Hanger Institute

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2025-26 ANNUAL REPORT

Hanger Institute

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A Letter from our Chief Clinical Officer

Dear Friends and Colleagues,

It is my privilege to introduce the Hanger Institute for Clinical Research and Education's 2025–2026 Annual Report.

In today's healthcare environment, progress depends on discovering new solutions and making them practical, measurable, and meaningful to the people we serve. Over the past year, we continued to move that work forward. We expanded our understanding of the health status, mobility, fall risk, and well-being of lower limb orthosis users, while advancing outcomes tools like the OPRO-M to better inform clinical decision making. We also deepened our work among lower limb prosthesis users by studying how socket replacement, alignment optimization, component selection, and structured outcome measurement can drive meaningful improvements in mobility, participation, and quality of life.

At the same time, we helped strengthen the clinical foundations of emerging areas of care. Our contributions in bone-anchored prosthetics clarified the importance of biologically informed rehabilitation, specialized alignment strategies, and consensus-driven component selection. We also invested in the continued evolution of our national residency program, explored workforce models that support clinicians through the use of clinical extenders, and advanced decision-support tools to create more space for meaningful engagement between patients and practitioners.

Beyond the clinic, we remained committed to shaping the future of access. By aligning research, shared decision-making, and advocacy, we are helping build a future in which orthotic and prosthetic care is more equitable, more personalized, and more responsive to individual goals.

As you will see throughout this report, the Hanger Institute is deepening its commitment to the orthotic and prosthetic community, moving beyond evidence generation to build the systems needed to ensure that evidence meaningfully improves care. To our collaborators, educators, clinicians, advocates, and the patients who continue to share their experiences with us, thank you. Your partnership is what makes this work possible.

We continue to operate and advance with a fundamental truth: outcomes tell us what happened, measuring outcomes that matter most to the individuals living with the condition captures value, and success is defined by whether it mattered to the individual we served.

Shane Wurdeman, PhD, FAAOP(D)
Chief Clinical Officer

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Informing Clinical Decision Making Among Lower Limb Orthosis Users

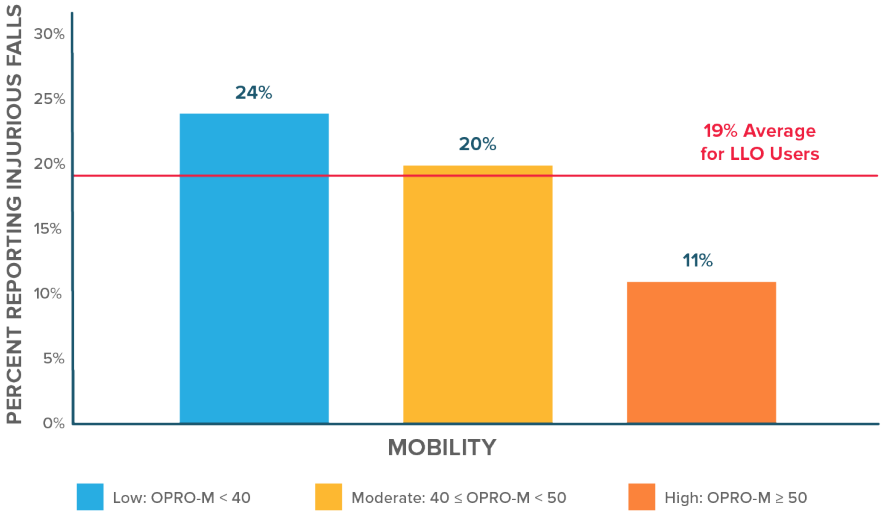
Over the past year, a growing body of research from the Hanger Institute and its academic collaborators at the University of Washington has advanced our understanding of the global health status, mobility, and lived experience of individuals who use lower limb orthoses. Through peer-reviewed publications and national and international scientific presentations, this work has characterized the substantial physical function deficits, elevated pain burden, fall risk, and quality of life challenges experienced by this population. The concurrent development and validation of a condition-specific mobility outcome measure have allowed the Institute to begin to collect and analyze mobility data from this population to better understand and address these challenges. Together, these initiatives reflect a coordinated effort to define the health profile of lower limb orthosis users (LLOU) and to strengthen the clinical tools available to optimize their care.

Defining the Global Health of the Population

In a recent publication for the Journal of Nurse Life Care Planning, the Hanger Institute summarized the global health profile observed among the average lower limb orthosis user (Stevens & Brice, 2025). Drawing upon an earlier collaboration with the University of Washington (Balkman et al., 2025), the article summarized the global health burdens observed in this population as identified using the PROMIS-29 survey instrument. Of primary concern was a significant compromise in the domain of Physical Function with the average LLOU in the 13th percentile relative to the general population. Of secondary concern, the average LLOU reported pain interference values in the 74th percentile relative to the general population.

