focus on the responsibilities that require experience, judgment, and personal interaction–qualities that remain at the heart of podiatric care.

## Looking Ahead: The Intelligent Specialty Practice

Artificial intelligence is still in the early stages of transforming healthcare operations. While much of today's attention focuses on documentation and administrative automation, the next generation of AI will increasingly serve as an intelligent operational partner, helping practices anticipate challenges, identify inefficiencies, and support better decision-making across the organization.

For podiatry, this evolution is particularly significant. The specialty combines complex clinical and reimbursement workflows. AI has the

potential to streamline these interconnected processes while helping practices improve operational consistency and financial performance.

Just as importantly, intelligent automation can help independent practices compete in an environment where larger health systems have traditionally benefited from greater administrative resources. By automating repetitive tasks and connecting clinical, operational, and financial workflows, AI allows smaller practices to accomplish more without proportionally increasing staffing.

Reducing administrative burden gives clinicians and staff more time to focus on what matters most: building relationships with patients, providing thoughtful care, and improving the overall patient experience.

## AI as a Long-Term Operational Strategy

As AI adoption accelerates, practice leaders should look beyond individual features and evaluate how technology supports the practice as a whole. Rather than adding another standalone application, the greatest value comes from platforms that integrate scheduling, documentation, patient communications, billing, and revenue cycle management into a unified workflow.

Ultimately, the practices that benefit most from AI will not necessarily be those that adopt the newest technology first. They will be those that use automation strategically to redesign workflows, reduce administrative friction, and create more sustainable operations.

The future of independent podiatry depends not only on delivering exceptional clinical care but also on building resilient, efficient practices that can adapt to an increasingly complex healthcare environment. AI will play an important role in that transformation by removing many of the repetitive administrative tasks that have long distracted them from patient care. In doing so, end-to-end automation can help independent practices strengthen both their financial health and their ability to deliver the high-quality care patients expect.

*Hersh Solanki is Chief Business Officer at Athelas a leading healthcare technology company specializing in revenue cycle management, ambient AI, and electronic health record solutions that streamline healthcare operations and improve patient outcomes. He works closely with healthcare organizations nationwide to implement AI solutions that enhance operational efficiency while enabling clinicians to spend more time focused on patient care.*



MEETING HIGHLIGHTS

# AOFAS Annual Meeting and IFFAS 9th Biennial Meeting 2026 Highlight International Advancements and Innovation in Orthopaedics

## Global Leaders Recognized for Contributions to Foot and Ankle Orthopaedics



More than 1,260 foot and ankle orthopaedic surgeons, advanced health practitioners, orthopaedic residents, and medical students across the globe attended the American Orthopaedic Foot & Ankle Society® (AOFAS) Annual Meeting and the International Federation of Foot & Ankle Societies (IFFAS) 9th Biennial Meeting on September 16–19, 2026. The meeting was held in-person in Seattle, Washington, as well as virtually.

The meeting was a special collaboration between AOFAS and IFFAS. IFFAS is an international federation of regional foot and ankle organizations: the Asian Federation of Foot & Ankle Surgeons, the European Foot & Ankle Society, the Latin American Federation of Medicine and Surgery of the Foot and Leg, the North American Federation of Foot & Ankle Societies, and the Southern Federation of Foot and Ankle Societies.

The AOFAS & IFFAS 2026 meeting offered attendees 316 live presentations, 300 poster and e-poster presentations, and the opportunity to connect with 98 exhibiting companies. During the meeting, the Society and the IFFAS presented its most prestigious awards for outstanding global research in foot and ankle orthopaedics:

