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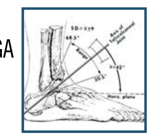

Problematic anatomy comes down to the 3 "S's"—and CAGA can measure each of them.

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30 CELL PHONE-RELATED LOWER EXTREMITY INJURIES WHILE USING NON-MOTOR VEHICLES

A portion of people use or carry cell phones while using bicycles and other non-motor vehicles (eg, scooters, skateboards, skates). This can increase the risk of injury.

By Mathias B. Forrester, BS


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Lower Extremity Review

Lower Extremity Review informs healthcare practitioners on current developments in the diagnosis, treatment, and prevention of lower extremity injuries. LER encourages a collaborative multidisciplinary clinical approach with an emphasis on functional outcomes and evidence-based medicine. LER is published monthly, except for a combined November/December issue and an additional special issue in December, by Lower Extremity Review, LLC.

LOWER EXTREMITY REVIEW

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

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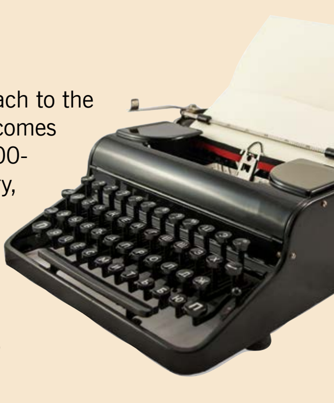

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Expert **Opinion**

A New Innovative and Transformational Approach to Treatment of Toenail Onychomycosis

By Tracey C. Vlahovic, DPM, and Lewis H. Freed, DPM

Tracey C. Vlahovic, DPM

Lewis H. Freed, DPM

Toenail onychomycosis has long been difficult to treat because many factors affect the treatment outcome: aging patients, long-standing infection, slow growth of thickened nails, co-morbidities, limitations of the treatment (eg, treatment length, side effects, toxicity, physical limitations of the patient).

Hesitation in using oral medications for a non-life-threatening infection exists due to perceived risk of hepatic toxicity. Hence, physicians continue to prescribe topical drugs that are associated with limited efficacy and poor patient compliance to a daily treatment regimen that can last a year or more.

Hallux Subungual Gel (HSG) is a novel proprietary treatment approach under development that consists of a higher concentration terbinafine gel, prepackaged in prefilled syringes with very fine cannulas, for subungual administration of the drug in the distal spaces between the hard nail plate and the nail bed.

Between January 2022 and August 2024, a Phase 2 open label clinical study was conducted in the USA. The study included 47 patients (13 female and 34 male), aged 22 to 75 years old (mean and median was 56, and 11 of the 47 patients were older than 65 years). KOH and culture positive at baseline, patients received 8 topical applications over 44 weeks, with a final assessment 52 weeks after the start of therapy (which was administered by a podiatrist or a dermatologist). Enrolled patients had between 25% and 75% of the total big toenail infected (mean involved area and length was 47.6% and 72.5%), and an IGA (Investigator Global Assessment or disease severity score) of 3 or 4 (0 being symptom-free and 4 meaning worst symptoms possible). Clinical evaluation was repeated every visit and mycology was tested again at week 52.

Various efficacy and safety parameters were evaluated throughout the study.

The results at the end of the study were as follows:

- Complete cure (0% involved nail, negative KOH and culture): 2/47 or 4.25%
- Mycological cure (negative KOH and culture): 11/47 or 23.4%
- Negative KOH: 11/47 23.4%
- Negative culture: 42/47 or 89.4%
- Clinical cure: 5/47 or 10.6%
- Positive response: (≥80% reduction in nail involvement) 11/47 or 23.4%
- Reduction in nail involvement 50%: 16/47 or 34%.
- Four patients (8.5%) were cured or almost cured (IGA 0-1, negative KOH and culture).

Interestingly, 7 of 47 patients were diagnosed with dermatophytoma at baseline (mean involved area and length was 52.4% and 78.2%), a condition that sometimes occurs when dense concentrations of fungal hyphae appear in the onycholytic areas. Considered refractory to oral and topical antifungals, they are always excluded in

This article has been republished with permission from Dr. Vlahovic. It was originally published in the *Journal of Dermatology Research Reviews & Reports* as a Letter to the Editor. The full citation: Vlahovic TC, Freed LH. A New Innovative and Transformational Approach to Treatment of Toenail Onychomycosis: An Open Phase 2 Study. Journal of Dermatology Research Reviews & Reports. SRC-JDMRS-25-192. DOI: doi.org/10.47363/JDMRS/2025(6)173

pivotal clinical trials. At the end of the 52-week study period, 4 of these 7 patients were KOH negative, all 7 patients were culture negative (hence 4 had a mycological cure), and 2 of these 7 patients (28.5%) had reduced disease involvement >60%, indicating they were on the road to complete resolution.

During the duration of the study, a total of 1605 toes were treated with HSG (mean affected nails 4.4). Pain was only reported 10 times (0.6%), burning sensation or stinging 4 times (0.2%). No redness, bruising, swelling, nor bleeding were reported. Of all adverse experiences reported, only 7 were deemed treatment related. A dose to the target great toe was completed in 60 seconds. Because of the relatively high concentration of terbinafine used locally and in a weaker area of blood perfusion, plasma levels of terbinafine have been monitored in 15 of these patients. The mean peak level of terbinafine was 0.129 ng/ml (ie, 7,700 times lower than the peak concentrations reported with oral terbinafine).

Several oral and topical drugs have been developed and approved over the past decennia, and overall, oral antifungal medications yielded better outcomes than topical antifungal medications. Traditionally, oral terbinafine and itraconazole have been used for onychomycosis with great therapeutic success but also have concerns of drug interactions and potential liver toxicity. Hence, a renewed interest in topical antifungal drugs emerged for the treatment of fungal toenail infections, resulting in topical terbinafine along with various other topical products, but results have not been as robust as the oral antifungals due to patient compliance and barriers from the nail's pathophysiology.

This Phase 2 study with HSG indicates that monthly or bi-monthly professional application of subungual HSG could become a paradigm shift in the management of fungal infections of the toenails. This approach may help to address issues that have plagued the treatment of toenail onychomycosis for a long time.

Several advantages can be emphasized with this approach:

1. An ideal alternative for older patients who are not able to reach their lower extremities.
2. Monthly or bimonthly application may provide better adherence than daily "at home" applications.
3. Dermatophytomas can be treated with higher expectations of resolution while leaving the nail intact.
4. Podiatrists or dermatologists can visualize where the drug should be applied.
5. Multiple toes can be treated in one session.
6. No risk for significant systemic exposure to the drug.

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Although some patients reached study completion with a positive KOH, the majority had negative fungal cultures. This indicates that HSG was fungicidal to dermatophytes, and that it requires a full outgrowth of the nail in 52 weeks before a KOH test would be negative. This may be challenging in older patients with a long history of infection and slower growing nails. A clinically meaningful endpoint for these patients is "Almost Cured" (90% clear nail with negative culture), especially in cases complicated by dermatophytoma.

Conclusion

The topical application of HSG by a physician has the potential to simplify the future treatment of onychomycosis. In addition, the dermatophytoma results may show utility to manage a subset of onychomycosis that traditionally has not been formally addressed in a clinical trial.

Acknowledgement

The contribution to the development of this innovative technology go to Mr. Mark Taylor (CEO and investor), Dr Jay Birnbaum (developer of terbinafine), Dr Geert Cauwenbergh (developer of itraconazole) and Robert Orr (developer of HSG).

Tracey Vlahovic, DPM, FFPM RCPS (Glasg), is now with Samuel Merritt University College of Podiatric Medicine in Oakland, California. She had spent 18 years in the Department of Microbiology at the Lewis Katz School of Medicine at Temple University while also serving as guest faculty at the Royal College of Physicians and Surgeons of Glasgow in Scotland and UTRGV School of Podiatric Medicine in Harlingen, Texas; and as Senior Vice President of Podaitric Eduction for Sagis DX in Houston, Texas. As the first podiatric physician in the US to complete a fellowship in podiatric dermatology, she has dedicated her career to advancing this subspecialty by educating other healthcare providers in lower extremity skin conditions.

Lewis H. Freed, DPM, specializes in foot and ankle arthroscopy, foot and ankle reconstruction, limb salvage, and minimally invasive tendon repair. He has practiced in the Phoenix, Arizona, area for more than 25 years.

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ShortTakes From the LITERATURE

YOUTH SPORT-RELATED KNEE JOINT INJURIES & THIGH MUSCLE STRENGTH

Knee extensor and flexor muscle (ie, thigh) weaknesses are well-established consequences of anterior cruciate ligament (ACL) tears treated with ACL reconstruction (ACLR). To learn more, Canadian researchers assessed bilateral knee extensor and flexor concentric isokinetic peak torque at 90° per second semiannually in 186 youth (106 injured, 80 controls) for 2 years. Between group differences in strength over time were estimated with generalized estimating equations (95% confidence interval [CI]). Confounding was controlled using inverse probability weighting. Strength differences between those with ACL tears and those with non-ACL tear injuries as well as between male and female participants were explored.

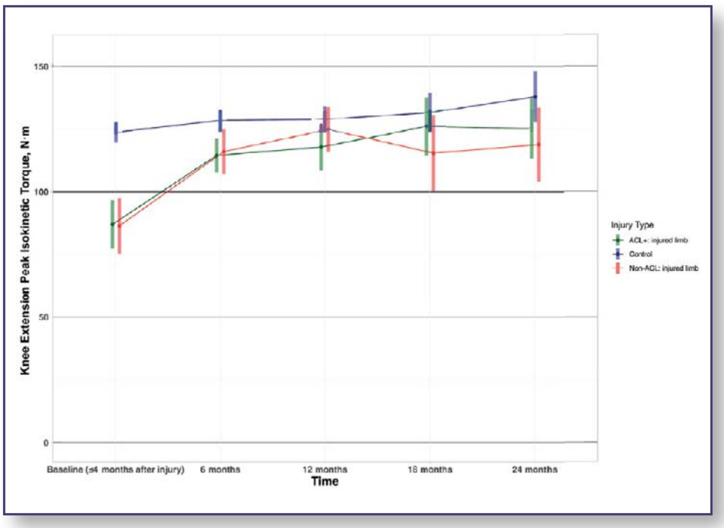


Figure 1: Trajectory of Injured Limb Knee Extension Torque by Injury Type*

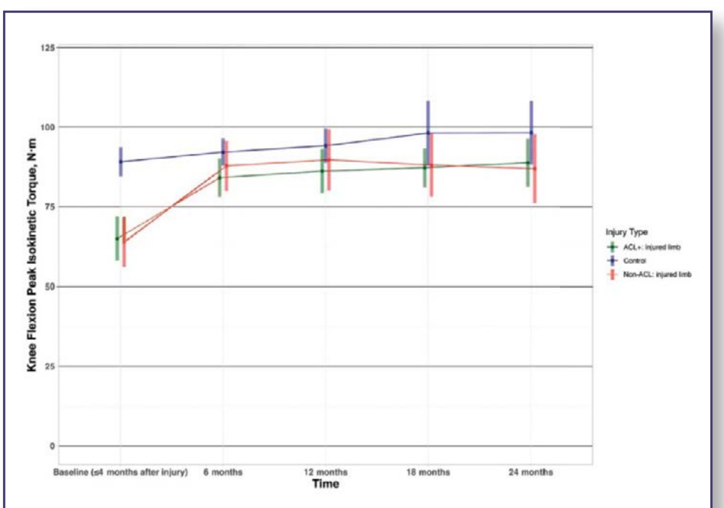


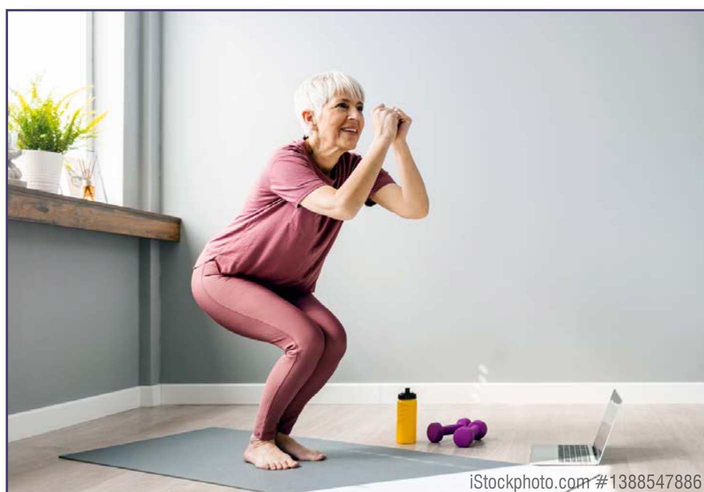
Figure 2: Trajectory of Injured Limb Knee Flexor Torque by Injury Type*

Their results showed that compared to uninjured controls, injured limb knee extensor strength was lowest at baseline (−37.1 Nm; 95% CI, −45.3 to −28.9) and 6-month follow-up (−13.3 Nm; 95% CI, −20.4 to −6.2), with minimal strength gain beyond the 12-month follow-up (1.7 Nm; 95% CI, −14.3 to 17.6). Knee flexor strength of the injured limb was lowest at baseline (−24.6 Nm; 95% CI, −31.5 to −17.8), and there was minimal strength gain beyond 6 months (2.3 Nm; 95% CI, −7.7 to 12.3). The average residual deficit was similar to the knee extensors (10% to 11%) at 24 months. Exploratory analysis suggested no difference based on injury type or sex.

Injured limb knee extensor and flexor weakness was present after different youth sport-related knee joint injuries. Strength deficits peaked early after injury, improved over time, and plateaued after 12 months, with lingering deficits at 24 months. Thigh muscle strength trajectory was similar across injury types and sex. ler

Source: *Losciale JM, Le CY, Jansen NEJ, et al. Strength Setbacks: The Impact of Youth Sport-Related Knee Joint Injuries on Thigh Muscle Strength. A 24-Month Prospective Cohort Study. J Orthop Sports Phys Ther. 2025;55(2):137-147. doi: 10.2519/jospt.2024.12663.*

YOGA PRACTICE AS A POTENTIAL SARCOPENIA PREVENTION



Sarcopenia is characterized by the progressive loss of skeletal muscle mass and poses a significant health challenge for older adults by increasing the risk of disability and decreasing quality of life. With the increasing number of older adults, sarcopenia has the potential to become a major public health burden across the globe. Yoga is considered a low-risk and beneficial exercise for older adults. This research aims to evaluate the potential of yoga practice as a preventive strategy against sarcopenia in Indonesian older adults.

An observational cross-sectional research study was conducted including 41 older adults age 60–87 years. The research focused on key biomarkers and functional assessments, including serum insulin-like growth factor 1 (IGF-1) levels, telomere length, gait speed, hand grip strength, and SARC-F questionnaire scores.