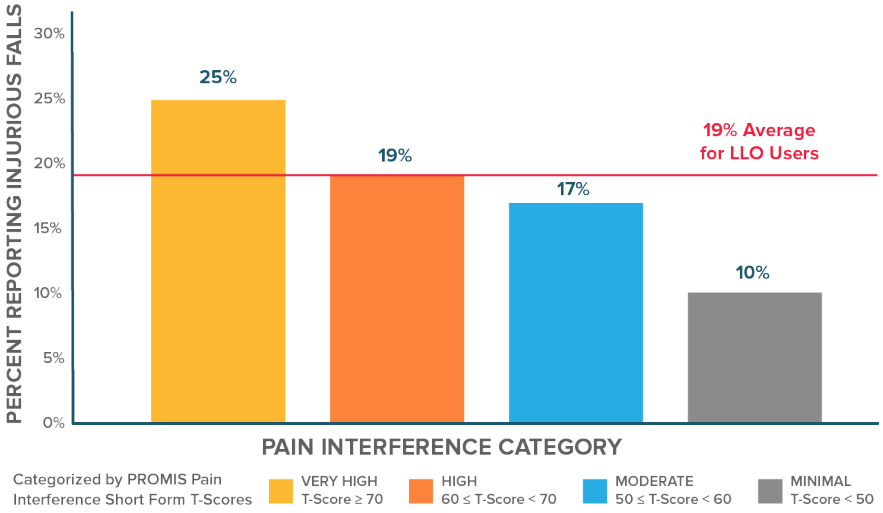
This data was supplemented by a recent analysis of the rate of injurious falls reported by individuals who had been prescribed lower limb orthoses. This analysis, presented at both the AOPA National Assembly (Stevens et al., 2025) and the AAPM&R Annual Assembly (Stevens et al., 2025b) reported a six-month rate of injurious falls among this population of nearly 20%, roughly 50% higher than the injurious fall rate observed among lower limb prosthesis users. Additional analysis identified several risk factors for injurious falls in this population. These included reduced mobility levels (Figure 1), increased pain interference levels (Figure 2), reduced lower limb strength and female sex.

In a subsequent analysis of LLOU, reported at the AOPA Annual Assembly, Steffensen (2025) confirmed a suspected positive relationship between mobility and the related constructs of quality of life, satisfaction and well-being (Figure 3). By contrast, negative relationships were observed between pain interference levels and both well-being (Figure 4) and quality of life (Figure 5). These aggregated observations on the Global Health Trends, Falls and Well-Being among LLOU were collectively presented at the 52nd Annual Meeting and Scientific Symposium of the American Academy of Orthotists and Prosthetists (Steffensen et al., 2026).



Fall Risk & Mobility

Figure 1: Percent of individuals reporting injurious falls by mobility classification.



Fall Risk & Pain Interference

Figure 2: Percent of individuals reporting injurious falls by pain interference classification.

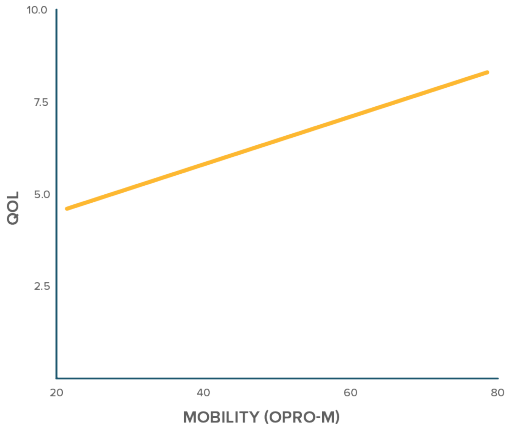
Assessing Mobility

As described above, mobility is a key construct in the management of LLOU. The Hanger Institute, in collaboration with the University of Washington, has continued their extensive efforts in the development and validation of an outcome measure designed specifically to measure mobility in this unique population. Having finalized the development of The Orthotic Patient-Reported Outcomes – Mobility, or OPRO-M, this past year was spent socializing the validation efforts associated with the new measure in peer-reviewed publication and at professional education meetings. Balkman et al. (2025), in collaboration with the Hanger Institute, published a paper in the peer-reviewed journal PLOS ONE describing the successful evaluation of the measures' construct validity and test-retest reliability. In addition, the collaborative OPRO-M development team shared their recent efforts to establish the validity and reliability of the OPRO-M alongside three other patient reported outcomes measures among LLOU (Balkman et al., 2025b).

A panel of researchers from the Hanger Institute and the University of Washington traveled to Stockholm, Sweden this past summer to present their aggregated efforts in the development, testing and clinical implementation of the OPRO-M at the World Congress of the International Society for Prosthetics and Orthotics (Balkman et al., 2025c).

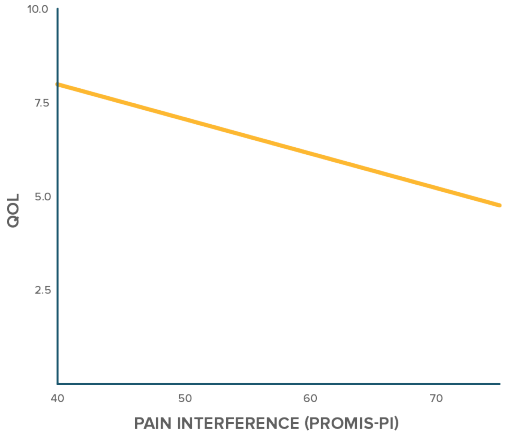
Establishing Usage Patterns

While in Stockholm, Stevens et al. (2025) presented the team's data on the usage patterns of orthoses and assistive devices among LLOU. This data, collected as part of the initial OPRO-M development effort, demonstrated that LLOU tend to be more reliant on their orthoses in outdoor activities than in familiar indoor settings. This insight is important as it underscores the value of assessing the impact of lower limb orthoses outside the convenient indoor settings of the clinic, a task which can be facilitated in part through the use of the OPRO-M assessment tool.