- **Roger A. Mann Award**, recognizing the outstanding clinical paper: Implant Design Matters Only in Non-Concentric Ankles Undergoing Total Ankle Arthroplasty authored by Antoine Acker, MD; Julia Lenz, MD; Halah Kutaish, PhD, Victor Dubois-Ferriere, MD; Xavier Crevoisier, MD; and Mathieu Assal, MD.
- **J. Leonard Goldner Award**, recognizing the outstanding basic science paper: Combined Interosseus Talocalcaneal and Spring Ligament Repair for Progressive Collapsing Foot Deformity (PCFD): A Cadaveric Study Assessing Alignment and Hindfoot Kinematics During Simulated Walking authored by Cesar de Cesar Netto, MD, PhD; Ricardo Villar, MD; Jeffrey W. Hoffman, MS; Francois Lintz, MD, PhD; Wolfram Grun, MD, MA; Scott J. Ellis, MD; Jonathan T. Deland, MD; and Brett D. Steineman, PhD.
- **IFFAS Award for Excellence**, recognizing the outstanding international paper: Umbilical Cord-Derived Allogeneic Mesenchymal Stem Cells Augmentation of Microfracture for Osteochondral Lesion of Talus: Early Functional Recovery Including Large Lesion: A Double-blind, Randomized, Controlled Trial authored by Nicolas Protasowicki, MD; Aaron Cortes, PhD; Emilio Muse, MD; Mario Escudero, MD; Ana Butteri, MD; Cristian Ortiz, MD; Felipe Chaparro, MD; Giovanni Carcuro, MD; and Manuel Pellegrini, MD.
- **Robert B. Anderson Award**, recognizing the outstanding sports paper: Apparent Syndesmotic Widening Is an Unreliable Indicator of True Fibular Instability A Cadaveric Biomechanical Study Using Six-Degrees-of-Freedom Analysis and Three-Dimensional Distance Mapping authored by Kareem Omran, MD, MPhil; Cesar de Cesar Netto, MD, PhD; Nacime Salomao Barbachan Mansur, MD, PhD; Kepler Carvalho, MD, PhD; Smitha Mathew, MBBS; Justin Siebler, MD; Alexander Sawatzke, MD; Sara Putnam, MD; and Kevin Dibbern, PhD.
- **IFFAS President's Award,** recognizing the outstanding research paper: Non-operative versus Operative Treatment of Suprasyndesmotic Ankle Fractures: A Multicentre, Randomized Controlled, Non-inferiority Trial authored by Ola Saatvedt, MD; Marius Molund, MD, PhD; Silje Karlsen, PT, MSc; Anders Refsum, MD; Frede Frihagen, MD, PhD; Peter Franz Schubert, MD; Are Hugo Pripp, PhD; Jan Erik Madsen, MD, PhD; and Havard Furunes, MD, PhD.
- **IFFAS President's Award**: recognizing the outstanding research paper: Effects of Mecobalamin on the Prevention of Complex Regional Pain Syndrome Type 1 Following Foot & Ankle Surgery: A Randomized, Double-Blinded, Pacebo-Controlled Trial authored by Marut Arunakul, MD.
- **2026 IFFAS Takakura Award:** recognizing the outstanding clinical paper: Is Deltoid Ligament Repair Necessary in Weber Type C Pronation-External Rotation Ankle Fractures? A Randomized Controlled Trial authored by Jun Young Choi, MD; Young Ho Jung, MD; and Seung Myung Choi, MD.

# Why Consistency Is the Foundation of a Great Custom Orthotic

For years, I believed that the art of making a great custom orthotic began with experience. The more feet I evaluated, the more I realized that even the best prescription could only be as good as the information I sent to the laboratory.



**By Dr Robert Conenello,** DPM

iOrthotics

Like many clinicians, I worked through the evolution of plaster casts, foam boxes, and eventually digital scanning. Digital technology made the process faster, but I still found myself asking the same question: Am I consistently capturing the foot in the position I want the laboratory to build from?

That's where a scanning plate—one of several tools that can help bring more consistency to scanning—has made a meaningful difference in my practice.

What I appreciate most isn't simply that it's another scanning tool. It helps remove much of the variability that naturally exists from one scan to the next. It creates a more consistent starting point for both the clinician and the laboratory, reducing the guesswork and improving communication throughout the fabrication process. When everyone is working from the same reproducible foundation, the end result is a more precise custom device.

An added benefit has been how quickly my staff learned the technique. Because the process is standardized, training is easier, consistency improves, and my team can confidently obtain high-quality scans while allowing me to focus more of my time on patient evaluation and treatment planning.

At the end of the day, the scanning plate isn't about replacing clinical judgment—it enhances it. My experience still determines what I want to accomplish biomechanically, but better data allows the laboratory to execute that vision with greater accuracy.