The results showed that participants age 71–80 years who practiced yoga for more than a year had significantly higher IGF- 1 levels ($p=0.04$). While improvements in gait speed, hand grip strength, and SARC-F scores were observed, these changes were not statistically significant, and no significant differences were found in telomere length.

The authors concluded that yoga in older adults was associated with higher IGF-1 levels and potential improvements in upper and lower extremity strength, though these findings were not statistically significant and did not influence telomere length. Yoga practice shows potential as an emerging adjuvant option but can not be applied as a single strategy for sarcopenia prevention in older adults.

Source: *Meiliana A, Dewi NM, Latarissa IR, et al. Yoga Practice as a Potential Sarcopenia Prevention Strategy in Indonesian Older Adults: A Cross-Sectional Study. Open Access J Sports Med. 2025;16:3-13. doi: 10.2147/OAJSM.S494489.*

MS RELAPSE PREVENTION: BABY LET THE SUN SHINE IN

Getting at least 30 minutes of daily summer sun in the first year of life may mean a lower relapse risk for children who are diagnosed with multiple sclerosis (MS) later, according to a study published in *Neurology Neuroimmunology & Neuroinflammation*. The study also found if a child's biological mother had at least 30 minutes of daily sun during the second trimester of pregnancy, the child had a lower risk of MS relapses. The study does not prove that sun lowers relapse risk for children with MS, it only shows an association.

"It is important not to spend too much time in the sun without sun protection, however greater exposure to sun has been tied in previous research to a lower risk of developing MS in childhood," said lead author Gina Chang, MD, MPH, of The Children's Hospital of Philadelphia and member of the American Academy of Neurology.

For the study, researchers looked at health records from 18 MS clinics across the United States to identify 334 children and young people with childhood-onset MS age 4–21. Participants were within 4 years of experiencing their first symptoms. The median follow-up time was 3.3 years.

To determine sun exposure, participants' parents or guardians completed questionnaires that asked how much time the participant and their biological mother had spent in the sun at various periods of life, what kind of clothing they typically wore, and how often they used sunscreen.

Of the total group, 206, or 62%, experienced at least one relapse during the study. Relapses were defined as new or returning symptoms lasting for at least 24 hours and separated by at least 30 days from the last MS attack, without a fever or infection.

They found that of 75 participants who had 30 minutes to an hour of daily summer sun during their first year of life, 34 children, or 45%, had a relapse. Of the 182 participants who had less than 30 minutes of daily summer sun during their first year of life, 118 children, or 65%, had a relapse.

After adjusting for factors such as tobacco exposure in the first year of life, season of birth, the type of MS medication taken and use of sun protection such as sunscreen, hats, and clothing, researchers found that 30 or more minutes of daily summer sun during the first year of life was associated with a 33% lower risk of relapse compared to less than 30 minutes of daily summer sun.

Researchers also looked at sun exposure for the biological mothers of the children.

They found that 30 minutes or more of daily sun during the second trimester of pregnancy was associated with a 32% reduced risk of relapse for their child with MS.

Source: *Chang G, Sebastian P, Virupakshaiah A, et al; as the US Network of Pediatric Multiple Sclerosis Centers. Association Between Sun Exposure and Risk of Relapse in Pediatric-Onset Multiple Sclerosis. Neurol Neuroimmunol Neuroinflamm. 2025;12(2):e200375. doi: 10.1212/NXI.0000000000200375.*

TIMING OF RESISTANCE EXERCISE AND CARDIOMETABOLIC HEALTH

In this secondary analysis, there was no difference between morning (AM) and afternoon/early evening (PM) exercisers in blood glucose, insulin, body composition, or muscular strength following 12 wk of supervised exercise. However, examining within-group changes, glucose area under the curve (AUC) was significantly reduced in PM exercisers,

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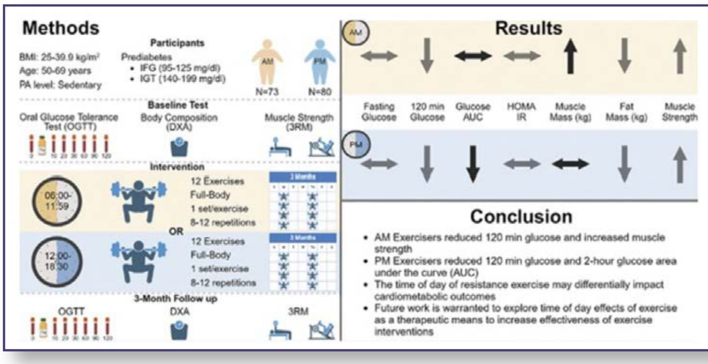
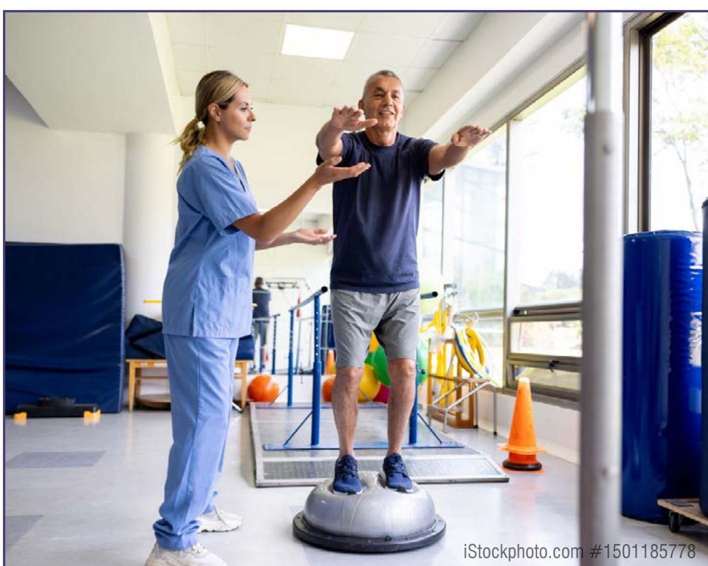


but not in AM exercisers.

Source: *Thomas JV, Davy BM, Winett RA, et al. Timing of resistance exercise and cardiometabolic outcomes in adults with prediabetes: a secondary analysis. J Appl Physiol (1985). 2025;138(2):439-449. doi: 10.1152/japplphysiol.00507.2024.*

WHICH IS BETTER…

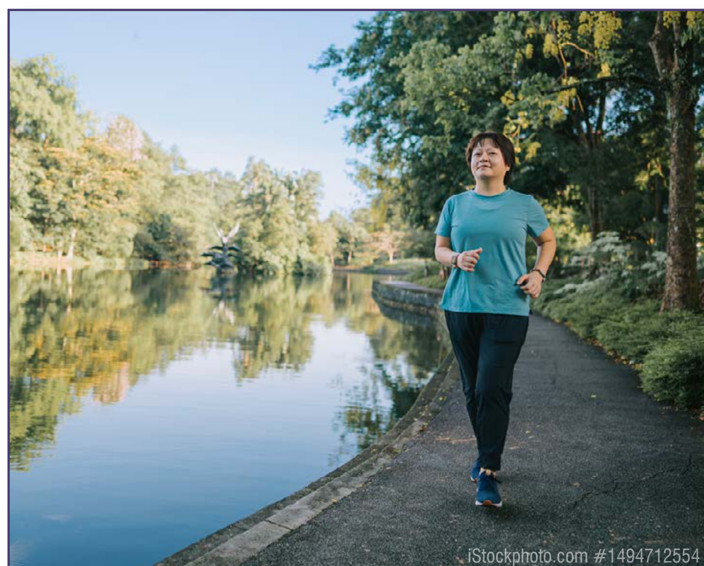
1) BALANCE TRAINING VS HIP STRENGTHENING FOR CAI



Reductions in balance performance, hip strength, and ankle function along with increases in disablement and injury-related fear are among the many motor-behavioral and sensory-perceptual impairments associated with chronic ankle instability (CAI). Both balance training (BAL) and hip strengthening (HIP) can improve balance, but how do the 2 modalities compare? That's the question a research team from Old Dominion University sought to understand in a recent randomized controlled study with 45 volunteers. Before and after the intervention, the involved limbs were tested using patient-reported outcomes for Foot and Ankle Ability Measure [FAAM-ADL, FAAM-S], modified Disablement in the Physically Active Scale [mDPA], Tampa Scale of Kinesiophobia-11 [TSK-11], Fear-Avoidance Beliefs Questionnaire [FABQ], and Self-Efficacy of Balance Scale [SEBS]), Star Excursion Balance Test (SEBT), and isometric hip strength (extension [EXT], abduction [ABD], and external rotation [ER]). The findings showed that BAL significantly improved in SEBT, EXT, ABD, and all patient-reported outcomes. HIP significantly improved in EXT, ABD, ER, FAAM-S, mDPA, FABQ, and SEBS. While balance training and hip strengthening both showed improvements in motor-behavioral and sensory-perceptual impairments in individuals with CAI, the authors concluded that balance training remains the most effective option for clinicians.

Source: *Suttmiller AMB, Johnson KR, Chung S, et al. Comparing the Effects of Progressive Balance and Hip Strengthening Rehabilitation in Individuals With Chronic Ankle Instability. J Sport Rehabil. 2024;34(2):67-76. doi: 10.1123/jsr.2024-0049.*

2) AQUA- VS LAND-BASED COOLDOWN EXERCISE



Sixteen college male athletes joined an 8-day study at the University of Hong Kong that compared the effects of aqua- and land-based exercises for postexercise recovery. The crossover design used 2 sets of 2-day experimental protocols that were separated by a 1-week washout. Muscle soreness, creatine kinase, anaerobic performance, countermovement-jump height, and flexibility were assessed at various time points. Based on the assessments, the research team concluded that aqua and land jogging have similar recovery effects on muscle soreness and performance-based parameters.

Source: *Chin EC, Chung-Nam Lai S, et al. Comparing the Effects of Aqua- and Land-Based Active Cooldown Exercises on Muscle Soreness and Sport*

Performance: A Randomized Crossover Study. Int J Sports Physiol Perform. 2024 Sep 19;19(12):1381-1390. doi: 10.1123/ijspp.2024-0020.

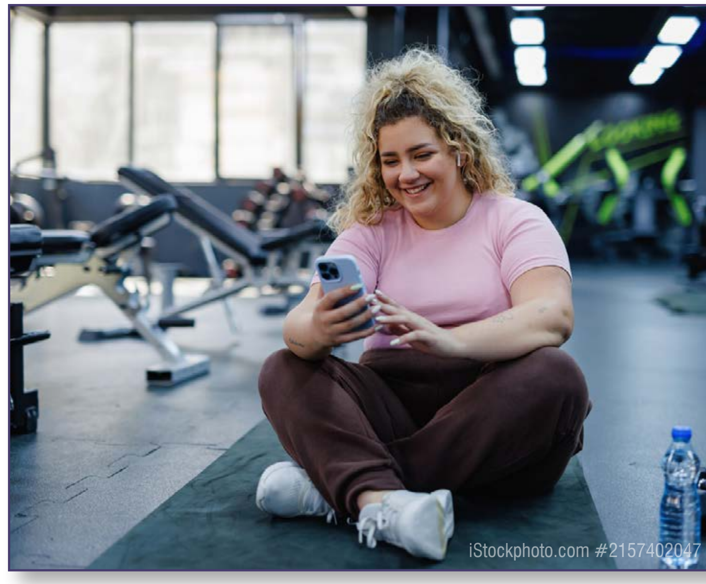
3) TELEHEALTH FOR ANTI-OBESITY MEDS?

Nearly 50% of adults in the United States are actively trying to lose weight and 45% are interested in taking some of the newer anti-obesity medications (AOM)—including 59% of those trying to lose weight. Adoption of telehealth appointments has risen steadily since the pandemic as has the use of the newest AOM treatments (glucagon-like peptide-1 receptor agonist [GLP-1-RA]-based drugs). But does telehealth work with the use of AOMs for weight loss?

Using data from 59,590 participants in a WW International Clinic (formerly Weight Watchers) telehealth program, researchers found that average weight loss across AOMs was 8.9% at 3 months, 14.1% at 6 months, 17.7% at 9 months, and 19.4% at 12 months.

The researchers concluded that telehealth-delivered treatment of obesity that includes current AOMs appears to produce comparable results with those seen in phase 3 clinical trials, suggesting that the results can be generalized beyond clinical trial and in-person settings.

Source: *Ard JD, Hong YR, Foster GD, Medcalf A, Nadolsky S, Cardel MI. Twelve-month analysis of real-world evidence from a telehealth obesity-treatment provider using anti-obesity medications. Obesity (Silver Spring). 2024 Dec;32(12):2246-2254. doi: 10.1002/oby.24169.*



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Navigating the Complexities of Hammer Toe Surgery

An overview of the talk by Adrienne M. Estes, DPM, MS, FACFAS, DABPM, FAPWHc

Hammer toe deformities are common foot pathologies and lead to a high proportion of podiatry office visits. This talk provides a comprehensive perspective on the challenges and strategies associated with recurrent digital deformities and metatarsophalangeal joint (MPJ) pain following hammer toe surgeries.

The learning objectives are to: understand the pathophysiology of hammer toe deformities including recognition of underlying causes; to understand the indications, advantages, and limitations of various hammer toe techniques; to recognize common complications associated with the surgery; and to learn how to manage and treat complications or failures of surgery including options for revision surgery and pearls to consider for index surgery.

Hammer toe correction surgery is perhaps the most common elective surgery performed in foot and ankle care, yet the rates of symptomatic recurrence and revision surgery can be high. This observation highlights the complexity of these procedures and the necessity for a detailed, patient-specific approach.

The importance of recognizing the multiplanar deformities inherent in hammer toe cases is critical to understanding the clinical landscape. These deformities often complicate both the initial surgical reduction and the long-term maintenance of the correction. The issue extends beyond a simple MTPJ contracture and often involves additional complications at the metatarsal phalangeal joints or transverse plane deviations.

The importance of recognizing the multiplanar deformities inherent in hammer toe cases is critical to understanding the clinical landscape.

The transverse plane is the number one predictor of surgical failure when it comes to hammer toe recurrence. This insight is critical for practitioners seeking to enhance surgical outcomes and patient satisfaction, urging them to adopt a more comprehensive diagnostic and treatment strategy.

Pathways to Successful Revision

For surgeons facing the challenge of revision surgery, the series of clinical pearls laid out here are the direct outcome of multiple surgeries, some successes, some otherwise. While the primary goal is to alleviate pain and restore normal digit alignment, achieving a perfect outcome is not always feasible and the importance of establishing realistic expectations with patients is critical for success. This transparent

This article is a summary of Dr. Estes' presentation from the APMA Surgical Complications Virtual Seminar, January 18, 2025. To view the 20-minute slide presentation with questions and answers, visit https://apmasurgical.lerexpo.com. All I have is the google drive link. Continuing education credits are available for many of our programs.