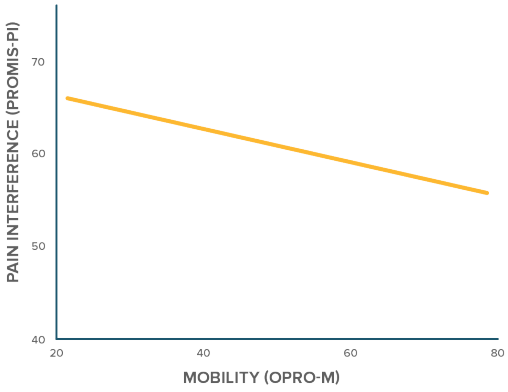
Mobility & Quality of Life

Figure 3: The positive relationship between mobility and the related constructs of quality of life, satisfaction and well-being.



Pain Interference & Quality of Life

Figure 4: The negative relationship observed between pain interference and the related constructs of quality of life, satisfaction and well-being.



Relationship Between Pain Interference & Mobility

Figure 5: The negative relationship observed between pain interference and mobility

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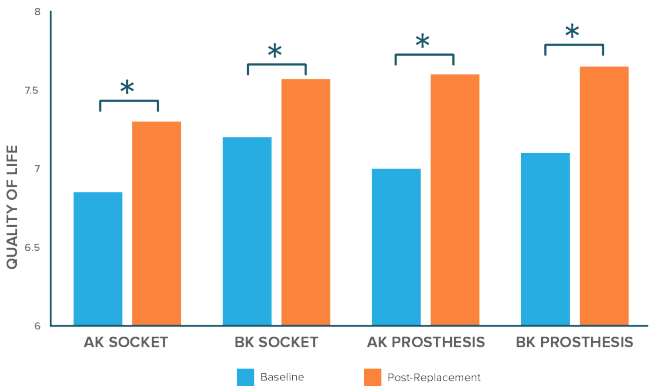
Facilitating Improvements Among Lower Limb Prosthesis Users

Over the past year, research conducted by the Hanger Institute has advanced our understanding of how targeted clinical interventions influence function and well-being among individuals with lower limb prostheses (LLP). Through peer-reviewed publications and both national and international scientific presentations, this work has characterized the impact of socket replacement, alignment optimization, component selection, and exercise facilitation on patient outcomes. Collectively, these efforts reflect a coordinated approach to identifying, measuring, and optimizing meaningful improvements in mobility, quality of life, and satisfaction in this population.

Defining the Impact of Clinical Interventions

A central focus of this year's work has been to better understand when and how common clinical interventions drive measurable change. In a recent publication in the Journal of Patient-Reported Outcomes (Castleberry et al., 2026), the Hanger Institute evaluated changes in patient-reported mobility following the replacement of prosthetic sockets or components. Findings demonstrated significant improvements in mobility, quality of life, and satisfaction following replacements, supporting the role of these interventions as meaningful opportunities to enhance function (Figure 6).



Significant Improvement in Quality of Life After Socket or Prosthesis Replacement

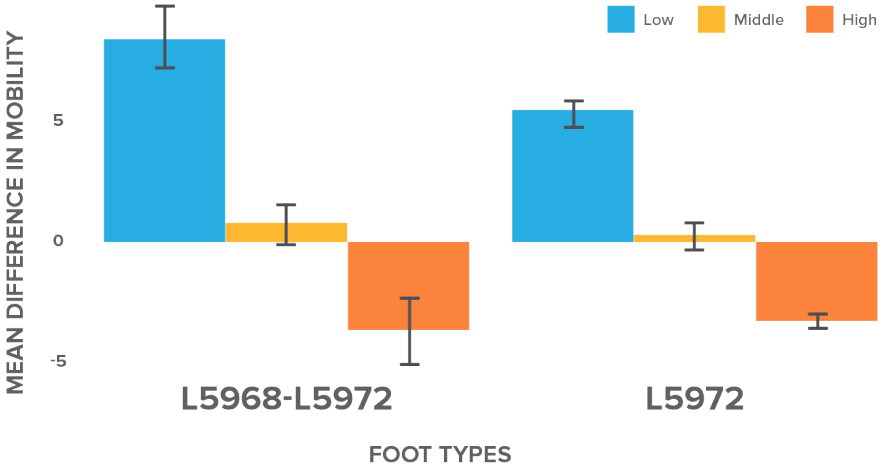
Figure 6: Mean quality of life values across each cohort, before and after interventions. **Represents statistical significance ($p<0.05$)*

These findings were further disseminated through presentations at the AAOP Scientific Symposium (Castleberry, 2026), and the AOPA National Assembly (Castleberry, 2025). Additional detailed content on transfemoral socket principles and considerations was presented by the Institute as part of the Academy's Certificate Program on Transfemoral Care (Carroll, 2026). Together, this body of work reinforces that appropriate socket management is central to optimizing outcomes among LLP users.

In addition to socket-related interventions, alignment optimization was identified as a critical determinant of mobility. A second educational session was presented as part of the Academy's Certificate Program on Transfemoral Care (Remington, 2026a) as well as the Amputee Coalition National Conference (Remington, 2026b). This material highlighted structured approaches for diagnosing and correcting alignment-related limitations. Collectively, these efforts demonstrated that systematic alignment assessment can resolve mobility impairments that might otherwise be attributed to component limitations or patient factors. Importantly, alignment was framed not as a one-time adjustment, but as an ongoing clinical process responsive to changes in patient condition and device configuration. Changes in user activity level, confidence, strength, and range of motion often necessitate iterative alignment adjustments as capacity grows or diminishes over time.