I've always believed that a custom orthotic can only be as good as the scan it begins with. If we can consistently deliver a more accurate digital impression—whatever tools help us get there—we're giving our patients the best opportunity to receive the most precise device possible—and that's ultimately what matters most.

iOrthotics

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An article by
Dr Robert Conenello, DPM

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Dr. Rob Conenello is the founder of Orangetown Podiatry in the New York metro area, Clinical Director of Special Olympics New Jersey Healthy Athletes, and Past President of the American Academy of Podiatric Sports Medicine. With 30 years' experience in sports medicine and biomechanics, he is a clinical partner of iOrthotics, whose custom orthoses and braces he relies on in caring for his patients.





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LOWER EXTREMITY REVIEW

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# New & Noteworthy

## Prosthetic Sleeve Protector with GlideWear Technology



The Tamarack Prosthetic Sleeve Protector (PSP) is designed to protect transtibial prosthetic suspension sleeves from premature failure, while also significantly reducing abrasion, improving comfort for those who rely on suspension socket systems. Built on Tamarack's patented ultra-low friction GlideWear fabric technology—which reduces chronic skin irritation and pain caused by shear forces, the PSP is designed to be worn under a vacuum suspension sleeve in areas exposed to high friction and abrasion, typically at the socket brim. The product, which helps maintain vacuum suspension performance, helps reduce wear that often leads to user discomfort and shortened suspension sleeve life caused by punctures, tears, and other issues. The low-profile design with minimal bulk helps prevent pinching and rubbing that can contribute to skin breakdown while providing extended comfort and flexibility. The PSP is machine washable and durable for repeated wear.

**Tamarack Habilitation Technologies**
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## DMEPOS Probationary Prior Authorization Starts October 15

Effective October 15, 2026, the Centers for Medicare & Medicaid Services (CMS) will implement a nationwide one-year probationary prior authorization (PPA) process for newly enrolled suppliers and suppliers undergoing a change of ownership. Additionally, prior authorization will be required as a condition of payment for certain durable medical equipment, prosthetics, orthotics, and supplies (DMEPOS; www.cms.gov/files/document/dmepos-probationary-prior-authorization-code-list.pdf ) items with dates of services on or after October 15, 2026.

New and change of ownership suppliers are also subject to regular program oversight initiatives, including the following requirements:

- Required prior authorization
- Face-to-face encounter
- Written order prior to delivery

For more information, visit the webpages for PPA Process for Newly Enrolled Suppliers of Certain DMEPOS Items, Prior Authorization Process for Certain DMEPOS Items, DMEPOS Order & Face-to-Face Encounter Requirements, and MLN Matters® Article SE20007.

## Consumer Exoskeleton for Hiking, Running

Ascentiz exoskeletons are designed for walking, hiking, running, cycling, stair climbing, and urban exploration. Rather than replacing the wearer's natural movement, the system syncs with gait and movement intent, assisting key phases of each step, such as lifting the leg forward and pushing off from the ground. The H Series, which




features a compact, lightweight design and quiet operations, is available in two configurations: H Pro is designed for everyday mobility, fitness, and lighter outdoor activities, offering a balance of portability, intelligent assistance, and up to 25 kilometers of assisted range. H Ultra is built for longer, more demanding journeys. Carbon fiber and a titanium-alloy Exo-Belt give it a premium, durable build, and a dual-battery system extends assisted range to 50 kilometers. It also offers greater power output and expanded motion recognition. The Ascentiz H Series is not a medical device and is not intended for clinical diagnosis or treatment.

**Ascentiz**
ascentizexo.com

## New AFO HCPCS Code and Code Change

The Centers for Medicare & Medicaid Services (CMS) has recently released their final determinations from the First Biannual 2026 Healthcare Common Procedure Coding System (HCPCS) code application meetings. The final determinations resulted in one new lower-limb code, which will be active and valid for claims with dates of service on or after October 1, 2026.

- L1972: Ankle foot orthosis, plastic or other material with ankle joint, with or without dorsiflexion assist, prefabricated, off-the shelf

The final determinations also resulted in descriptor changes for one lower-limb code, which will be active and valid for claims with dates of service on or after October 1, 2026. Changes are in bold.