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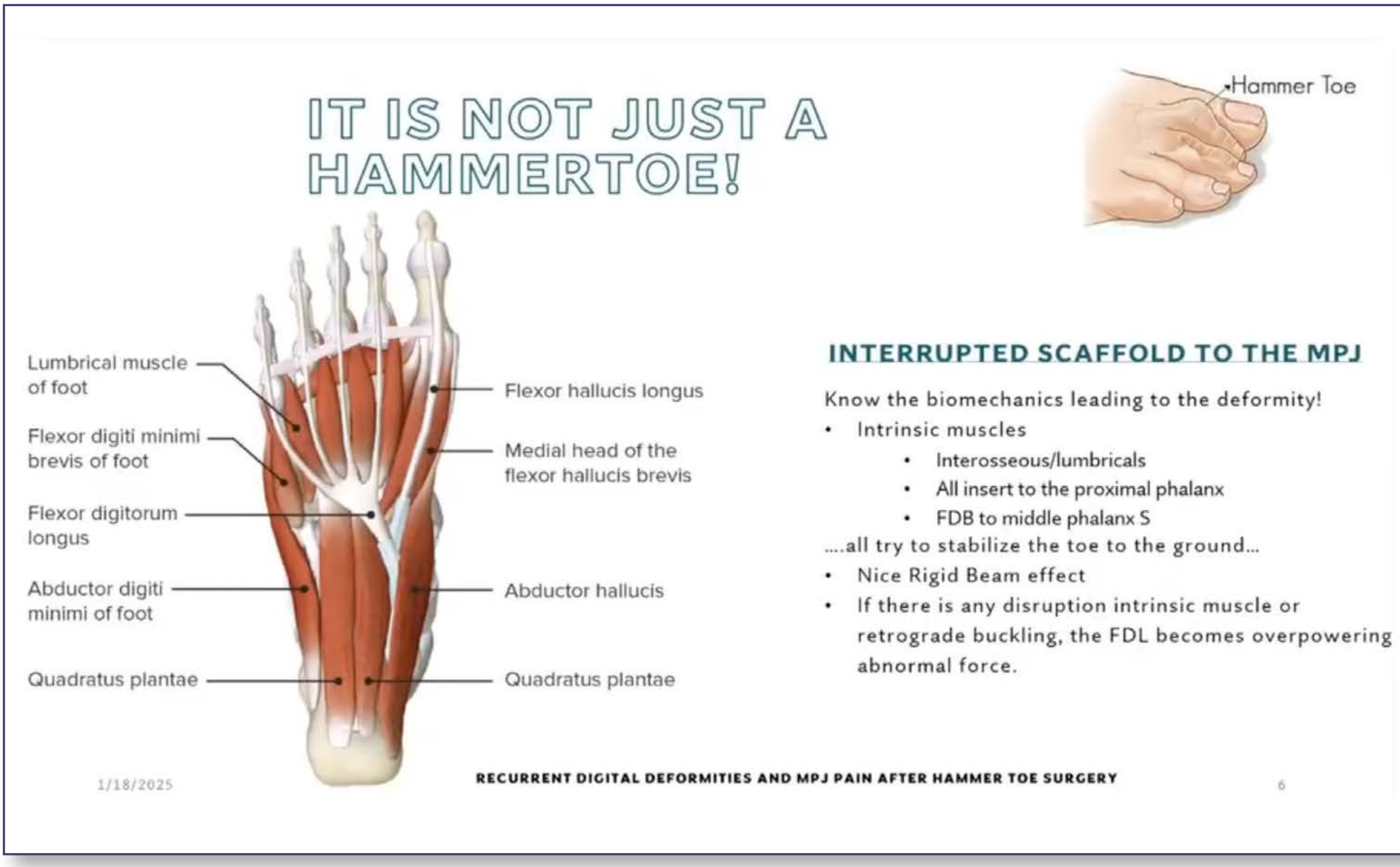
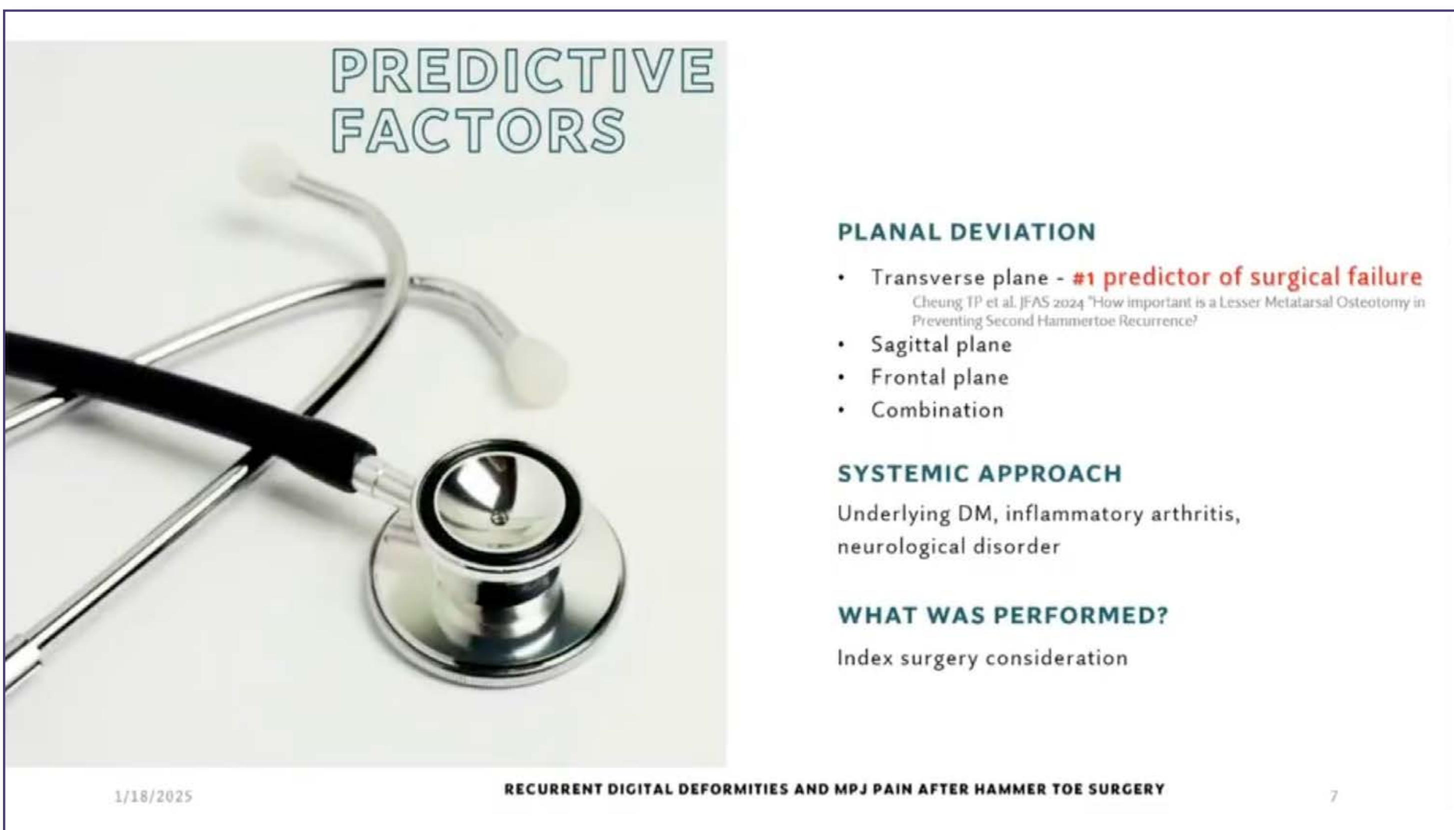


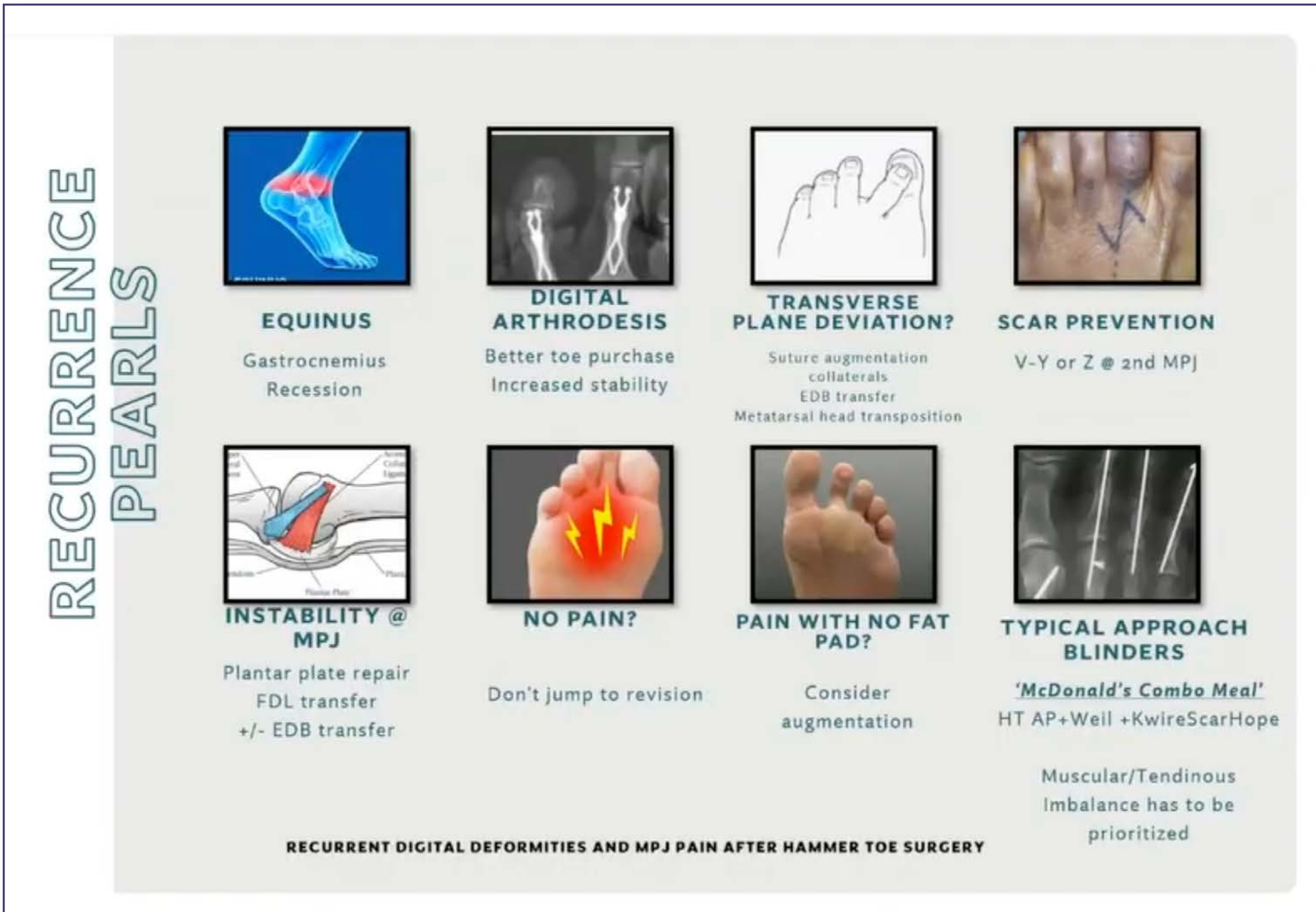


communication is essential in managing patient expectations and fostering a collaborative treatment environment.

Embracing Clinical Innovation and Collaboration

Final advice? Focus on understanding the complexities of the deformities and avoid the stereotypical approach to hammer toe surgeries. Be sure to set realistic expectations for the patient regarding revisions and be clear to address all aspects of the deforming force. Consider clinical innovations to the revisions including soft tissue augmentation and podoplastic techniques for success.

Adrienne M. Estes, DPM, MS, FACFAS, DABPM, FAPWHc, is a podiatric surgeon in Southern California, an Associate ~~assistant~~ professor at the Western University of Health Sciences, and Chief of Podiatry at Riverside University Health System.



CAGA 101: The 12 Dirty Truths Of Foot Mechanics
Dirty Truth #1: The Foot Is Not Symmetrical

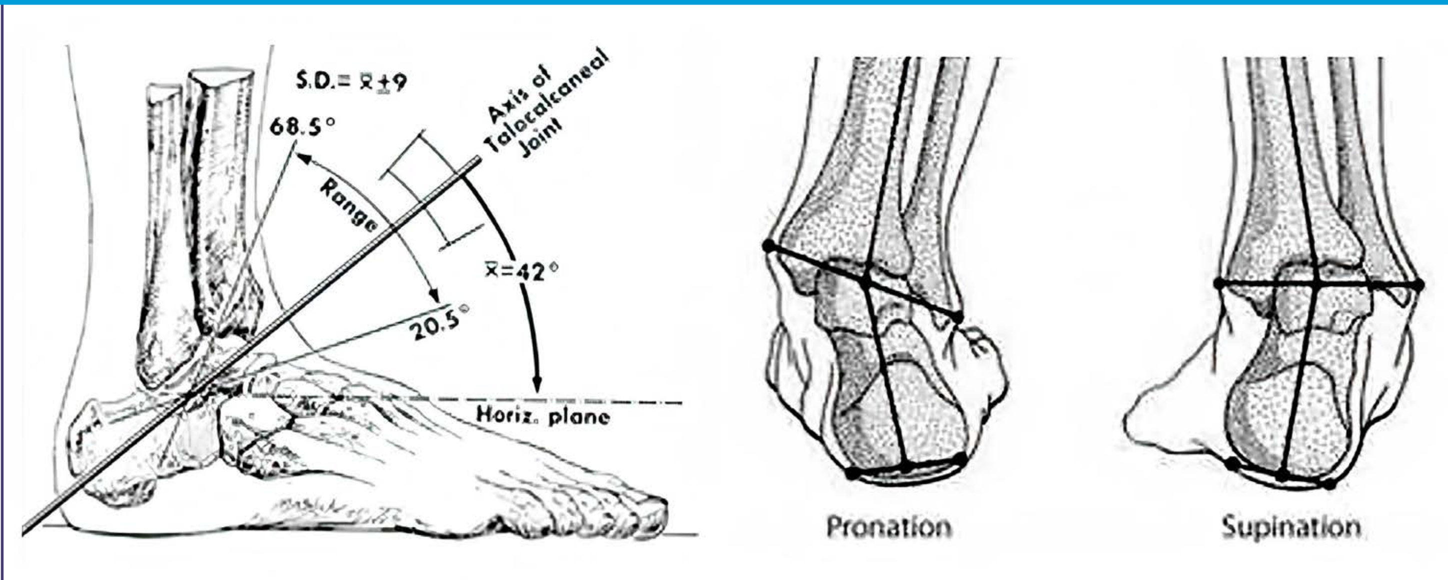


Figure 1: Our 3-dimensional feet, all 26+ bones in each one, deform, or subluxated in all 3 planes of motion L/M, Do/Pl, P/Di(A/P).