Expanding Mobility Through Component Selection

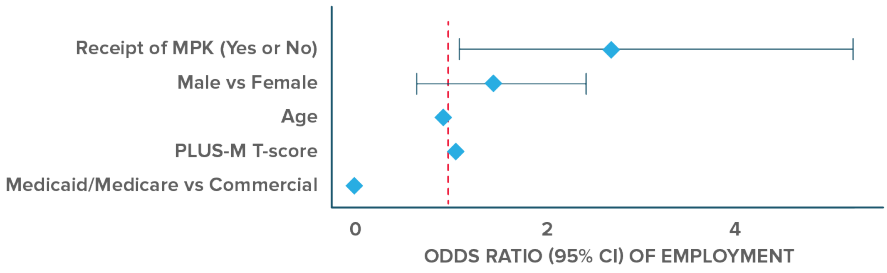
Research presented at national and international conferences has also contributed to a growing understanding of how component selection influences mobility potential. At the AOPA National Assembly, Fylstra et al. (2025) reported that hydraulic ankle-foot components are associated with increased mobility among individuals classified as K2, especially those with the lowest mobility (Figure 7). These findings challenge traditional prescribing patterns and suggest that carefully selected modern components may enable greater functional performance in populations historically considered limited in mobility potential.



Score Change by Mobility Group

Figure 7: Mean mobility differences observed among low, middle and high mobility K2 ambulators following the receipt of hydraulic ankle and non-articulate flexible keel feet.

Similarly, findings presented at the International Society for Prosthetics and Orthotics (ISPO) World Congress highlighted the benefits of microprocessor knee utilization among individuals with transfemoral amputation. Outcomes from the ASCENT K2 trial (Wurdeman et al., 2025) demonstrated functional gains within this population, while additional analyses presented at AOPA indicated that



Adjusted Odds of Employment

Figure 8: Among the queried variables, the receipt of an MPK was associated with the greatest increased odds for employment.

receipt of a microprocessor knee within the first year post-amputation was associated with increased likelihood of employment, particularly among individuals in underserved communities (Steffensen, 2025) (Figure 8). Together, these findings reinforce the broader relationship between mobility and participation, demonstrating that component selection decisions have implications beyond physical performance alone.

Measuring and Facilitating Change

Consistent with these efforts, the Hanger Institute has advanced approaches to measuring and facilitating clinically meaningful change in LLP users through both performance and patient-reported outcomes.

In the peer-reviewed journal Prosthetics and Orthotics International, Clemens et al. (2025) evaluated the Component Timed-Up-and-Go (TUG) test as a clinical measure of mobility change following alterations to the prosthesis. This retrospective cohort study demonstrated that the Component TUG is sensitive to detecting functional improvements, providing clinicians with a practical and objective tool to support clinical decision-making.

In addition to this novel performance measure, the Institute has published and presented extensively upon the value of patient-reported prosthetic mobility relative to Well-Being, Fall Risk, and Employment. These observations were recently summarized at an organized session at the ISPO World Congress (Stevens et al., 2025). The same congress featured a free paper characterizing the expected prosthetic mobility trajectories across the lifespan based on demographic and clinical factors (Fylstra, 2025a). Similar content on the resultant “mobility curves” was later presented at the AAPM&R Annual Assembly (Stevens & Fylstra, 2025). These tools provide important context for evaluating patient progress and identifying deviations that may warrant intervention.

Building upon the mobility trajectory curves described above, efforts to enhance the interpretation of patient-reported outcomes have led to the development of the CASTLE 2 framework. In this approach, individual mobility response items are mapped against population response probabilities. This enables clinicians to better interpret patient-reported mobility and identify areas of potential improvement. This concept was published in the peer-reviewed PM&R (Fylstra et al., 2026), and shared at the ISPO World Congress (Fylstra et al., 2025b).

Facilitating Active Engagement

Beyond device-related interventions, this year’s work emphasized the importance of exercise and active engagement in supporting long-term outcomes. Presentations at the AOPA National Assembly highlighted practical strategies for facilitating exercise among individuals using prosthetic and orthotic devices (Castleberry et al., 2025). These efforts reinforce that exercise is a foundational component of care, contributing to strength, balance, and confidence while supporting the benefits achieved through socket optimization and advanced component use. Encouraging sustained physical activity is therefore critical to maximizing functional outcomes and reducing fall risk.

A Coordinated Approach to Improvement

Across these initiatives, a consistent theme has emerged: improvement among LLP users is both achievable and measurable through data-informed clinical practice. Socket replacement, alignment optimization, appropriate component selection, and structured outcome measurement each contribute to enhanced mobility and broader life participation.

Together, these efforts demonstrate the value of integrating clinical expertise with rigorous measurement tools to guide decision-making and optimize patient outcomes. Through continued research, dissemination, and clinical implementation, the Hanger Institute remains committed to advancing care strategies that not only restore mobility, but meaningfully improve the lives of those who rely on prosthetic technology.

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Novel Resources in Bone-Anchored Prosthetic Care

Bone-anchored prosthetic (BAP) systems are transforming lower-limb prosthetic care by eliminating the socket interface and enabling direct skeletal attachment through osseointegration. While this approach offers meaningful functional and quality-of-life benefits for appropriately selected individuals, it also introduces distinct rehabilitation, biomechanical, and safety considerations that differ from traditional socket-based practice in fundamental and important ways. As clinical adoption expands, there is growing recognition that prosthetic connection, component prescription, alignment strategy, and rehabilitation progression for BAP users require specialized frameworks grounded in bone biology and implant mechanics.