- L1971: Old descriptor - Ankle foot orthosis, plastic or other material with ankle joint, with or without dorsiflexion assist, prefabricated, includes fitting and adjustment
- L1971: New descriptor - Ankle foot orthosis, plastic or other material with ankle joint, with or without dorsiflexion assist, prefabricated, **item that has been trimmed, bent, molded, assembled, or otherwise customized to fit a specific patient by an individual with expertise**

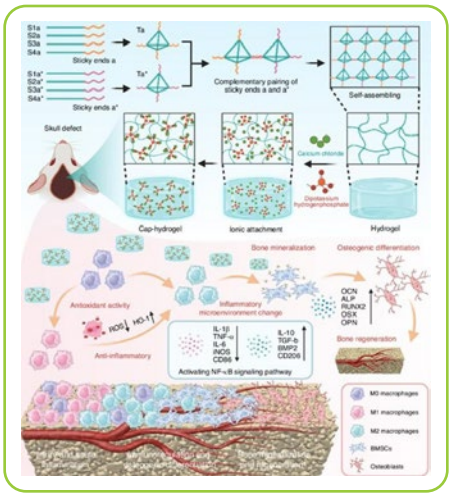
## Spikeless Men's Performance Golf Shoes




SQAIRZ has released a spikeless version of its ProS2™ spiked men's golf shoe. The shoe's premium grain-textured microfiber upper is paired with a classic leather-inspired appearance. That design is joined by four proprietary SQAIRZ technologies that work together to improve the golfer's swing and connection to the ground, including a patented roomier toe box geometry; hybrid SmartTraction™ system designed to maximize grip, stability, and ground contact while maintaining comfort; TPU anti-torsion heel stabilizer; and ProTect™ structural reinforcement for enhanced stability during rotational movement without unnecessary weight. Completing the ProS2 Spikeless' architecture are a Blumaka® anti-slip performance footbed that further enhances traction and stability while also delivering 14% greater energy return and 17% more cushioning than standard competitive insoles; HydroShield™ Engineered Mesh Lining to maximize breathability while keeping feet dry; NRG™ foam EVA midsole providing responsive cushioning and lasting comfort; and Sta-Put™ silicone-printed laces.

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## Mineralized DNA Scaffold Boosts Bone Repair by Reprogramming Immune Cells



RESEARCHERS FROM SICHUAN UNIVERSITY DEVELOPED A MINERALIZED DNA HYDROGEL SCAFFOLD THAT REGULATES IMMUNE RESPONSES WHILE SUSTAINING CALCIUM-DRIVEN BONE REGENERATION FOR IMPROVED HEALING OF SKELETAL DEFECTS.

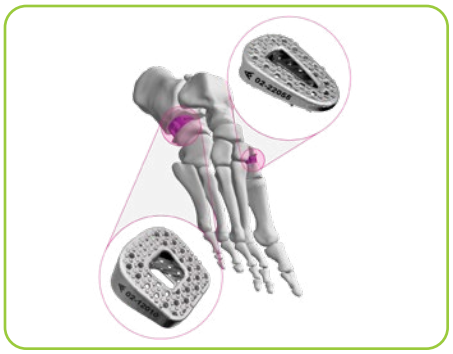
A new study developed a mineralized DNA hydrogel called "Cap-gel" that combines immune regulation with sustained bone regeneration. Using tetrahedral DNA nanostructures and calcium phosphate mineralization, researchers created a scaffold that promotes healing-friendly macrophage activity while supporting bone-forming stem cells. In animal models, the material accelerated bone repair, improved tissue mineralization, and prolonged structural stability. The findings may advance next-generation biomaterials for craniofacial reconstruction, traumatic injuries, and challenging bone healing disorders worldwide.