By Jay Segel, DPM; Sally Crawford, MS

In the introductory article on the dirty truth of biomechanics, we presented a playbook laying out 12 particularly concerning issues as they relate to human weight-bearing and locomotion. In this installment, we will delve into dirty truth number one, problematic anatomy, laying out the "whats" and the "whys", and how computer-aided gait analysis (CAGA) can make this dirty truth a bit cleaner and more digestible.

More specifically, this is a discussion about the three "S's" of problematic anatomy: shape, structure, and symmetry—with a focus on our bony building blocks and how CAGA can capture these very specific characteristics and how they play out through movement. To start, we know of course that each foot has 26 bones (or 28 if we include the sesamoids) with over 100 tendons, ligaments, and muscles; however, our largest concerns are over the 33 joints in each foot, all with 3 different axes of motion (Figure 1).

What is of concern anatomically comes down to the 3 "S's" and in CAGA we can highlight each – the "shape" of the gait line, the "structure" of the peak pressures and area, as well as the changes side to side

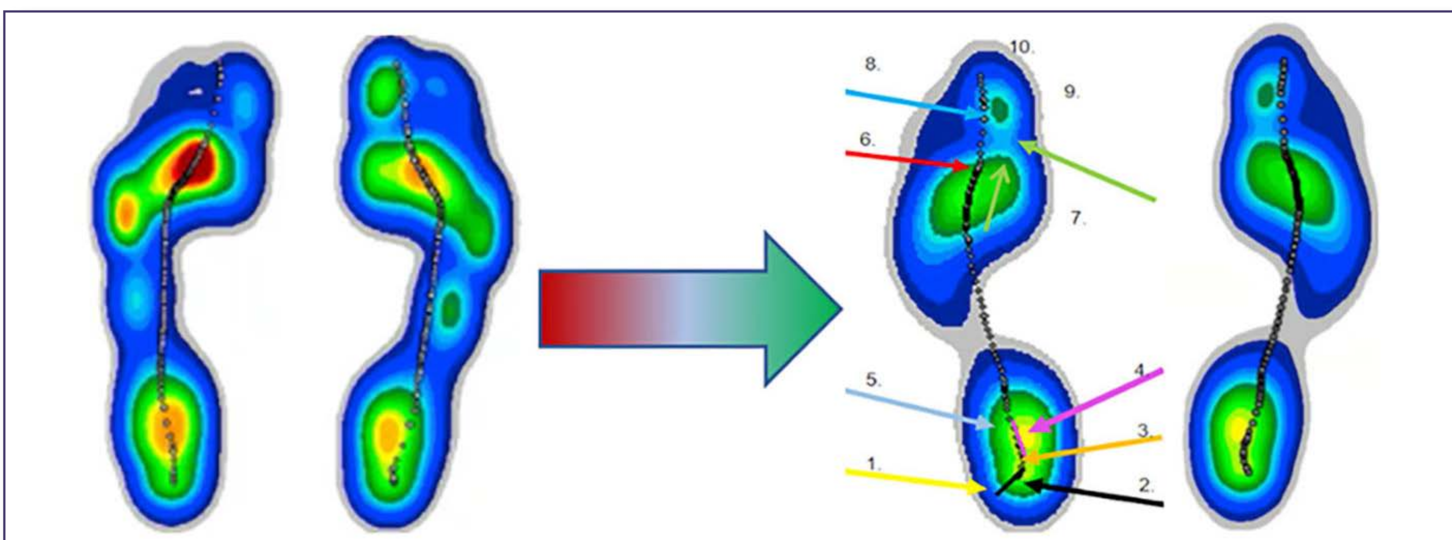


Figure 2: On the left, we see average peaking pressures with collapsing arches, characterized by caving center of pressure (COP) gait lines through midfoot. Asymmetrical areas left to right are also visible, plus medial shifted COP gait line overlays. On the right a more ideal gait line with more optimal shape, structure, and symmetry.

Continued on page 24

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Figure 3: Pronation and supination are required for normal gait. With computer-aided gait analysis we can see these events in the Center Of Pressure gait lines and the resulting pressure that results from such repetitive micro-trauma and potential degenerative joint disease.

- "symmetry." But first, consider the aggregate of bones by design. The normal foot has a modified semiflexible, 3-dimensional pyramidal shape. Any structure with these characteristics will collapse under a load, which in the case of human beings is body weight and gravity. Now, one might argue that this "loose bag of bones" allows for adaptation to a support surface, which is true, but at what cost and for how long? The 2 main costs are structural integrity and local microtrauma.

More specifically, when 2 bones that comprise a joint complex are subject to deformation, the subluxation causes a loss of joint space neutrality, which in turn leads the 2 adjacent articular surfaces to impact one another and begin the process of joint scarring. This set of events, quantified visually in Figure 2, then causes imbalances in the muscular agonist/antagonist relationship and an asymmetric and progressive loosening and contralateral tightening of the ligamentous joint complex. As to the question of how long, this foot deformation and return to a rigid lever for propulsion relies on soft tissue durability, which has a limited time frame (as will be discussed more thoroughly in a later "Dirty Truth").

The foot is not symmetrical rearfoot to forefoot, medial to lateral, top to bottom, or left to right. Our patients often think because they have 2 feet that they are the same, but that is not the case. We see differences congenitally, during growth, and through acquired means such as single-sided traumas and muscular differences because of "footedness," just like differences that occur with say, arm strength secondary to "handedness."

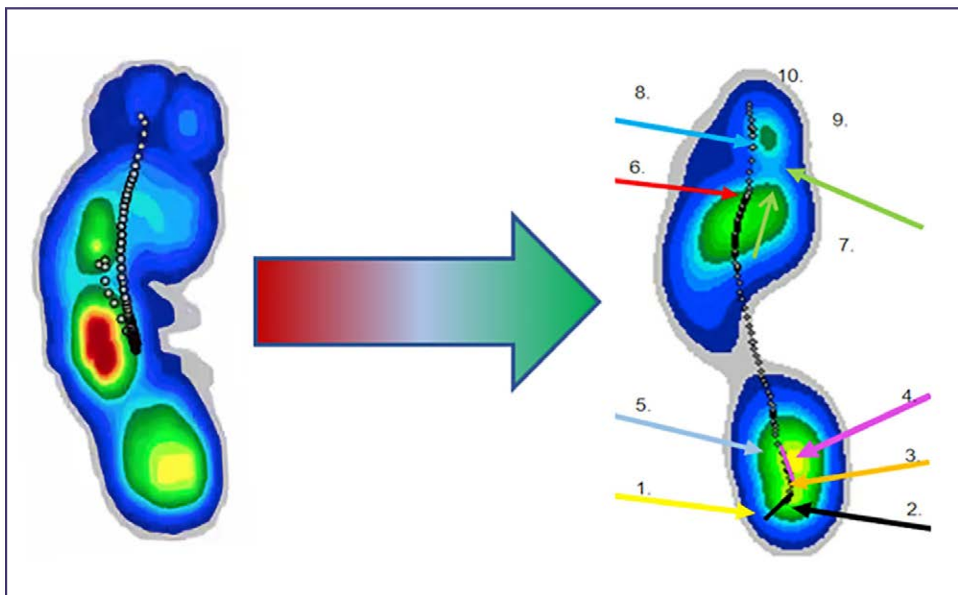

Figure 4: In CAGA you see the events representing the motions through anatomical complications, or sometimes you see what is missing. On the left, we have a clear picture of where Center of Pressure gait line events are missing and care can be improved. On the right side, we see each COP gait line event needed to move forward.

Acknowledgment of these dirty truths allows us a deeper understanding of how to combat these physics problems in human stance and locomotion.

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Sally Crawford, MS, is a Biomedical Engineer, IT director, and data manager.

Part 1 of this 12-part series, CAGA 101: The 12 Dirty Truths Of Foot Mechanics, which appeared in the February issue, can be accessed https://tinyurl.com/y78kj5s3.

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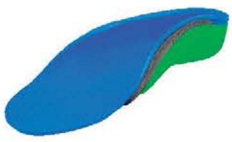

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Unipedal Stance Reliably Measures Neuromuscular Aging

By Asghar Rezaei, Sandesh G. Bhat, Chih-Hsiu Cheng, Robert J. Pignolo, Lichun Lu, and Kenton R. Kaufman

Adequate muscle strength, efficient gait, and good balance, which decline with age, are crucial contributors to independence and well-being.

Aging is often associated with disability and multiple health concerns. To address these challenges, effective interventions are essential. This study investigated potential age-related declines in gait, balance, and strength and also sought to assess any relationships between these 3 parameters and explore potential differences between women and men.

Methods

Healthy individuals over 50 years of age were recruited for this cross-sectional study. Grip strength and knee strength of the dominant side were measured. Static balance was performed on the force plate in different situations each for 30 seconds: bilateral stance with eyes open, bilateral stance with eyes closed, as well as dominant leg and non-dominant leg unilateral stance with eyes open. Gait was measured during level walking using an optical motion capture system. Additionally, the dynamic stability margin (DSM) was calculated for the level walking trials.

Results

The study results indicated that gait parameters were not significantly affected by age ($p \geq 0.12$), while knee and grip strength, along with several balance parameters, showed a significant decline with age (Figure 1).

All individuals were able to maintain their bipedal balance, but their center of pressure (CoP) movement increased significantly by age ($p \leq 0.028$). Z-scores were calculated to compare significant age parameters. Unipedal stance time was found to be the most affected by age compared to other contributing factors ($p \leq 0.001$) (Figure 2). The duration of unipedal balance showed the most significant change per decade (non-dominant: -0.62 SDs; dominant: -0.53 SDs), while strength measures exhibited the lowest amount of change per decade (grip strength: -0.34 SDs; knee strength: -0.26 SDs). Sex differences were observed exclusively in strength parameters, with no discernible impact on the decline in balance parameters.

Discussion

The importance of balance, especially in unipedal stance, arises from the fact that it requires multiple sensory inputs and neuromuscular control, in addition to adequate muscle strength. This is why balance on 1 leg, as demonstrated in this study, undergoes the fastest decline in this healthy cohort, reflecting age-related declines in muscle strength similar to prior studies, and in the rapid coordination

This article has been excerpted from "Age-related changes in gait, balance, and strength parameters: A cross-sectional study." PLoS ONE 19(10): e0310764. https://doi.org/10.1371/journal.pone.0310764. Editing has occurred, including the renumbering or removal of tables and figures, and references have been removed for brevity. Use is per CC.

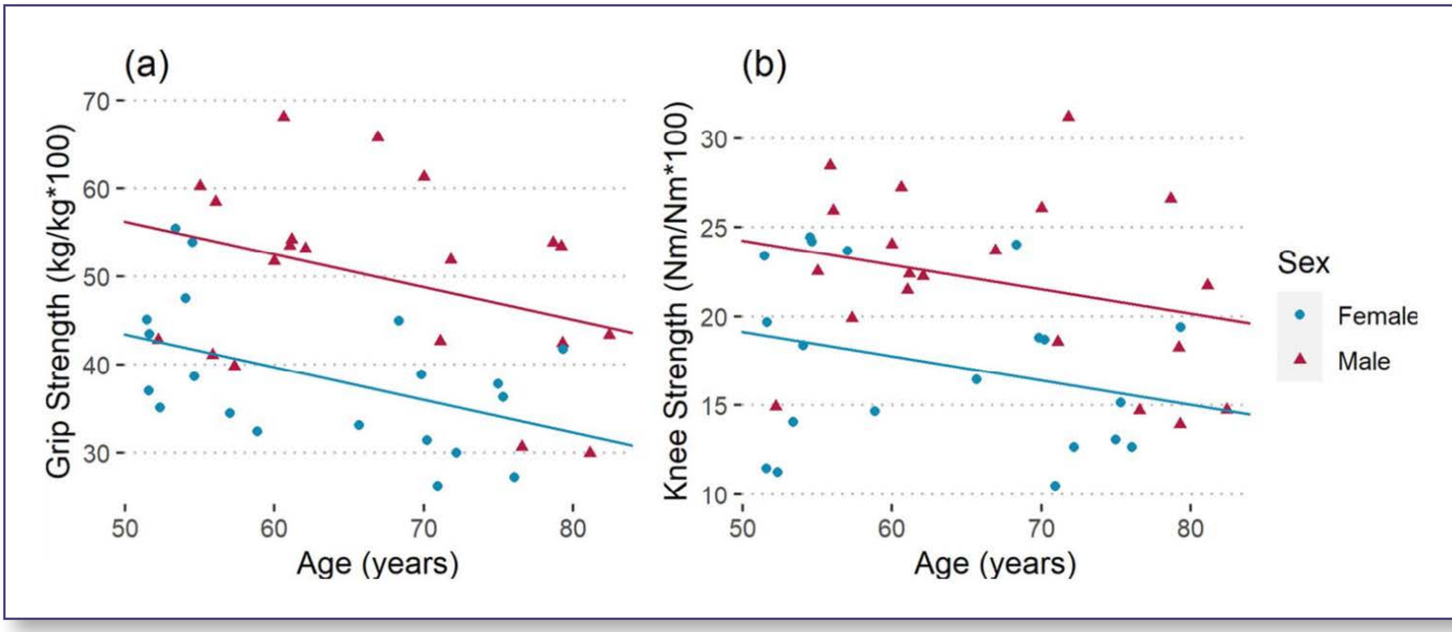

Figure 1: Normalized (a) dominant grip strength ($R2 = 0.39$, $p < 0.001$) and (b) dominant knee strength ($R2 = 0.25$, $p = 0.005$) for male and female subjects.