Recognizing the disruption associated with these novel considerations, the American Academy of Orthotists and Prosthetists, in collaboration with the American Board for Certification in Orthotics, Prosthetics and Pedorthics, convened a State of the Science Conference on these topics (Figure 9). Membership from the Hanger Institute contributed to this Conference as well as its subsequent proceedings, including articles on biologically informed rehabilitation protocols, the critical role of connector and fail-safe designs, and the need for dedicated BAP prescription guidelines. This was followed shortly by an international consensus effort to establish prosthetic component recommendations within this population. Together, these works highlight both the progress made and the knowledge gaps that remain in optimizing safe, durable, and evidence-informed care for individuals using bone-anchored prostheses.

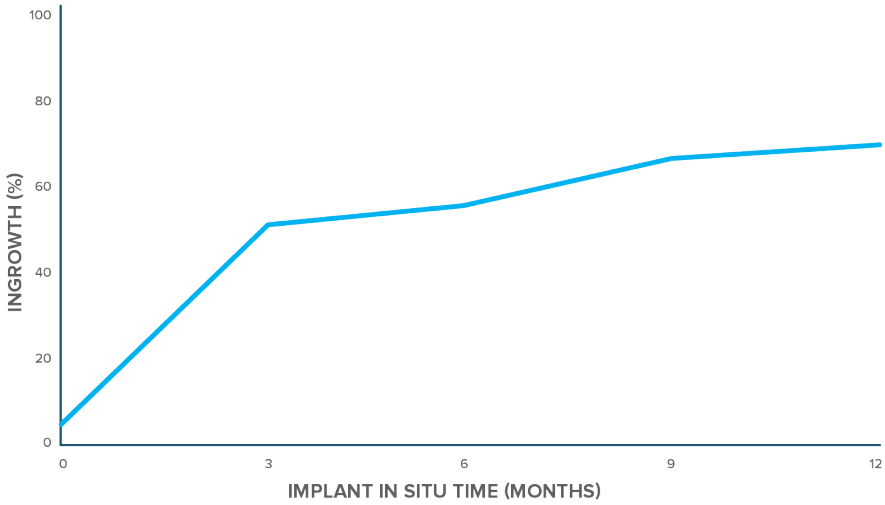
Rehabilitation of the Bone-Implant Interface

In one chapter of the proceedings, Stevens and Prasso (2025) connect bone physiology with rehabilitation strategy, explaining why the gradual progression from a shortened training prosthesis to a full-length limb makes biological and clinical sense. Drawing from animal data showing rapid

State of the Science

Figure 9: Access the Prosthetic Care Following Bone-Anchored Prosthesis Surgery: State of the Science Proceedings by scanning the QR code.

osseointegration in the first three months followed by slower remodeling, the authors outlined the biology behind staged loading protocols (Figure 10). These progressive protocols are used across both threaded (i.e., OPRA) and press-fit systems.



Ingrowth (%) vs. Implant in Situ Time

Figure 10: Bony in-growth into the implant over time following osseointegration ("in situ" time).

The article goes on to explain how the short training prosthesis is more than a temporary device — it allows progressive load tolerance, contracture management, hip strengthening, core activation, and neuromuscular adaptation while minimizing torque and distraction forces. Pain monitoring becomes the key clinical barometer for progression, and clinicians are encouraged not to rush the transition to full-length. The overarching theme is that successful BAP rehabilitation depends on respecting bone biology, progressing load intentionally, and integrating targeted physical therapy to support safe, durable osseointegration.

Prosthesis Connection and Alignment

In a separate article, Garibaldi et al. (2025) provided a practical clinical guide to the connector systems and alignment considerations that are unique to bone-anchored prostheses. The authors reviewed each of the major implant systems (OPRA, ILP, OPL, Luci/OTN, Hermle, Compress, POP) and described how each uses different coupling mechanisms and fail-safe designs to protect the bone-implant interface. While connector design may directly influence safety, durability, and even gait efficiency, the literature on connector performance is surprisingly sparse. The authors also emphasized the heightened importance of precise alignment of BAP, including the related phenomenon of hip flexor tightness, anterior femoral bowing, and sagittal offsets. Overall, it underscores that connector familiarity, careful alignment, and collaboration with manufacturers are essential for optimizing patient outcomes and safety.

Novel Considerations in Component Selection

Earley et al. (2025) make the case that prescribing components for BAP is not simply a socket-based process without the socket — it's a fundamentally different clinical decision pathway that deserves its own guidelines. The authors walk through familiar prescription variables like height, weight, residual limb length, activity level, fall risk, and access to follow-up care, and explain how each takes on new implications when the prosthesis is directly attached to bone. They highlight that forces are transmitted more directly through the skeleton, that alignment tolerances are tighter, and that fail-safe mechanisms become a critical part of

component selection rather than an afterthought. Clinically, the message is clear: osseointegration changes biomechanics, risk profiles, and safety considerations enough that consensus-driven guidance is urgently needed to support prosthetists making these high-stakes decisions.

International Consensus

Hanger Institute members also contributed to the first international effort to bring structured clinical consensus to prosthetic component prescription for transfemoral BAPs (Earley et al., 2025b). The effort used a three-round Delphi process with experienced clinicians across five countries. The central clinical takeaway was that prescription decisions for BAP users should prioritize microprocessor or hydraulic knees, dynamic response feet, torsion absorbers, and appropriate safety connectors while also recognizing the unique biomechanical realities of direct skeletal attachment. Notably, there was strong agreement that sex and age alone should not drive prescription changes; instead, decisions should be based on functional ability and desired activities. The panel strongly favored torsion absorbers to mitigate rotational forces transmitted to the implant — an area not emphasized in traditional socket guidelines. Importantly, this work does not establish formal clinical practice guidelines but instead provides a clinically grounded framework that identifies where expert consensus exists.