The scientists focused on two biological processes essential for bone repair: inflammation control and osteogenesis, the formation of new bone tissue. Cap-gel was designed to encourage macrophages to switch into the "M2" healing phenotype, which promotes tissue regeneration. At the same time, the mineralized structure of Cap-Gel acted as a long-term reservoir of calcium ions, which are crucial for bone formation and cellular signaling. The researchers found that the hydrogel gradually released calcium over several weeks, activating pathways linked to osteogenic differentiation. Bone marrow stem cells exposed to Cap-gel showed stronger expression of osteogenic proteins compared with control groups. The material also promoted the formation of mineralized nodules, demonstrating active bone-building activity.

To evaluate the material in living systems, the team implanted Cap-Gel into skull bone defects in rats. Imaging and tissue analyses showed that the hydrogel accelerated bone repair. Early after implantation, the material reduced inflammatory infiltration and increased the presence of pro-healing macrophages. Over time, defects treated with Cap-Gel developed denser collagen networks, more organized bone structures, and greater bone volume than untreated controls or non-mineralized hydrogels. After eight weeks, the regenerated bone displayed mature architecture and stronger mineralization.

The researchers believe the study could encourage collaborations across regenerative medicine, biomaterials science, nanotechnology, and immunology. Because the material combines programmable DNA nanostructures with bioactive mineral components, it may inspire future strategies for cartilage repair, dental reconstruction, chronic wound healing, and implant integration.

## Wedge Fixation System for Evans and Cotton Osteotomies

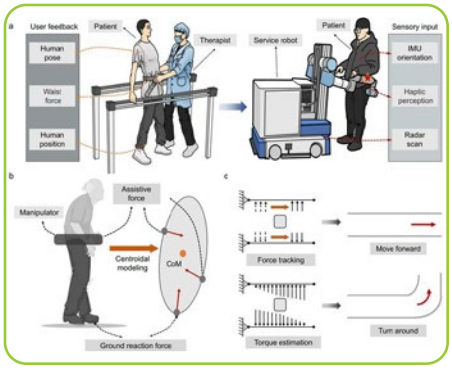


The ARKEO™ Wedge Fixation System integrates an anatomical design with the pillared microstructure of the Auxano® in-growth technology to provide a secure fixation interface at the site of correction. Designed for use in Evans and Cotton osteotomies, the surgical set includes intuitive instrumentation that enhances reproducibility by giving surgeons complete control over implant positioning throughout the procedure. The system is designed to optimize fixation and graft integration through several key features: subflush placement reduces irritation and maintains alignment; large central graft cavity and thru-growth fenestrations maximize graft capacity and promote biologic fixation; controlled stability—the pillared surface morphology has demonstrated viability in scientific research studies and clinical efficacy in midfoot fusion applications; and intuitive instrumentation, which simplifies each step for efficient, consistent outcomes. Supplied in a steam-sterilizable tray, the system includes a Hintermann distractor, k-wires, osteotomes, mallet, slap hammer, implant trials, inserter, and an impactor.

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## Walking-Support Robot Learns to Follow the Body Through Touch

A research team from Zhejiang University, Tencent Robotics X Laboratory, and Shanghai Jiao Tong University has developed a walking-support robot that uses large-area tactile contact at the human torso as its main channel for physical interaction. Large-area tactile interfaces embedded in the robot's two arms measure not only how much force is applied, but also where the contact occurs and how pressure is distributed. A forward or backward shift of the contact region reflects the user's movement tendency. An asymmetric distribution between the two sides creates a turning signal. These changing tactile patterns directly modulate the robot's motion, rather than first being converted into discrete labels such as "move forward" or "turn left."




RATHER THAN WAITING FOR AN INSTRUCTION OR AN EMERGENCY EVENT, THE ROBOT CAN REMAIN CONTINUOUSLY ENGAGED WITH THE USER'S MOVEMENT THROUGH TOUCH. IMAGE COURTESY OF SCIENCE CHINA PRESS; IMAGE PROVIDED BY YU SUN ET AL.

In experiments, users walked forward and backward and turned left and right without issuing explicit commands. The spatial distribution of tactile contact changed systematically with each movement, and the robot adjusted its base and arm motion smoothly. During sudden lateral balance disturbances, the robot first repositioned its arms toward a more mechanically effective support region and then increased the supporting force. As the user recovered, the force gradually decreased and the system returned to normal walking assistance without a separate fall-detection trigger.