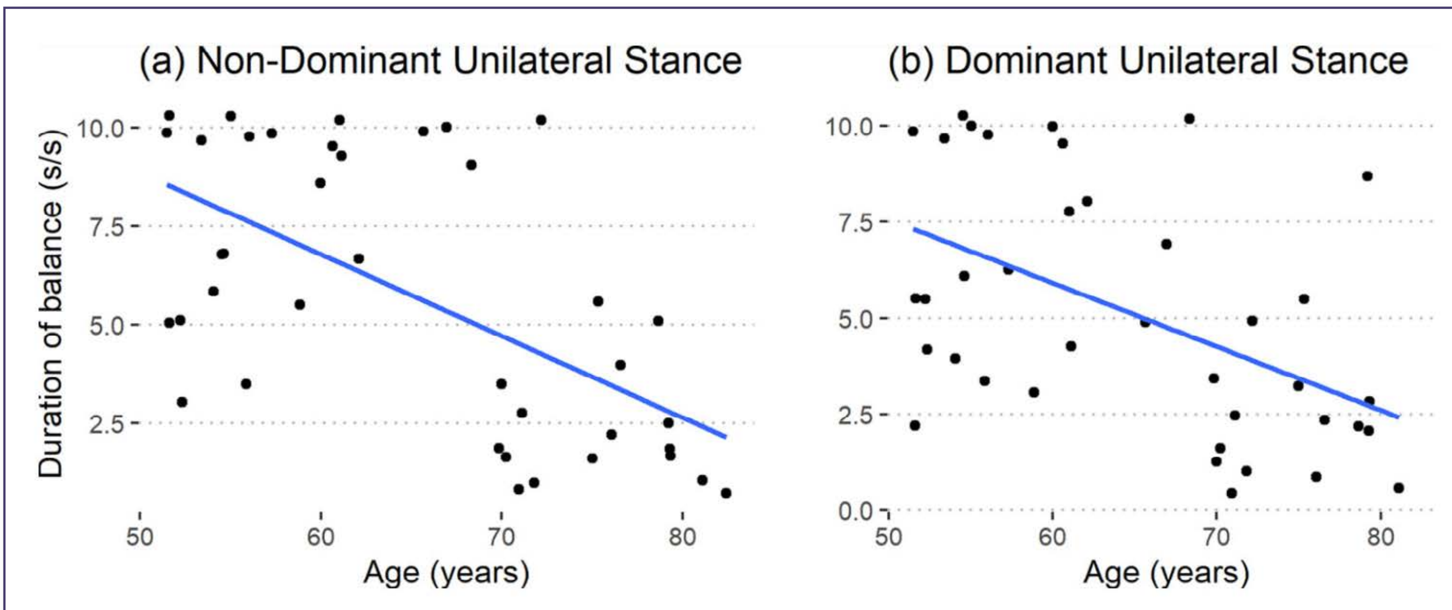

Figure 2: Unipedal standing duration for the (a) non-dominant ($R2 = 0.38$, $p < 0.001$) and (b) dominant sides ($R2 = 0.27$, $p = 0.004$).

and integration of data by the central nervous system.

While all the subjects were easily able to maintain their balance during bilateral stance tests, these study results showed that their CoP movements increased significantly with age, which were in accordance with prior studies, showing that the bipedal balance deteriorated with age. While aging affects both muscular and neurological aspects, standing on both limbs for only 30 seconds does not require a large amount of muscle strength. This can mean that increased CoP movement due to aging may suggest a greater decline in the neuromuscular sensory system compared to strength.

Muscle strength serves as an additional indicator of muscle quality and a predictor of various health concerns, such as disability and mortality. Unlike level walking or balance tests, maximal muscle strength evaluates the greatest capacity of the muscle, which declines with age. The grip strength test, a simple and reliable measurement, has been recognized as a powerful predictor of disability, mortality, and morbidity. The current study observed a significant decline in grip strength, which decreased at a faster rate than knee strength. This trend aligns with findings from a longitudinal study, where grip strength was reported to decline more rapidly than hip or knee strength. Hence, grip

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strength serves as a better predictor of musculoskeletal aging than other strength measures.

Sex differences were observed in knee and grip strength parameters, even when the strength data were normalized by the weight and size of individuals. However, there were no sex-specific age-related declines in strength parameters, indicating that all individuals experienced declines in upper and lower extremity strength at a similar rate. No sex differences were identified in the gait and balance parameters studied in the current article, suggesting that both male and female subjects were equally affected by age similar to prior studies.

Conclusions

This study underscores the significance of the unipedal balance test in monitoring elderly subjects in the community, regardless of sex. The duration an individual, whether male or female, can maintain balance on 1 leg emerges as the most reliable determinant of aging, surpassing strength, gait, and other balance parameters. This finding is significant because this measurement does not require specialized expertise, advanced tools, or techniques for measurement and interpretation. It can be easily performed, even by individuals themselves.

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Cell Phone-Related Lower Extremity Injuries While Using Non-Motor Vehicles

By Mathias B. Forrester, BS

Background: A portion of people use or carry cell phones while using bicycles and other non-motor vehicles (eg, scooters, skateboards, skates). This can increase the risk of injury. This study described cell phone-related lower extremity injuries while using non-motor vehicles that were treated at United States (US) hospital emergency departments (EDs).

Methods: Cell phone-related lower extremity injuries while using non-motor vehicles reported to the National Electronic Injury Surveillance System during 2000-2023 were examined. The NEISS collects data on product- and activity-related injuries treated at a representative sample of 100 US hospital EDs. These records can be used to calculate national injury estimates.

Results: An estimated 1,261 cell phone-related lower extremity injuries while using non-motor vehicles were treated at US hospital EDs during 2000-2023, representing 14.8% of the estimated 8,536 such injuries affecting all body parts. The type of non-motor vehicle was 90.0% bicycle, 8.8% skateboard, and 1.3% roller skates. The affected body part was 49.1% knee, 17.6% lower leg, 12.4% ankle, 13.9% upper leg, 6.9% toe, and 0.0% foot. The most severe diagnoses were 33.0% contusion or abrasion, 26.5% strain or sprain, 16.7% fracture, 8.9% laceration, and 14.9% other or not stated. The patient disposition was 90.6% treated or evaluated and released from the ED, 4.9% treated and admitted for hospitalization (within same facility), and 4.5% left without being seen or against medical advice.

Conclusion: Relatively few cell phone-related injuries while using non-motor vehicles, particularly involving the lower extremity, were reported to US hospital EDs during the 24-year period. Most of these injuries involved bicycles. Almost half of the severe diagnoses involved the knee. The most common severe diagnoses were contusion or abrasion followed by strain or sprain. Most patients were treated or evaluated and released from the ED. The information in this study may be useful for education and prevention efforts in the future.

Cell phones are ubiquitous in the United States (US), with 98% of adults reporting ownership of a cell (mobile) phone in 2023.[1] With so many people using such devices, cell phone-related injuries are likely to occur. Much of the literature has focused on injuries that occur while being distracted by cell phones while driving or while walking.[2-7]

However, cell phone-related injuries also may occur when riding a bicycle or using other non-motor vehicles (eg, bicycles, scooters, skateboards, skates). Studies in China and the Netherlands reported 3-5% of bicyclists used cell phones while cycling.[8-10] A study in Boston, Massachusetts, found that 13.5% of bicyclists observed at selected intersections in the city had visual/tactile distractions (object/cell phone in hand or on handlebars) at the time.[11] Bicyclists who use a cell phone exhibit more unsafe behaviors than those bicyclists who are not performing a secondary task.[12] A study in China observed an increased risk of traffic injury among bicyclists who had used a cell phone within 1 minute of the injury.[13]

The objective of this study was to characterize cell phone-related lower extremity injuries while using a non-motor vehicle managed at US hospital emergency departments (EDs).

Methods

The data source for this retrospective epidemiologic study was the National Electronic Injury Surveillance System (NEISS) database at https://www.cpsc.gov/cgibin/NEISSQuery/home.aspx. Details of the NEISS database have previously been described in *Lower Extremity Review.*[14] In brief, operated by the US Consumer Product Safety Commission (CPSC), NEISS collects data on consumer product- and activity-related injuries from a probabilistic sample of the EDs of approximately 100 US hospitals. National estimates are calculated from database records according to the sample weight assigned to each case based on the inverse probability

Table 1. Type of vehicle involved in cell phone-related injuries while using non-motor vehicles treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Type of vehicle	Lower extremity (LE) injuries		Total injuries		LE rate (%)
	Estimate	%	Estimate	%	
Bicycle	1,135	90.0	7,714	90.4	14.7
Skateboard	110	8.8	660	7.7	16.7
Horse	0	0.0	93	1.1	0.0
Scooter	0	0.0	53	0.6	0.0
Roller skates	16	1.3	16	0.2	100.0
Total	**1,261**		**8,536**		**14.8**

The lower extremity analysis is based on those records where the most severe diagnosis involved the lower extremity.

LE rate = lower extremity injury estimate/total injury estimate, presented as a percentage.

Estimate = Weighted estimate (sum of the Weight numeric field in the National Electronic Injury Surveillance System database). The numbers in the Weight field are not whole numbers but include decimals. As a result of rounding to whole numbers when performing analyses, the sum of the estimates for a given variable might not equal the total. The Consumer Product Safety Commission considers an estimate unstable and potentially unreliable when the estimate is <1,200.

of the hospital being selected for the NEISS sample.[15,16] Since the data are publicly available and de-identified, the study is exempt from institutional review board approval. Previously published studies used NEISS data to examine cell phone-related injuries.[17-23] While, none of these studies focused on injuries while using non-motor vehicles, several studies did focus on lower extremity injuries.[17,18]

Cases were cell phone-related injuries while using non-motor vehicles reported to NEISS during 2000-2023. The NEISS database contains three numeric fields for coding the product or activity involved in the injury (Product_1, Product_2, Product_3). (Product_3 was added to the NEISS database in 2018 but does not appear to have been used until 2019.)[16] The NEISS database includes product code 550 (telephones or telephone accessories), but this code is used not only for cell phones but also for landline phones, intercoms, and other such devices. Consequently, product code 550 alone cannot be used to identify cell phone-related injuries. For this analysis, first, all records with product code 550 in any of the three product code fields or "phone" in the Narrative text field (a text field that summarizes the circumstances of the injury) were identified. Second, the Narrative fields of all of the records were individually reviewed to determine whether the injury appeared to be related to a cell phone while using non-motor vehicles. A record was included even if its Narrative field did not explicitly state that the phone was a *cell* phone because it was assumed that a landline phone, even a cordless phone, would not be used with a non-motor vehicle. Records where the patient was not in or on the non-motor vehicle with the cell phone (eg, the patient was walking down the street and was hit by a bicycle whose rider was texting on their cell phone) were excluded.

The examined variables were the affected body part, type of non-motor vehicle, year and month of treatment, patient age and gender, location of the incident, most severe diagnosis, and patient disposition. The type of non-motor vehicle was identified from the record Narrative. Some vehicles may or may not have a motor (eg, bicycle, scooter, wheelchair). For such vehicles, if the record did not specifically indicate that the vehicle had a motor, it was included in the analysis.

A person injured while using a non-motor vehicle may experience multiple injuries to multiple body parts. The NEISS database contains multiple fields for documenting the diagnosis and/or affected body part; however, only 2 fields were used consistently throughout the study period: Diagnosis (a numeric field for coding the most severe diagnosis) and Body_Part (a numeric field for coding the body part associated with the most severe diagnosis). (All diagnoses are supposed to be documented in the Narrative, but this is not performed in a consistent manner.) Therefore, only the Diagnosis and Body_Part numeric fields were used to analyze the diagnosis and affected body part.

Analyses were performed using Microsoft 365 Access and Excel (Microsoft Corporation, Redmond, Washington, US). For the selected variables, the distribution of the national injury estimates was determined for cell phone-related injuries while using non-motor vehicles affecting (1) any body part (total injuries) and (2) the subset of lower extremity injuries (based on

Table 2. Time period and location of incident of cell phone-related injuries while using non-motor vehicles treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Variable	Lower extremity (LE) injuries		Total injuries		LE rate (%)
	Estimate	%	Estimate	%	
4-year period					
2000-2003	17	1.3	324	3.8	5.2
2004-2007	16	1.3	560	6.6	2.8
2008-2011	362	28.7	1,573	18.4	23.0
2012-2015	128	10.1	1,696	19.9	7.5
2016-2019	312	24.7	1,917	22.5	16.3
2020-2023	427	33.8	2,466	28.9	17.3
3-month period					
December-February	215	17.0	958	11.2	22.5
March-May	400	31.7	2,233	26.2	17.9
June-August	245	19.5	2,630	30.8	9.3
September-November	401	31.8	2,716	31.8	14.8
Location of incident					
Street or highway	593	47.0	4,641	54.4	12.8
Other public property	92	7.3	618	7.2	14.9
Home	67	5.3	300	3.5	22.4
School	5	0.4	111	1.3	4.3
Place of recreation or sports	72	5.7	88	1.0	82.1
Not recorded	432	34.2	2,777	32.5	15.6
Total	**1,261**		**8,536**		**14.8**

*Please see footnote in Table 1.

the Body_Part field). Comparisons were made between the two groups for the studied variables by calculating the lower extremity rate (lower extremity injury estimate/total injury estimate x 100, presented as a percentage). National injury estimates were calculated by summing the values in the Weight numeric field in the publicly available NEISS database. The CPSC considers an estimate unstable and potentially unreliable when the estimate is <1,200.[15]

Results

An estimated 1,261 cell phone-related injuries while using non-motor vehicles were treated at US hospital EDs during 2000-2023 where the most severe diagnosis affected the lower extremity, representing 14.8% of the estimated 8,536 such injuries affecting all body parts. The distribution of lower extremity injuries by affected body part was 620 (49.1%) knee, 222 (17.6%) lower leg, 156 (12.4%) ankle, 176 (13.9%) upper leg, 87 (6.9%) toe, and 0 (0.0%) foot.

Over 90% of both total injuries and lower extremity injuries involved bicycles (Table 1). However, a small proportion involved skateboards, scooters, roller skates, and even horses.

Table 2 shows the distribution of cell phone-related injuries while using non-motor vehicles by time period and location of the incident. When the 24-year period was divided

Table 3. Patient demographics of cell phone-related injuries while using non-motor vehicles treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Variable	Lower extremity (LE) injuries		Total injuries		LE rate (%)
	Estimate	%	Estimate	%	
Patient age (years)					
0-5	0	0.0	6	0.1	0.0
6-12	65	5.1	522	6.1	12.4
13-19	225	17.8	2,012	23.6	11.2
20-29	470	37.3	1,860	21.8	25.3
30-39	88	7.0	1,259	14.7	7.0
40-49	110	8.7	982	11.5	11.2
50-59	94	7.5	958	11.2	9.8
60-69	62	4.9	575	6.7	10.8
70+	147	11.7	363	4.3	40.6
Patient gender					
Male	990	78.5	6,630	77.7	14.9
Female	271	21.5	1,906	22.3	14.2
Total	**1,261**		**8,536**		**14.8**

*Please see footnote in Table 1.

into 6 4-year periods, the estimated number of total injuries increased with each 4-year period. While the highest estimated number of lower extremity injuries was reported during the most recent 4-year period (2020-2023), the next highest estimated number of lower extremity injuries was reported during 2008-2011. However, for lower extremity injuries, the general trend was an increase in estimated injuries over time.

For both lower extremity and total injuries, the lowest proportion of injuries were treated during December-February. However, the lower extremity rate was higher for December-February than for any other 3-month period. For those injuries where the location of the incident was recorded, most of the lower extremity injuries and total injuries occurred on a street or highway. Smaller proportions of injuries occurred at other public property, home, school, and a place of recreation or sports.