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Extending and Retaining: Ensuring O&P Care in Modern Practice

In 2025, Hanger positioned itself at the forefront of the evolving O&P landscape by embracing the strategic integration of clinical extenders — a transformative approach to building a workforce ready to meet rising demand for orthotic and prosthetic care. Recognizing opportunities presented by growing patient populations, Hanger invested in scalable workforce models that empower clinicians to focus on delivering top-of-license care. These initiatives strengthen engagement and operational excellence while laying the foundation for sustained growth and expanded patient access.

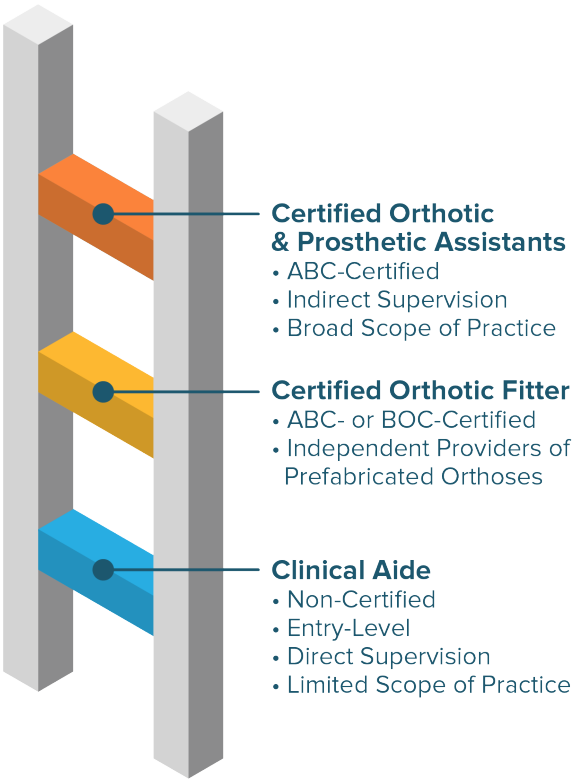
As demand for specialized O&P care continues to surge, Hanger has recognized that investing in its clinicians is essential to delivering exceptional outcomes at scale. In 2025, Hanger expanded team-based care models that leverage the strengths of clinical aides, certified fitters, and certified assistants (Figure 11). By distributing responsibilities across these roles, clinicians are empowered to focus on high-impact work — fostering professional fulfillment, longevity, and organizational growth.

This strategy was highlighted at the American Orthotic and Prosthetic Association meeting (O'Brien et al., 2025), where Hanger's approach to workforce sustainability took center stage. The session emphasized key drivers of clinician engagement — including workload optimization, mentorship, professional development, and operational support — and reinforced a clear vision: clinicians thrive when they can prioritize patient care. The integration of care extenders was presented as a structural solution that accelerates early-career development and builds confidence in emerging clinicians.

A complementary session at the same event (O'Brien et al., 2025b) demonstrated how well-trained assistants improve clinic flow, reduce clinician burden, and enhance patient satisfaction. By redistributing tasks such as room preparation, documentation support, device adjustments, and patient follow-up, clinicians can focus on evaluation, decision-making, and complex case management — resulting in a more balanced workload and increased capacity.

This messaging continued in a webinar hosted by the American Academy of Orthotists and Prosthetists Independent Practice Group (O'Brien & Fletcher, 2025), which outlined a practical framework for implementing extender models. The session emphasized that success requires intentional onboarding, clear role definition, competency development, and leadership alignment. Hanger's 2025 approach reflected this comprehensive perspective, focusing on both hiring and structured training while fostering collaborative clinic cultures.

As the year progressed, the Hanger Institute shifted from foundational awareness to strategic optimization. A recent session (O'Brien & Schultea, 2026) highlighted how extender integration supports long-term workforce sustainability by enabling clinician specialization, leadership development, and research engagement. Reducing administrative burden allows clinicians to pursue advanced certifications and contribute to innovation, strengthening both fulfillment and organizational loyalty.



Extender Career Ladder

Figure 11: Within the Extender model proposed by the Hanger Institute, clinical extenders matriculate through a series of increasing certifications with expanding independence and scope of practice.

Importantly, Hanger's retention strategy also addressed the transitional vulnerability of new graduates. A recent session at the AAOP Annual Meeting (Gilhooly-Senczyszyn et al., 2026) emphasized the importance of structured early-career support. While not exclusively focused on extenders, it reinforced a central principle: clinicians thrive in well-supported team environments. Clinical extenders play a key role in stabilizing workloads, enabling new clinicians to build clinical judgment and professional identity.

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Supporting Collaborative Research Efforts with the Veterans Administration

Over the past several years, the Hanger Institute has engaged in a series of productive cross-sector collaborations with researchers from the Veterans Administration to advance the measurement and clinical management of individuals living with limb loss and limb difference. Two such initiatives — one focused on advanced lower extremity orthoses, and the other on the development and refinement of patient-reported outcome measures for upper limb prosthesis users — exemplify the Institute's commitment to generating rigorous, generalizable evidence that serves both the military and civilian populations it treats. In each case, the Institute's participation extended the reach of these efforts beyond the VA and military systems, ensuring that the resulting findings and clinical tools reflected the breadth of patients encountered in everyday prosthetic and orthotic practice.