The researchers also evaluated physiological and subjective responses in six healthy adult participants under three conditions: normal walking without robotic support, handle-based robotic assistance and torso-level tactile assistance. Hamstring surface electromyography showed a significant overall effect of walking condition. Torso-level assistance produced lower muscle activity than handle-based assistance in all six participants, with a statistically significant paired comparison. Five of the six participants also showed lower activity than during normal walking, although this comparison did not reach conventional statistical significance.

The study suggests that tactile sensing can play a deeper role than simply detecting contact. By coupling the robot to the torso over a broad area, touch becomes a bidirectional physical communication channel: the user continuously influences the robot's motion, while the robot continuously redistributes contact and support in response. The findings provide a path toward assistive robots that act less like command-driven devices and more like physically cooperative partners.

## Magnetic Acupressure Insoles



Akusoli insoles are designed with advanced magnetic acupressure technology that targets specific pressure points to relieve tired, achy feet and prevent soreness from prolonged standing and walking. By integrating magnetic acupressure therapy, these insoles stimulate blood flow and apply

gentle massage-like pressure They are engineered to support overall foot health, targeting issues such as plantar fasciitis, heel pain, sciatica, and general fatigue. Evidence-based ergonomic support features include antimicrobial silver coating and soft, breathable materials to help maintain hygiene and odor control during daily use. They are universally fitting and easily trimmable to accommodate all shoe sizes, ensuring that they cater to a wide range of users. These insoles adapt to the contours of the foot, offering support where it's most needed. Their lightweight construction is ideal for both active and sedentary users, and they are machine washable for easy maintenance.

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## Exploring How Near-Infrared Light Therapy Could Help Diabetic Wounds Heal Faster



EXPERIMENTAL SETUP OF A LASER DIODE (PBM EQUIPMENT) USED FOR IN VITRO IRRADIATION. IMAGE COURTESY OF THE RESEARCHERS AND *LASERS IN MEDICAL SCIENCE*.

Researchers at the University of Johannesburg's (UJ) Laser Research Centre are investigating the potential of photobiomodulation (PBM), also known as red light therapy, as a promising approach to improving diabetic wound healing. Led by Professor Nicolette Houreld from UJ's Faculty of Health Sciences, the study examined whether near-infrared light at an 830 nm wavelength could assist in repairing wounded diabetic skin cells in a laboratory setting. Unlike a surgical laser that cuts through skin, PBM uses low-powered light from lasers or light-emitting diodes (LEDs) at very specific wavelengths and doses. PBM heals by stimulating the tiny "batteries," also called mitochondria, which exist inside cells, said Houreld.

"These 'batteries' provide the energy the wounded cell needs to work," she said. "When you shine the right kind of light on a wound or injury, the 'batteries' absorb that light energy, and they start producing more energy and start working harder." This triggers specific biological cell signals, giving the cell the power it needs to repair the damage by itself.

The findings revealed that the light therapy enhanced the movement, survival, and multiplication of fibroblasts, critical skin-repair cells involved in wound healing. These results point to the potential of PBM as a safe and non-invasive therapeutic strategy for diabetic wound care.

"This study shows that different wavelengths of light can stimulate biological cells through different mechanisms. But it cannot be ruled out that activation of the PI3K/AKT/mTOR pathway may have occurred at an earlier time point, or that a different dose may be required, or that healing may have occurred via a different pathway," explained Houreld.

The researchers are planning more advanced studies where different cell types interact as they would in the body. They also plan to test different light doses and wavelengths, and to search for the alternative signaling pathways that may explain the 830 nm results.

## Study: Kneecap Resurfacing During Knee Replacement Should Be the Standard

While total knee replacement is generally highly successful, up to one in five patients continue to experience pain or reduced function after surgery. Many of these poor results are thought to relate to the movement between the kneecap and the underlying knee replacement. One



PHOTO BY JUDY BETH MORRIS ON UNSPLASH.

potential solution is kneecap resurfacing, which involves replacing the damaged underside of the kneecap with a smooth artificial surface during knee replacement surgery. However, whether surgeons should routinely perform this procedure has long been debated, and practice varies widely.