When cell phone-related injuries while using non-motor vehicles were examined by patient age (Table 3), relatively few injuries were reported among patients aged 0-12 years. For lower extremity injuries, the highest proportion of patients were aged 20-29 years, followed by patients aged 13-19 years. For total injuries, the highest proportion of patients were aged 13-19 years, followed by patients aged 20-29 years. The lower extremity rate was twice as high for patients aged 20-29 years than for patients aged 13-19 years. For both lower extremity injuries and total injuries, most patients were male (Table 3). The lower extremity rate did not differ greatly between the sexes.

Table 4 presents the distribution of cell phone-related injuries while using non-motor vehicles by most severe diagnosis and patient disposition. For total injuries, the most frequently reported diagnosis was contusion or abrasion followed by fracture, laceration, and strain or sprain. For lower extremity injuries, the most frequently reported diagnosis was contusion or abrasion followed by strain or sprain, fracture, and laceration. The lower extremity rate was highest for strain or sprain and lowest for laceration. For both lower extremity injuries and total injuries, most of the patients were treated or examined in the hospital ED and released.

Discussion

Cell phone-related injuries while using non-motor vehicles treated at US hospital EDs were relatively uncommon. Only an estimated 8,536 such injuries were reported during a 24-year period, and of these, only an estimated 1,261 (15%) had the most severe diagnosis affect the

Table 4. Most severe diagnosis and patient disposition of cell phone-related injuries while using non-motor vehicles treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Variable	Lower extremity (LE) injuries		Total injuries		LE rate (%)
	Estimate	%	Estimate	%	
Severe diagnosis					
Contusion or abrasion	416	33.0	1,921	22.5	21.7
Fracture	210	16.7	1,837	21.5	11.4
Laceration	112	8.9	1,225	14.3	9.2
Strain or sprain	335	26.5	1,196	14.0	28.0
Internal organ injury	0	0.0	966	11.3	0.0
Concussion	0	0.0	340	4.0	0.0
Dental injury	0	0.0	180	2.1	0.0
Nerve damage	0	0.0	78	0.9	0.0
Avulsion	77	6.1	77	0.9	100.0
Dislocation	0	0.0	21	0.2	0.0
Other/not stated	112	8.9	695	8.1	16.1
Patient disposition					
Treated or examined at emergency department and released	1,143	90.6	7,844	91.9	14.6
Treated and admitted for hospitalization (within same facility)	62	4.9	350	4.1	17.7
Treated and transferred to another hospital	0	0.0	161	1.9	0.0
Held for observation (includes admitted for observation)	0	0.0	16	0.2	0.0
Left without being seen or left against medical advice	56	4.5	166	2.0	33.8
Total	**1,261**		**8,536**		**14.8**

*Please see footnote in Table 1.

lower extremity. However, the estimated number of injuries increased over this time period, with 30% of total injuries and 34% of lower extremity injuries reported during the most recent 4 years (2020-2023). If this trend continues, cell phone-related injuries while using non-motor vehicles might become more common and a greater public health issue in the future.

The increase in cell phone-related injuries while using non-motor vehicles over the time period is consistent with several other studies using NEISS data that also observed temporal increases in cell phone-related injuries,[20,22,23] including several that focused on lower extremity injuries (but not injuries while using non-motor vehicles).[17,18] This increase is likely due to an increase in the number of people owning cell phones. A November 2024 Pew Research Center fact sheet indicated that the proportion of adults reporting ownership of cell phones increased from 62% in 2002 to 98% in 2024.[1] Alternately, it may be that, over time, the hospital staff providing records to NEISS increasingly documented in the Narrative field that the injury was related to cell phone use while using non-motor vehicles.

Of the most severe diagnosis affecting the lower extremity, almost half involved the knee while an additional 30% involved the lower leg and ankle. This indicates that all lower extremity body parts are not at equal risk of cell phone-related injuries while using non-motor vehicles.

For both lower extremity injuries and total injuries, the lowest proportion of injuries were treated during December-February. This might be expected because the weather is usually coldest in the US during these months. Consequently, during December-February, people may be less likely to ride bicycles or use other non-motor vehicles outside. Although December-February had the smallest proportion of injuries, it had the highest lower extremity rate. It may be that there are seasonal differences in the types of activities causing cell phone-related injuries while using non-motor vehicles and their likelihood to involve the lower extremity.

For both lower extremity injuries and total injuries, relatively few of the patients were aged 0-12 years and the highest proportion of patients were aged 13-29 years. Moreover, almost 80% of the patients were male. It may be that persons aged 13-29 years and males are more likely to use bicycles and other non-motor vehicles. Alternately, persons of this age group and sex may be more likely to use cell phones while using non-motor vehicles.

The lower extremity rate was twice as high for patients aged 20-29 years than for patients aged 13-19 years. It may be that people aged 13-19 years are less likely than people aged 20-29 years to engage in the types of activities causing cell phone-related injuries while using non-motor vehicles that affect the lower extremity.

Several other studies used the NEISS database to examine other types of cell phone-related injuries during the same time period. Among cell phone-related injuries while walking, relatively few of the patients were aged 0-12 years, and the highest proportion of patients were aged 13-29 years, like the age pattern observed in the present study. However, most patients in those studies were female.[17] Additionally, among cell phone-related injuries while in or on a motor vehicle, while relatively few of the patients were aged 0-12 years, the highest proportion of patients were aged 20-39 years. Moreover, while most of the patients with lower extremity injuries were male, patients with total injuries were more evenly divided by sex.[18] This suggests that education and prevention efforts may need to focus on different demographic groups depending on which type of cell phone-related injuries are being targeted.

Lower extremity injuries and total injuries differed by the pattern of diagnosis. For total injuries, the most frequently reported diagnosis was contusion or abrasion followed by fracture, laceration, and strain or sprain. For lower extremity injuries, the most frequently reported diagnosis was contusion or abrasion followed by strain or sprain, fracture, and laceration. These differences might partly be expected considering certain diagnoses (eg, internal organ injury, concussion, dental injury) cannot affect the lower extremity.

In most cases, the most frequently reported diagnoses (contusion or abrasion, fracture, laceration, and strain or sprain) might not be expected to require extensive hospital management. In fact, this study found that over 90% of the patients were treated or examined in the hospital ED and released.

There are limitations to this study. As described in the Methods section, the NEISS database does not have any fields or codes to easily identify cell phone-related injuries. For this study, all records where the product code for telephones or telephone accessories was used in any of the product code fields or "phone" was used in the Narrative field were identified. Then the Narrative for each record was reviewed to determine whether the injury was related to a cell phone while using non-motor vehicles. The study would not include any records that did not include the telephones or telephone accessories product code or "phone" in the Narrative field.

A person experiencing a cell phone-related injury while using a non-motor vehicle may experience multiple injuries of multiple body parts. This study was limited to the data fields that coded the single most severe diagnosis and affected body part because these were the only fields that consistently documented diagnosis and affected body part throughout the entire study period. Thus, a higher proportion of patients may have experienced lower extremity injuries.

A single person selected the records for inclusion in the study. In addition, the study included only those patients treated at hospital EDs. Examination of patients treated elsewhere would provide a more complete understanding of injuries that occur while using a cell phone while using non-motor vehicles.

In conclusion, relatively few cell phone-related injuries while using non-motor vehicles, particularly involving the lower extremity, were treated at US hospital EDs during the 24-year period. Most of these injuries involved bicycles. Almost half of the severe diagnoses affecting the lower extremity involved the knee. The most common severe diagnoses affecting the lower extremity were contusion or abrasion followed by strain or sprain. Most patients were treated or evaluated and released from the ED. The information in this study may be useful for creating educational activities to prevent or manage these injuries in the future.

Mathias B. Forrester, BS, is an independent researcher in Austin, Texas. Now retired, he has performed public health research for various university and government programs for 39 years.

References

1. Pew Research Center. Mobile fact sheet. November 13, 2024. Available at https://www.pewresearch.org/internet/fact-sheet/mobile/. Accessed March 1, 2025.
2. Russo BJ, James E, Aguilar CY, Smaglik EJ. Pedestrian behavior at signalized intersection crosswalks: Observational study of factors associated with distracted walking, pedestrian violations, and walking speed. Trans Res Rec. 2018;2672(35):1-12.
3. Barkley JE, Lepp A. Cellular telephone use during free-living walking significantly reduces average walking speed. BMC Res

Notes. 2016;9:195.

4. Basch CH, Ethan D, Rajan S, Basch CE. Technology-related distracted walking behaviours in Manhattan's most dangerous intersections. J Community Health. 2015;40(4):789-792.

5. Caird JK, Johnston KA, Willness CR, Asbridge M, Steel P. A meta-analysis of the effects of texting on driving. Accid Anal Prev. 2014;71:311-318.

6. Thompson LL, Rivara FP, Ayyagari RC, Ebel BE. Impact of social and technological distraction on pedestrian crossing behaviour: an observational study. Inj Prev. 2013;19(4):232-237.

7. Redelmeier DA, Tibshirani RJ. Association between cellular-telephone calls and motor vehicle collisions. N Engl J Med. 1997;336(7):453-458.

8. Wu X, Xiao W, Deng C, Schwebel DC, Hu G. Unsafe riding behaviors of shared-bicycle riders in urban China: A retrospective survey. Accid Anal Prev. 2019;131:1-7.

9. de Waard D, Westerhuis F, Lewis-Evans B. More screen operation than calling: the results of observing cyclists' behaviour while using mobile phones. Accid Anal Prev. 2015;76:42-48.

10. de Waard D, Schepers P, Ormel W, Brookhuis K. Mobile phone use while cycling: Incidence and effects on behaviour and safety. Ergonomics. 2010;53(1):30-42.

11. Wolfe ES, Arabian SS, Breeze JL, Salzler MJ. Distracted biking: An observational study. J Trauma Nurs. 2016;23(2):65-70.

12. Terzano K. Bicycling safety and distracted behavior in The Hague, the Netherlands. Accid Anal Prev. 2013;57:87-90.

13. Ren J, Chen Y, Li F, et al. Road injuries associated with cellular phone use while walking or riding a bicycle or an electric bicycle: A case-crossover study. Am J Epidemiol. 2021;190(1):37-43.

14. Forrester MB. Pickleball-related injuries involving the lower extremity treated in emergency departments. Lower Extremity Review. 2021;13(5):24-30.

15. United States Consumer Product Safety Commission. National Electronic Injury Surveillance System (NEISS). Available at https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data/Explanation-Of-NEISS-Estimates-Obtained-Through-The-CPSC-Website. Accessed March 1, 2025.

16. United States Consumer Product Safety Commission. NEISS Coding Manual. January 2021. Available at https://www.cpsc.gov/s3fs-public/January-2021-NT-CPSC-only-NEISS-Coding-Manual.pdf?xa_nMM1kB4SGpuSMOwf0NHkkkIqNcn8F. Accessed March 1, 2025.

17. Forrester MB. Cell phone-related lower extremity injuries while walking. Lower Extremity Review. 2024;16(11):46-53.

18. Forrester MB. Cell phone-related lower extremity injuries while in or on a motor vehicle. Lower Extremity Review. 2025;17(1):30-34.

19. McLaughlin WM, Cravez E, Caruana DL, Wilhelm C, Modrak M, Gardner EC. An epidemiological study of cell phone-related injuries of the hand and wrist reported in United States emergency departments from 2011 to 2020. J Hand Surg Glob Online. 2023;5(2):184-188.

20. Zheng H, Giang WCW. Risk perception and distraction engagement with smart devices in different types of walking environments. Accid Anal Prev. 2021;162:106405.

21. Guyon PW Jr, Corroon J, Ferran K, Hollenbach K, Nguyen M. Hold the phone! Cell phone-related injuries in children, teens, and young adults are on the rise. Glob Pediatr Health. 2020;7:2333794X20968459.

22. Nasar JL, Troyer D. Pedestrian injuries due to mobile phone use in public places. Accid Anal Prev. 2013;57:91-95.

23. Smith DC, Schreiber KM, Saltos A, Lichenstein SB, Lichenstein R. Ambulatory cell phone injuries in the United States: an emerging national concern. J Safety Res. 2013;47:19-23.

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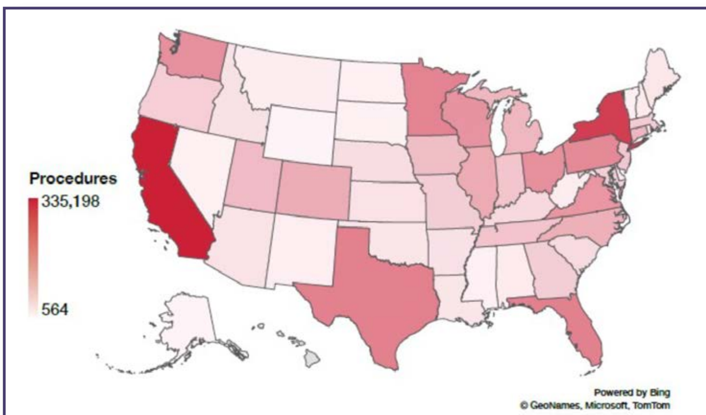
2025 AAOS Meeting Highlights

Meeting Highlights from the 2025 Annual Meeting of the American Academy of Orthopaedic Surgeons

2024 AJRR REPORT ON HIP AND KNEE ARTHROPLASTY RELEASED



The American Academy of Orthopaedic Surgeons (AAOS) Registry Program released the American Joint Replacement Registry (AJRR) 2024 Annual Report Supplement during the AAOS 2025 Annual Meeting in San Diego.

"The 2024 AJRR Supplement provides important information to stakeholders as it underscores the registry's growth and ability to track more nuanced outcomes for complex problems," said Jeffrey Benjamin Stambough, MD, FAAOS, via press release. He is an AJRR Steering Committee member and co-editor of the AJRR Supplement. "The investigation of specific outcomes for Debridement, Antibiotics, and Implant Retention (DAIR) for periprosthetic joint infection diagnoses provides a clearer picture of the mid-to-long-term success of such an intervention. Additionally, through this report, we have provided a poignant case example that showcases the power of the registry to track specific implant survivorship and note trends if certain constructs fall below the accepted standard."

To read and download the AJRR 2024 Annual Report Supplement, visit AAOS.org.

Source: *American Academy of Orthopaedic Surgeons. American Joint Replacement Registry (AJRR) 2024 Annual Report. Published March 10, 2025. Available at https://www.aaos.org/registries/publications/ajrr-annual-report/. Accessed March 15, 2025.*

PRIOR AUTHORIZATION DOES NOT REDUCE THA COSTS, DELAYS PATIENT CARE

Prior authorization (PA) has been implemented by payors in an effort to reduce unnecessary healthcare utilization. However, obtaining PA has been shown to increase the administrative burden and delay access to care. To our knowledge, the financial burden and cost-effectiveness of PA in total hip arthroplasty (THA) is yet to be determined. The purpose of this prospective study was to quantify the costs associated with obtaining PA in primary THA patients.