Developing a Better Measure of Function for Upper Limb Prosthesis Users

Building upon a foundational body of work developed through the collaborative efforts of the Providence VA Medical Center and the Hanger Institute, a recent publication by Resnik, Borgia, Heinemann, Stevens, and Ni (2025) advanced the measurement science underlying the Upper Extremity Functional Scale for Prosthesis Users Two-Handed Task scale (UEFS-P). The original development of the UEFS-P, emerged from a recognition that existing measures — including the widely used PROMIS Upper Extremity short forms — failed to account for prosthesis engagement in task performance, limiting their clinical utility in prosthetic rehabilitation (Resnik et al., 2023). That foundational work, conducted across a sample of 423 prosthesis users drawn from both VA and civilian sources, established two unidimensional subscales addressing one- and two-handed task performance.

The Hanger Institute's participation in recruitment through its private-sector network was instrumental in ensuring that the resulting measure reflected the broader prosthesis-using population, extending

beyond the predominantly male, veteran-heavy samples that have historically characterized this field. Notably, the development process identified meaningful differential item functioning by both laterality and sex, with items such as buttoning a shirt proving more difficult for women and others demonstrating distinct performance patterns across unilateral and bilateral amputees — findings that directly shaped the DIF-adjusted scoring approach ultimately adopted for the UEFS-P.

The 2025 publication addressed subsequent methodological critiques of the original scoring model and introduced a novel mixed generalized linear model approach — combining a Poisson count model with a partial credit model — that more appropriately captured both the number of tasks performed with a prosthesis and the difficulty of those tasks. The resulting model demonstrated superior test-retest reliability (ICC = 0.86), improved person reliability (0.78), and robust known group validity as evidenced by significant differentiation across amputation levels.

Critically, the inclusion of a task count variable reflected a clinically meaningful construct: the extent to which individuals actually engage their prosthesis in everyday bimanual activities. This insight was only possible through a sample of sufficient size and diversity — a direct product of the cross-sector collaboration between the VA and Hanger Institute — and reinforced the importance of ensuring that civilian patients, including women whose functional profiles and task difficulty patterns differed meaningfully from their male counterparts, were actively represented in the calibration sample. The continued refinement of the UEFS-P scoring framework positions this measure as an increasingly rigorous and clinically actionable tool for evaluating prosthetic rehabilitation outcomes across the full spectrum of upper limb prosthesis users.

Differentiating Lower Limb Orthoses

A modern AFO design in which a carbon strut positioned along the back of the leg mimics the resistive and propulsive forces of the calf muscle.

The IM ABLE (Injuries Managed with Advanced Bracing for Lower Extremities) study represented a significant cross-sector collaboration between the U.S. Department of Veterans Affairs (VA) and Hanger Clinic, alongside academic partners at the University of South Florida, to address a critical gap in orthotic care research (Miro et al., 2025). Despite approximately 20,000 extremity trauma cases attributed to the wars in Iraq and Afghanistan — and an additional 25,000 to 35,000 civilian extremity trauma cases occurring annually — the evidence base supporting clinical decision-making for modern ankle-foot orthoses (AFOs) remained strikingly limited.

Prior research on the Intrepid Dynamic Exoskeletal Orthosis (IDEO), one of the most studied advanced AFOs, had encompassed fewer than 400 subjects drawn almost exclusively from young, otherwise healthy male service members, leaving outcomes among veterans, older adults, women, and civilian patients largely uncharacterized. Given the novelty and complexity of such devices, the absence of rigorous comparative evidence is consequential for both clinical practice and resource stewardship.

To address these gaps, the IM ABLE study proposes to employ a prospective multi-site crossover design in which participants are randomized to either a modern or conventional AFO, undergo a structured training and accommodation protocol, and then cross over to the alternative device. Clinical outcomes — including mobility (Timed Up & Go, Two-Minute Walk Test), self-reported function (EQ-5D), pain, and balance confidence (ABC scale) — will be assessed at each crossover point and following a 90-day real-world utilization period.

The integration of Hanger Clinic as a private-sector site is particularly noteworthy, as it extends the study's reach beyond VA and military populations to the broader civilian community. The study targets a total enrollment of 120 participants, with a target of approximately 40 individuals recruited from the civilian sector through Hanger Clinic. Together, these collaborative sites are positioned to generate generalizable evidence that can directly inform prescription guidelines across the full continuum of ambulatory ability — from household ambulation to high-level community mobility.

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Continued Evolution of the National Residency Program

The Hanger Clinic O&P Residency Program remains a cornerstone of our commitment to developing the next generation of clinical experts. Since 1996, the program has trained more than 950 residents, ensuring continued access to high-quality orthotic and prosthetic care across the nation. Over the past year, the program has undergone leadership changes and strategic transformation, including a transition from a locally driven training model to a more coordinated, centralized approach that supports improved consistency, enhanced oversight, and alignment of residency positions with long-term workforce needs.

Program Leadership

Sally Kenworthy, PhD, MPO, CPO, LO
Resident Strategy Lead

Erin O'Brien, CPO, FAAOP
National Residency Program Coordinator

Jason Wening, MS, CPO, LPO, FAAOP
National Residency Program Coordinator

Deborah Stock
Administrative Specialist

Annual mock-exam events hosted by the Hanger Institute provide residents with practical exposure to certification exam formats.