The KAT (Knee Arthroplasty Trial) study—which followed more than 1,700 patients for 20 years, published in *The Lancet,* compared outcomes for patients who had kneecap resurfacing (replacing part of their kneecap) during their knee replacement operation with those who had knee replacement without any change to the kneecap.

The study found that both approaches had good outcomes over the long term with little difference between the two groups in long-term clinical outcomes, including knee function, complications and rates of further surgery. However, most measures showed a small but consistent trend in favor of kneecap resurfacing. When costs and patient benefits were considered together, resurfacing the kneecap was very likely to offer the best value for the National Health Service.

## Researchers Develop Ceramic Implants that Mimic Natural Bone

Researchers at Tampere University, Finland, have developed a 3D-printed ceramic implant material that closely mimics real human bone. The findings advance the development of personalized bone regeneration and may lead to more effective and accessible treatments for bone defects. The research led by



3D-PRINTED SCAFFOLDS THAT MIMIC THE CHEMICAL COMPOSITION AND ARCHITECTURE OF NATURAL BONE TISSUE. IMAGE COURTESY OF JONNE RENVALL, TAMPERE UNIVERSITY.

Antonia Ressler, PhD, Postdoctoral Research Fellow at the Tampere Institute for Advanced Study, has successfully used hydroxyapatite, the same compound that forms the mineral structure of natural bone, to create bone-like scaffolds that support the body's own capacity for tissue regeneration.

"By using the same material that nature uses and shaping it through ceramic 3D printing, the implants can be precisely tailored to match a patient's individual bone defect, without relying on drugs or growth factors that may cause side effects," said Ressler.

Using an advanced manufacturing technique known as ceramic 3D printing, the researchers were able to precisely control the internal architecture of the scaffolds, including the size and connectivity of pores that allow cells to grow and nutrients to flow through the material. The team identified an optimal bone-like structure: implants with carefully designed internal pores of around 400 micrometers and approximately 45% porosity. "This architecture achieved a crucial balance between strength and biological performance, allowing bone-forming cells to enter the material, interact with one another, and successfully begin forming new bone tissue," said Ressler.

The team also discovered that subtle changes in material chemistry and surface properties can influence cell behavior. "We found that the high temperatures required during processing can alter the surface of the material in ways that make it more difficult for human cells to attach. Our finding highlights that not only the composition, but also the surface properties of biomaterials are critical for successful bone regeneration," she said.

## Performance Running Shoe



The Hoka Speedgoat 7 running shoe is engineered for performance on rocky ascents, slick mud, technical downhills, and everything in between. Bold in design and color, it is built for runners who push limits, thrive in the elements, and demand versatility without compromise. The shoe brings upgraded traction and cushioning to deliver the ultimate balance of grip and responsiveness. This latest iteration features a refreshed super-critical foamed EVA midsole for enhanced energy return, paired with a Vibram® Megagrip outsole with traction lugs for reliable control (5 mm lugs). Other key features include lay-flat tongue with dual gusset; lightweight RPET woven textile upper; stretchy, patent-pending dynamic vamp; heel pull tab and reflective details; and integrated gaiter attachment.

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## Compression Knee Sleeve

The Dr. Brace Knee Compression Sleeve was developed with a focus on targeted comfort and everyday usability. A dedicated support zone around the kneecap is designed to create a sense of stability while allowing the joint to move naturally. Reinforced support zones




along the sides of the sleeve help stabilize the joint during repetitive movement or increased load. All of this works together within a smart compression system that delivers targeted pressure where it is needed, without restricting range of motion. The Dr. Brace Knee Sleeve is constructed from breathable fabric and features ventilated zones designed for extended wear without heat buildup or bulk. Anti-slip silicone strips help keep it securely in place during movement. Every knee sleeve comes with a resistance band and complimentary access to the Dr. Brace Knee-Strengthening Exercise eBook. The unisex design fits either knee and is offered in multiple sizes to support a wide range of users.