Methods

A consecutive series of 3,922 patients undergoing primary THA with commercial insurance from a single payer from 2020-2022 at a single institution were included. Data on PA status, the number of office visits, and total claims cost of nonoperative treatment received in the year prior to THA and from the initial PA request date to date of surgery was prospectively collected and analyzed.

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Results

Of the study population, 2,840 (72.4%) patients required PA. There was no difference in the mean claims cost in the year prior to THA ($316 ± 234 in PA vs. $318 ± 273 in the no PA cohort, *P*=0.760) and from initial request date to date of surgery ($318 ± 249 in PA vs. $302 ± 245 in no PA cohort) between the 2 groups (*P* =0.430). However, patients that required PA were found to have significantly lower preoperative HOOS-JR scores (48.1 ± 15.5 vs. 49.7 ± 14.7, *P* =0.021) and experienced a significantly longer duration from initial surgery request date to date of THA (40.4 days ± 37.0 vs. 38.7 days ± 36.0, *P* =0.023).

Discussions and Conclusions

In the present study, obtaining PA was found to be an ineffective cost-saving measure in patients undergoing primary THA. Additionally, THA patients who required PA not only had lower preoperative functional outcome scores, but also experienced significantly longer wait times prior to obtaining surgery.

Abe E, Lizcano JD, Tarabichi S, et al. Prior Authorization Does Not Reduce Costs in Patients Undergoing Primary THA. Presented at 2025 Annual Meeting of the American Academy of Orthopaedic Surgeons. San Diego, CA: March 10, 2025.

STOP GLP-1 AGONISTS 14 DAYS BEFORE TJA TO REDUCE ANESTHESIA RISKS

Glucagon-like peptide-1 receptor agonists (GLP-1A) have advanced the treatment of type 2 diabetes and obesity. Given the prevalence of these conditions among candidates for total joint arthroplasty (TJA), managing GLP-1A in the perioperative period is crucial to minimize complications.

The TriNetX Research Network was queried for patients who underwent total hip or knee arthroplasty from January 2018 to January 2023. A control group of 206,005 patients with no prior Ozempic use was identified. Ozempic users were categorized based on when they stopped the medication before surgery: 30 days (482 patients), 14 days (591), 7 days (680), 5 days (758), 3 days (777), 1 day (706), and continued use through surgery (170). Propensity-matched cohorts were analyzed to determine the relationship between the time of last Ozempic dose and anesthesia complications using multivariate logistic regression.

Results

- Stopping Ozempic 5 days before surgery was an independent risk factor for delayed emergence from anesthesia (OR 1.59, *P*=0.005); stopping 3 days (OR 1.84, *P* <0.001) and 1 day prior (OR 2.23, *P* < 0.001) also increased this risk.
- For aspiration, stopping 7 days prior was a risk factor (OR 1.24, *P* =0.002), with higher risks for stopping 5 days (OR 2.53, *P* <0.001), 3 days (OR 3.09, *P* <0.001), and 1 day (OR 4.96, *P* <0.001) prior.
- Stopping 7 days before surgery also increased the risk for aspiration pneumonitis (OR 1.29, *P* <0.001), with even higher risks for stopping 5 days (OR 2.74, *P* <0.001) and 1 day prior (OR 2.74, *P* <0.001).
- Multivariate logistic regression identified last Ozempic dose at 7 days prior to surgery as an independent risk factor for conversion to intubation (OR 1.39 [95% CI 1.06-1.56], *P* =0.0343). Similarly, last Ozempic dose at 5 days (OR 2.09, [95% CI 1.76-2.36], *P* <0.001), 3 days (OR 4.68, [95% CI 4.40-4.97], *P* <0.001), and 1 day (OR 6.37, [95% CI 5.92-6.72], *P* <0.001) were independent risk factors for conversion to intubation.
- The highest risk for all complications was observed in patients who continued Ozempic use through surgery.
- Diabetes itself was not an independent risk factor for any of the complications.

Discussions and Conclusions

Stopping Ozempic more than 7 days prior to surgery reduced the risk of delayed emergence from anesthesia and aspiration pneumonitis, additionally stopping 14 days prior to surgery reduced the risk of aspiration

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and conversion to intubation in this cohort. To minimize risks of delayed emergence from anesthesia, aspiration, aspiration pneumonitis, and conversion to intubation, ceasing GLP-1A 14 days before surgery is optimal. Careful planning and coordination in managing GLP-1A in the preoperative period are essential to optimize surgical outcomes.

Chokshi SN, Hou N, Ford MC, Crockarell JR, Mihalko JL, Holland CT. Optimal Timing for Cessation of GLP-1 Agonist Before Elective Total Hip and Knee Arthroplasty. Presented at 2025 Annual Meeting of the American Academy of Orthopaedic Surgeons. San Diego, CA: March 10-14, 2025.

THA/TKA IMPROVES SPOUSES QUALITY OF LIFE TOO!

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Hip and knee arthritis is debilitating for patients but the decreased activity level and independence may also affect spouses. Spouses of individuals who have undergone THA or TKA often assume caregiving roles during the postoperative rehabilitation period but may benefit in the long term from increased patient activity levels. However, little research has been done to specifically examine the perspectives and quality of life changes of spouses of patients who have undergone these procedures. This was a retrospective cohort study where spouses of patients who underwent primary THA or TKA at a single urban tertiary care academic medical center were surveyed. Spouses were asked various Likert-style questions. 100 total spouses (50 hips and 50 knees) were surveyed. Means were compared using ANOVA analyses. Average follow-up time was 2 years.

Results

When asked to rate their own quality of life, the THA group spouses had a mean of 4.1 (SD=0.9) and the TKA group had a mean of 4 (SD=1) where 1=significantly worse and 5=significantly better. When spouses were asked to rate their own opinion of the patient's improvement of their quality of life, the means were 4.7 (SD=0.7) and 4.3 (SD=1.2) for the THA and TKA groups, respectively. Spousal assistance of daily activities also decreased over time. Means for the THA group were 2.6, 2.7, and 1.4 ($P<0.00001$) where 1=never and 5=always at pre-operative, 1-2 weeks post-operative, and at least 1-year post-operative timepoints, respectively. Means for the TKA group were 2, 3.7, and 1.8 ($P<0.00001$).

Discussions and Conclusions

Spouses of patients undergoing THA and TKA see a significant improvement in their own quality of life. Further, they report providing less assistance to the patient in daily activities at least 1-year post-operatively. These results show that THA and TKA improves the lives of not only the patients, but also their caregivers.

Jozefowski N, Farley JM, Cole MW, Haughom B, Schmitt D, Brown NM. Spouses of Total Hip and Knee Arthroplasty Patients See Improvements in Quality of Life. Presented at 2025 Annual Meeting of the American Academy of Orthopaedic Surgeons. San Diego, CA: March 10-14, 2025.

HEADER RESTRICTION POLICY IN YOUTH SOCCER SHOWS PROMISING IMPACT ON CONCUSSION RATES

Soccer is one of the most popular youth sports in the United States and worldwide. Due to growing concerns regarding repeated head trauma, in 2015 the United States Soccer Federation (USSF) banned headers for athletes age 10 and under and limited athletes age 11 to 13 to practicing headers for 30 minutes per week. The purpose of this study was to assess whether the USSF header ban policy was associated with fewer soccer-related concussions that presented to an emergency department following the 2015 season.

Methods

A retrospective cohort from the National Electronic Injury Surveillance System (NEISS) database was assessed. Age, sex, and injury type were extracted for all soccer-related emergency department visits between

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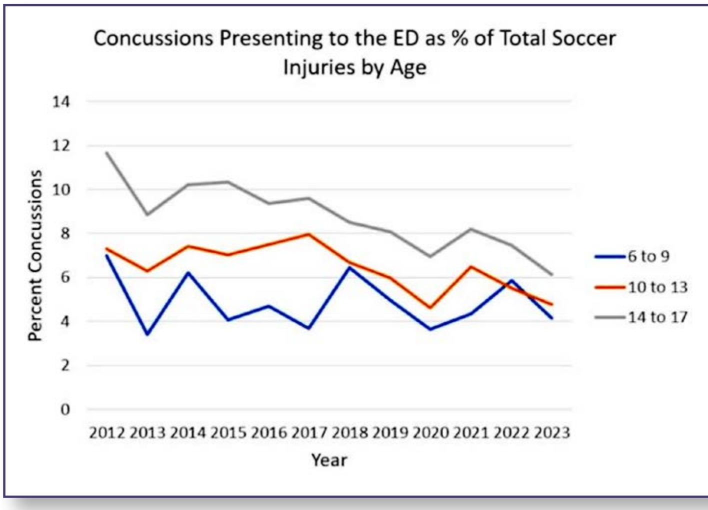

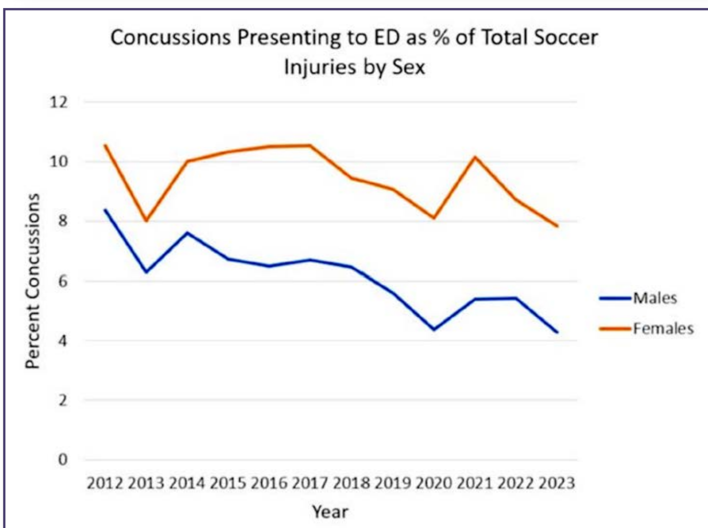

January 1st, 2012, and December 31st, 2023. Univariate and multivariable regression analyses were conducted to assess concussions as a percentage of all soccer-related injuries based on sex, age group, and year.

Results

The number of concussions as a percentage of all soccer-related injuries decreased from 8.2% in 2012-2015 to 6.1% in 2020-2023 (P <0.01). The 14–17-year-old subgroup concussion rate decreased by 3.1%, the 10–13-year-old subgroup concussion rate decreased by 1.7%, and the 6-9-year-old subgroup concussion rate decreased by 0.5%. From 2012-2023, the concussion rate among 14-17-year-olds and 10-13-year-olds was higher than 6-9-year-olds (8.9% and 6.6% compared to 4.9%, P <0.01). Despite a lower soccer-related injury rate overall, females were diagnosed with a greater proportion of concussions than males (9.6% compared to 6.2%, P <0.01). In a multivariable regression analysis, injuries that occurred in the years 2020-2023 were associated with lower odds of a concussion compared to 2012-2015 (OR: 0.75, 95% CI: 0.69- 0.81). The 10-13-year-old age group, 14-17-year-old age group, and female sex were associated with higher odds of concussion compared to the 6-9-year-old age group and male sex respectively (OR: 1.30, 95% CI: 1.16- 1.45; OR: 1.79, 95% CI: 1.61- 1.99; OR: 1.53, 95% CI: 1.43- 1.63).

Discussions and Conclusions

The USSF youth soccer header ban policy introduced in 2015 was associated with a 25.6% relative risk reduction to sustain a soccer-related concussion and present to the emergency department in 2020-2023 compared to 2012-2015. A header ban in players under 10 years old, and limitation to 30 minutes of header practice a week in players under 13 years old may improve player safety by reducing head impacts in the youth population.

Sullivan GR, Lin E, Hoffer A , Richardson M, Chhabra A. Pediatric Concussion Injuries in Soccer: Emergency Department Trends in the United States from 2012 to 2023. Presented at 2025 Annual Meeting of the American Academy of Orthopaedic Surgeons. San Diego, CA: March 10-14, 2025.

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SWEDISH RESEARCH TEAM DEVELOPS SOFT, ROBOTIC ANKLE EXOSKELETON

A team of researchers from KTH Royal Institute of Technology (KTH) and Karolinska Institutet, both located in Stockholm, Sweden, have developed a soft, robotic ankle exoskeleton consisting of actuation and transmission systems to assist 2 degrees of freedom simultaneously: dorsiflexion and eversion, then performed several proof-of-concept experiments on non-disabled persons.

According to doctoral student Xiaochen Zhang at the research group KTH Moveability, Department of Engineering, who presented the work for his thesis, the design of the ankle exoskeleton can assist both drop foot and excessive inversion. "It also introduces a novel multi-objective Human-in-the-Loop optimization protocol aiming to maximize the different assistive effects simultaneously," he said.

Overview of the soft ankle exoskeleton designed to counteract drop foot and excessive inversion.

The actuation system consists of 2 motors worn on a waist belt. The transmission system provides assistive force to the medial and lateral sides of the forefoot via Bowden cables. The coupling design enables variable assistance of dorsiflexion and inversion at the same time, and a force-free controller is proposed to compensate for device resistance. The team first evaluated the performance of the exoskeleton in 3 seated movement tests: assisting dorsiflexion and eversion, controlling plantarflexion, and compensating for device resistance, then during walking tests. In all proof-of-concept experiments, drop foot tendency was simulated by fastening a weight to the shoe over the lateral forefoot.

In the first 2 seated tests, errors between the target and the achieved ankle joint angles in 2 planes were low; errors of <1.5° were achieved in assisting dorsiflexion and/or controlling plantarflexion and of <1.4° in assisting ankle eversion. The force-free controller in test 3 significantly compensated for the device resistance during ankle joint plantarflexion. In the gait tests, the exoskeleton was able to normalize ankle joint and foot segment kinematics, specifically foot inclination angle and ankle inversion angle at initial contact and ankle angle and clearance height during swing.

"Our exoskeleton is designed to assist people with drop foot caused by stroke or other neurological injuries," said Zhang. "We are hopeful that it could significantly improve their safety while walking by reducing the risk of tripping and falling and then enhance their mobility and quality of life."

TOPICAL OXYGEN THERAPY WITH NATROX O_2

NATROX O_2 is a compact, wearable device that generates and delivers a continuous flow of oxygen directly to the wound bed to promote accelerated healing and foster a healthy wound environment, even in wounds that have persisted for years, such as diabetic foot ulcers, venous leg ulcers, pressure injuries, and non-healing surgical or traumatic wounds. Its non-invasive nature, coupled with its effectiveness, offers a significant advancement in chronic wound treatment. Ideal across all clinical and home care settings, it can be used during any phase of healing and works with most standard secondary dressings. The oxygen delivery system is comprised of a soft, triple-layer material that conforms to the wound bend, ensuring optimized comfort even for patients with deep, uneven wounds. This sterile, single-use interface has a wheel shape to allow free passage of wound exudate into the secondary dressing while optimizing oxygen flow.