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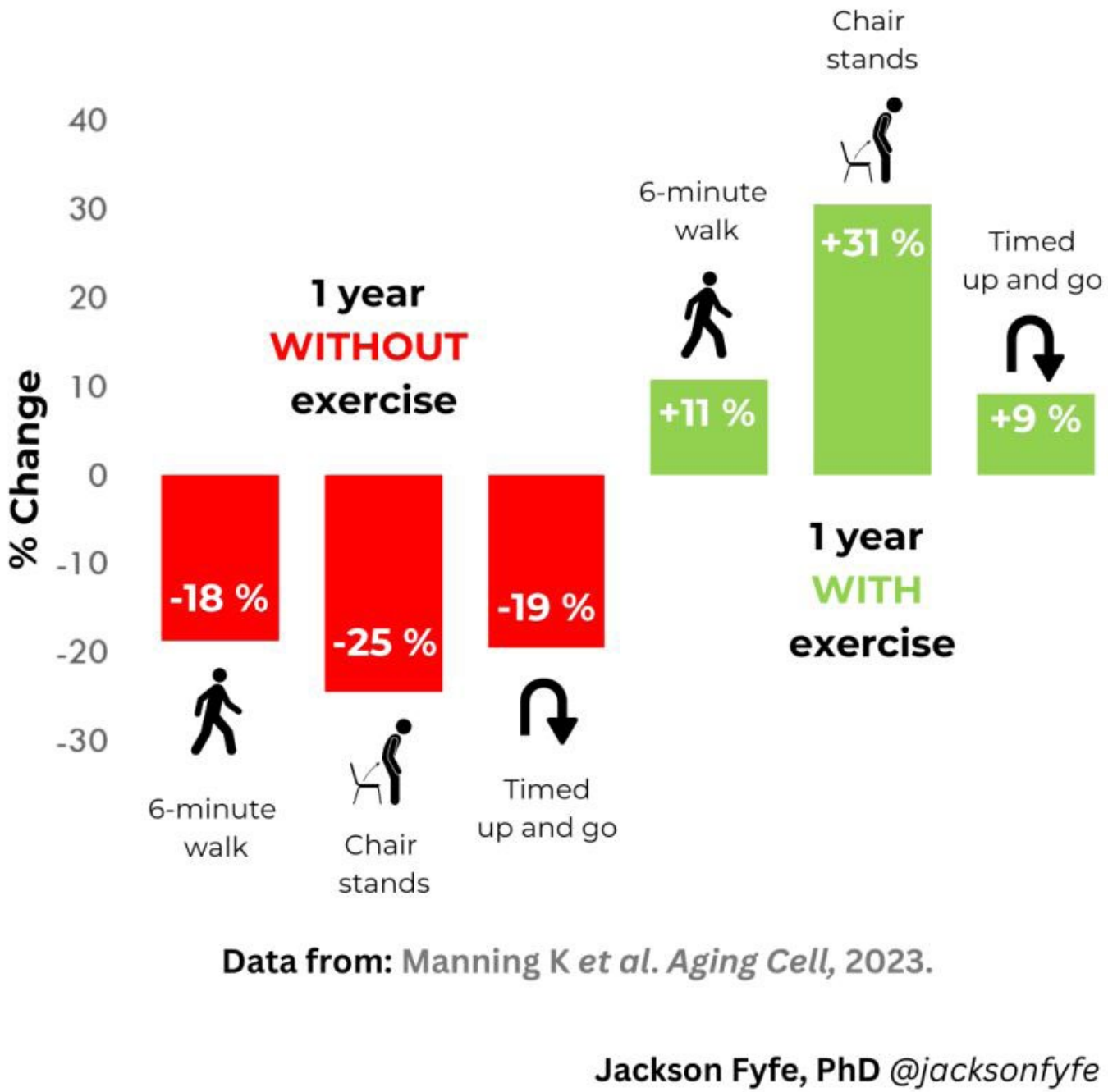
# The Last Word

## Where would you be if you started 1 year ago?

Here's the impact of 12 months of exercise or inactivity on the physical function of older adults aged 70+.

Like many things, the best time to start exercise was yesterday.

But the next best time is now.




**Source:** Manning KM, Hall KS, Sloane R, Magistro D, et al. Longitudinal analysis of physical function in older adults: The effects of physical inactivity and exercise training. Aging Cell. 2024 Jan;23(1):e13987. doi: 10.1111/acel.13987.