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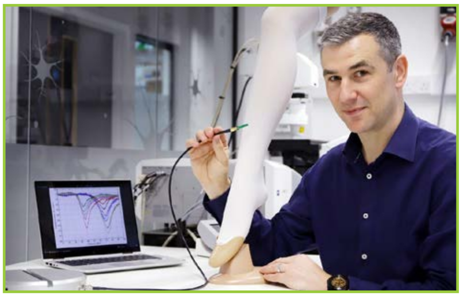
NEW FLEXIBLE SENSOR CAN IMPROVE COMPRESSION THERAPY

Scottish scientists have developed a low-cost, flexible device that can help prevent blood clots for patients after an operation. Their polymer-based sensor fits underneath bandages and compression stockings like a sticking plaster, and a handheld reader measures whether the bandage is exerting the correct pressure on the body.

The sensor is wireless, thinner, more sensitive, and more flexible than similar devices, so it doesn't distort the compression garment as it measures the pressure.



Hands holds the reader to measure the stocking's pressure. Image courtesy of the University of Edinburgh.

"Currently most people who have an operation wake up to find themselves wearing compression stockings, and often they don't fit well," said 1 of the inventors, Philip Hands, PhD, University of Edinburgh, Scotland. "Our device is unobtrusive, and with a wave of the handheld antennae near the body you can measure the pressure and adjust the stocking or bandage. We think this simple, cheap device has huge potential."

According to co-inventor Marc Desmulliez, associate principal (Impact) at Heriot-Watt University, Edinburgh, "Due to its polymer composition, the sensor offers versatility as 1 or more can be positioned anywhere on the body. It could also have broader applications in all sorts of wearable devices, roll up smartphones, and high-performance sports equipment, such as elite swimsuits, where fit is extremely important."

PORTABLE DIGITAL 3D FORCE PLATE

Kistler has introduced a portable digital 3D force plate with piezoelectric sensors for balance and gait analyses. Thanks to digital technology, the portable force plate allows simpler measurement setups, accommodates up to 16 force plates connected in series, and requires less additional hardware than its analog predecessor. The company has also improved the measuring range and natural frequency of the piezoelectric force plate, enabling an even more precise performance analysis in professional sports, clinical applications, and research. The measurement results are delivered via an ethernet interface in a digital format. A shielded hybrid cable handles both data transfer and power supply without affecting the quality of the measurement results. Additionally, Kistler's DataServer interface enables users to integrate motion tracking and other third-party measurement systems. The force plate can be installed on a mounting frame or walkway. It is available in 2 sizes.

Kistler
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GENUTRAIN S PRO KNEE BRACE

The GenuTrain S Pro knee brace, which is designed for active lifestyle and athletic use, adds mechanical stability to the joint by stabilizing the knee with 2 adjustable hinges that are integrated medially and laterally. Depending on the indication, the hinge can be blocked out to limit movement during rehabilitation. The 3D Train active knit provides medical grade compression to reduce swelling and promote joint stabilization. Anatomically contoured sidebars attach directly to the straps for increased stabilizing effect. Hinges can be restricted at 30°, 60°, or 90° flexion and 20° extension. The sidebars are heat-moldable if customization is needed. The viscoelastic insert surrounds the patella and facilitates correct positioning and pain reduction. The knit and insert work together to stimulate proprioception. The brace comes in right and left specific for optimal fit.

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RED LIGHT THERAPY FOR ACCELERATED HEALING, RECOVERY

Recharge Health's FlexBeam portable, high-powered red light therapy device is designed to accelerate healing and recovery. Combining advanced infrared technology with ergonomic design, FlexBeam delivers targeted therapy for pain relief, inflammation reduction, and tissue repair, offering an innovative approach to wellness and recovery. The FlexBeam red light therapy device combines cutting-edge technology with a user-friendly design, making it an efficient and versatile therapeutic tool. It delivers targeted red and near-infrared light directly to the body, stimulating natural healing processes at the cellular level. The device is particularly effective for promoting tissue repair, reducing inflammation, improving circulation, and providing relief to users with muscle soreness, joint pain, and skin conditions. At the core of its functionality is the principle of photobiomodulation, which utilizes specific wavelengths of light to interact with cells and enhance energy production in the body's mitochondria.

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"LIGHTING UP" BACTERIA IN WOUNDS FOR BETTER INFECTION PREVENTION

When physicians debride a wound, such as a diabetic foot ulcer, they remove as much bacteria as possible. However, they face a key limitation—not all bacteria can be seen by the human eye, and some may be missed during the debridement. Now, Keck Medicine of University of Southern California research suggests there may be a more effective method to detect bacteria during wound debridement. Autofluorescence (AF) imaging, where a handheld device "lights up" bacteria previously invisible to the human eye, uses violet light to illuminate molecules in the cell walls of any bacteria. Different types of bacteria turn different colors, allowing physicians to immediately determine how much and which types of bacteria are in the wound.

Armstrong uses AF imaging to debride a wound. Image courtesy of Armstrong.

"We're hopeful this new technology can help surgeons improve their accuracy when pinpointing and consequently removing bacteria from wounds and therefore improve patient outcomes, particularly for those with diabetic foot wounds," said David G. Armstrong, DPM, PhD, a podiatric surgeon and limb preservation specialist with Keck Medicine. "The early detection and removal of bacteria from a wound is vital to preventing avoidable amputations."

According to the research, AF imaging can identify bacteria in wounds in approximately 9 in 10 patients that traditional clinical assessments miss. Additionally, with AF imaging, physicians are able to make medical decisions during the wound debridement, such as starting the patient on antibiotics or providing a special type of wound dressing, rather than waiting for lab results to initiate treatment. Another benefit to the technology is that if bacteria is caught early, the patient may avoid being prescribed antibiotics, which in wound care can be prolonged, thus avoiding possible antibiotic resistance.

HANGER HONORS 2024 PARTNER AWARD RECIPIENTS

Hanger, Austin, TX, announced that its 12th annual Partner Awards honored 4 companies that provide exceptional products and services that advance the field of orthotics and prosthetics and improve patient care and outcomes, as follows:

Ottobock, Duderstadt, Germany, received the inaugural Clinical Evidence Award, which recognizes a partner that made a meaningful contribution through evidence-based published research—ultimately improving patient outcomes. In its recent collaboration with the Hanger Institute for Clinical Research and Education, Ottobock measured the impact of microprocessor knee ankle foot orthoses among users of lower limb orthoses and prosthetic microprocessor knees in the K2 ambulator population.

Infinite Biomedical Technologies, Baltimore, MD, was recognized with the Collaboration Award for partnering with Hanger on the creation of grants and clinical trials throughout their development of the novel Glide platform—ultimately providing streamlined, cost-effective upper limb pattern recognition technology.

WillowWood, Mt. Sterling, OH, received the Innovation Award, which recognizes companies that exhibit expansive thinking in product innovation and technology, resulting in positive clinical outcomes. The company was chosen because of its innovative META Flow foot, which mimics the function of traditional hydraulic ankle feet without the cost, weight, and durability concerns of hydraulic cylinders, meeting a broad range of needs for a large patient population.

College Park, Warren, MI, received the

Operational Performance Award, which recognizes a partner that outperformed industry benchmarks in quality, efficiency, and cost containment. With over 30 years of outstanding customer service, College Park was an early adopter of Hanger's electronic data interchange program, with a 98% adoption rate since inception.

BRIDGES CONSUMER HEALTHCARE ACQUIRES KT TAPE

Bridges Consumer Healthcare, Chattanooga, TN, a consumer healthcare platform comprised of 9 over-the-counter (OTC) and personal care brands, has acquired KT® Tape, American Fork, UT, a kinesiology tape brand designed to provide drug-free pain relief and support for muscles, tendons, and ligaments. The strategic move diversifies and strengthens Bridges' portfolio of specialty OTC brands, increasing the company's scale and positioning it for accelerated organic growth and further add-on opportunities. Terms of the transaction were not disclosed.

WALKING IN LOCKSTEP

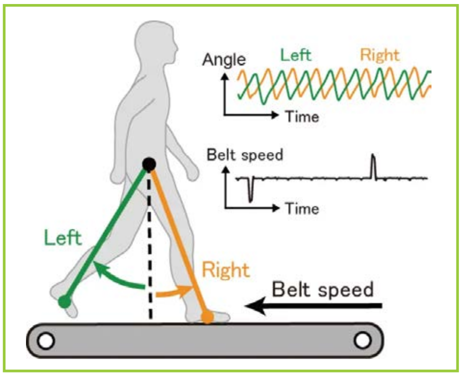

Image courtesy of Osaka University.

Researchers at Osaka University, Japan, have used experimental data and Bayesian inference to study the control of leg motion during walking, and find that intervention occurs only when discoordination exceeds a certain threshold, which may improve rehabilitation methods.

For the study, the researchers captured kinematic data from healthy patients walking on a treadmill that was occasionally perturbed by a sudden change in speed. This led to a momentary loss of the antiphase relationship, but it was quickly restored as the subjects reoriented their walking movements. The data from this experiment was analyzed using a mathematical model of 2 coupled oscillators—similar to 2 pendulums connected by a spring—along with a Bayesian inference method. The approach allowed the researchers to calculate the most probable function that represents how the brain applied its control to coordinate the leg motions.

To simplify the problem further, phase reduction theory was applied, which assumes that the perturbed system is returning to a regular periodic solution, called the limit cycle. Surprisingly, the researchers found that the brain does not actively intervene to coordinate the relative position of the legs until they are a certain amount out of lockstep. They suggest that not requiring the constant application of control improves both energy efficiency and maneuverability.

This research may be important to help improve the walking of elderly people, or individuals who have experienced the neurological effects of a stroke or Parkinson's disease. It may also lead to the development of physical aids that help people walk more naturally.

ADULT INDEPENDENCE WALKER

The Independence Stand-Up Walker™ is designed with joy and change in mind. To accomplish this, the medical device has a tubular frame for easy transport and storage with a vertically and horizontally tapered pole (narrower at the top, both in width and depth), which inherently adds stability. The Independence Walker's large diameter pivoting wheels mean that rolling over uneven floors or gaps in tile are no problem. The armpit braces are height-adjustable, and the side panels are

width-adjustable to accommodate various body sizes. Individuals whose needs are not met within the current device spectrum will have new opportunities for mobility with this device. Individuals who have lost minor functionality of at least 1 arm, such as stroke survivors, will be able to use the device, which in turn, could increase the rate of recovery. The patent-pending walker is manufactured in the United States.

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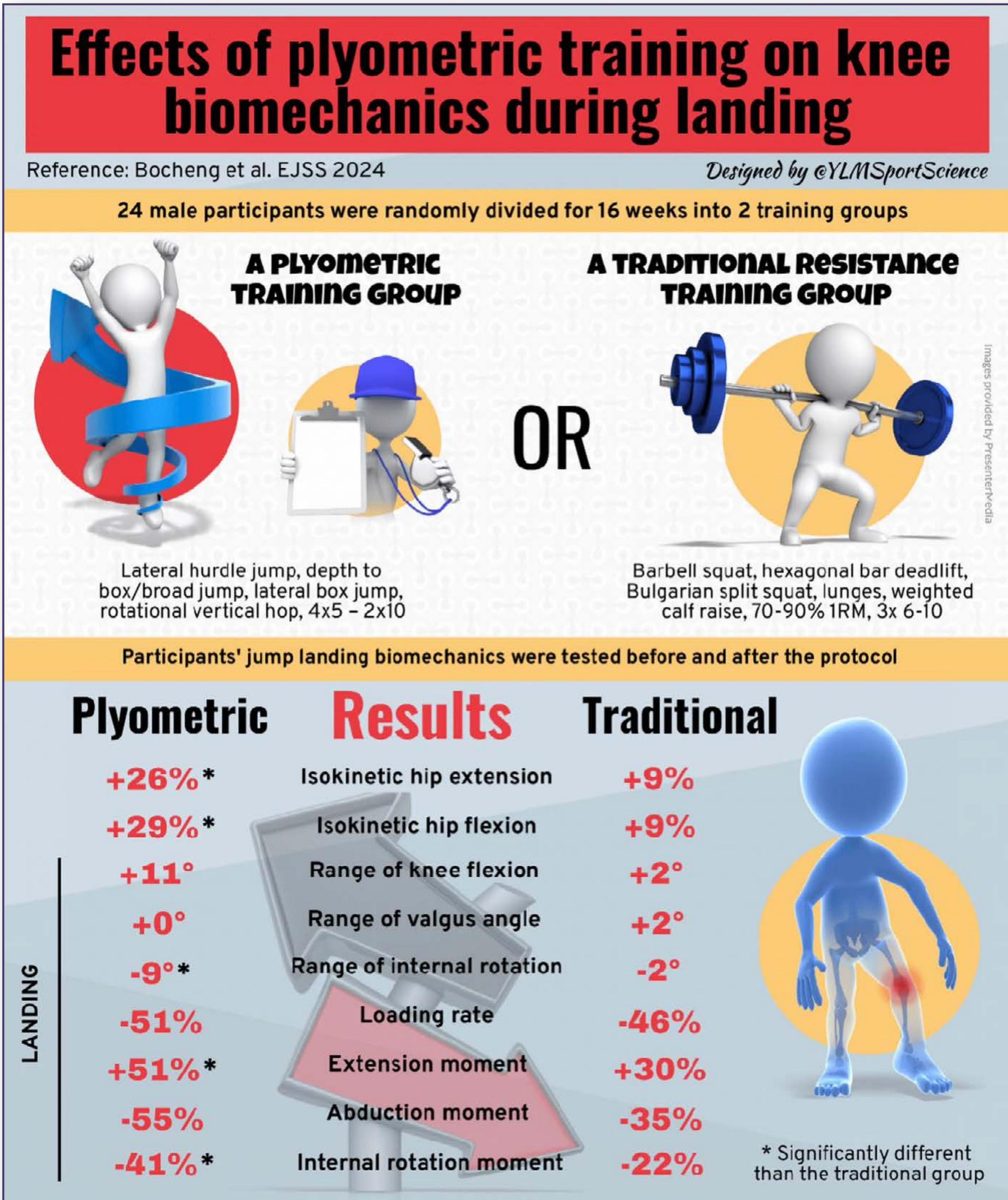

Source: Bocheng C, Ziyan Y, Jiaxin W, Wang G, Tiancheng Y. Effects of 16 weeks of plyometric training on knee biomechanics during the landing phase in athletes. Eur J Sport Sci. 2024;24(8):1095-1109. doi: 10.1002/ejsc.12174.

Peripheral Artery Disease

Peripheral Artery Disease (PAD) is a deadly chronic condition that can lead to heart attack, stroke, or amputation.

1 in 3

» Diabetics age 50+
» Smokers age 50+
» Everyone age 70+

Have PAD

$390 billion

annual US healthcare costs attributable to PAD

100,000 amputations

of lower extremities in the US annually, due to vascular disease

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