Engaging Our Clinical Education Community

The continued evolution of the program is supported by the active engagement of clinicians and residents across the organization. This year, we expanded opportunities for participation and feedback through the establishment of a Resident Advisory Council and a Mentor Advisory Council, both of which provide direct insight into the training experience and inform ongoing program improvements. The program also continued to deliver structured mock board examinations supported by a national group of over 40 clinician examiners. In addition, we launched a peer tutoring initiative in which board-eligible clinicians provide academic support to strengthen board examination preparation.

We recognize and thank the numerous contributors to this program, including 13 Zone Residency Leads, 15 Mentor Advisory Council members, 15 Resident Advisory Council members, 23 peer tutors, and the mock examination organizers and examiners whose contributions strengthened the program this year.

Metrics

150

NCOPE-Approved Residency Sites

395

NCOPE-Approved Mentors

124

Residencies in Progress

111

Residencies Completed in 2025

Every year the Hanger Institute hosts several mock-exam events where residents are exposed to the format of the various certification exams.

Enhancing Clinical Care Through Artificial Intelligence

How Hanger built CARA — an AI purpose-built for prosthetic and orthotic care

Why We Did This: The Opportunity We Set Out to Seize

Prosthetic and orthotic care has always been built on relationships — the deeply personal partnerships between clinicians and the patients whose mobility and independence depend on their expertise. As the field has evolved, so have the documentation and payer policy requirements that support high-quality care. Hanger recognized an opportunity to meet these growing demands in a way that strengthens, rather than competes with, the patient-clinician relationship.

When AI emerged in healthcare, members of the Hanger Institute collaborated with our partners in Digital Technologies to identify where it could best serve the company. Working with clinicians and grounded in Hanger Institute research, the team aligned on a clear focus: use AI to reduce documentation burden, restore clinician attention to the patient, and improve outcomes through stronger relationships and shared decision making.

This led to a deliberate choice in 2023 — rather than adopt a general-purpose healthcare AI, build one purpose-built to transform O&P care. That was not a technology decision. It was a decision about what kind of clinical experience Hanger wanted to deliver, and what kind of profession O&P should be. The result is CARA: the Clinical Assistant for Records Automation.

What Makes CARA Different

CARA's core differentiator is the data behind it. Working with Hanger Clinic, members of the Hanger Institute used clinical documentation of patient cases drawn from clinics across the United States. As a result, CARA learned how O&P clinicians think, document, and reason — across regions, patient populations, device types, and care settings. It has been trained to understand and speak the clinical language of prosthetics and orthotics, and reflects the full breadth of how O&P care is delivered

nationwide. That foundation is continuously refined by real-world clinical use and newly published research from the Hanger Institute and the broader field. The longer CARA is used, the more O&P-specific it becomes — a compounding advantage for clinicians and patients alike.

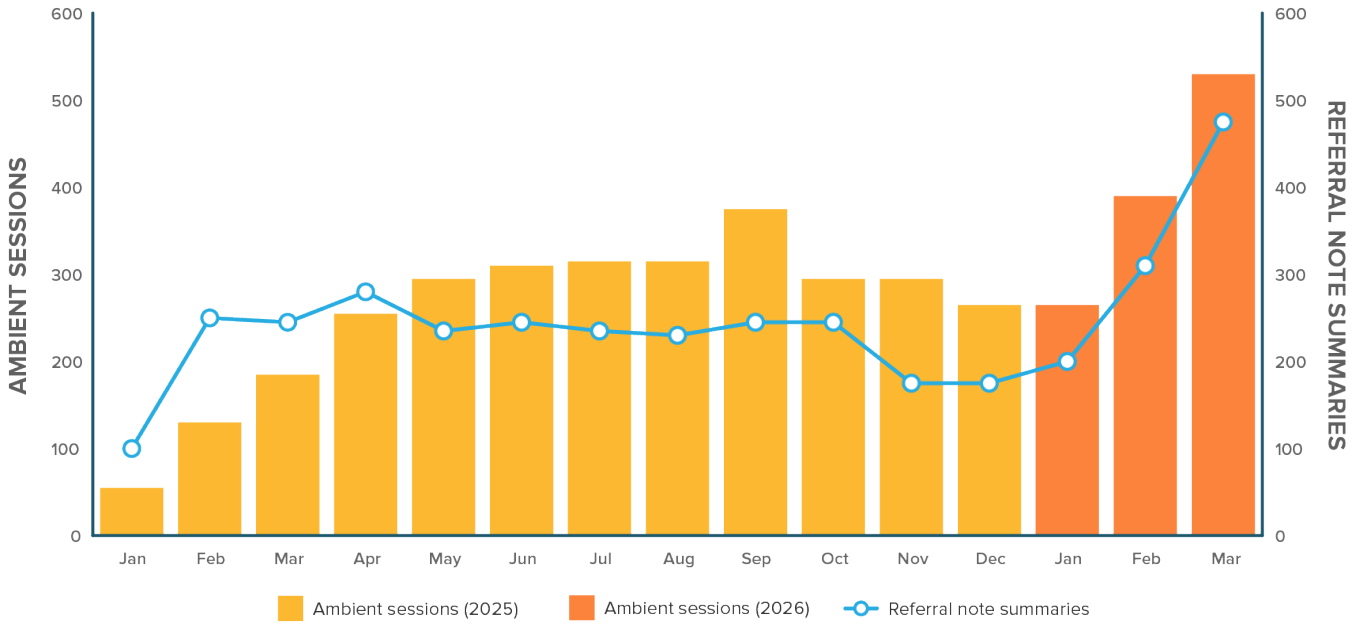
Why This Helps Clinicians and Patients

At its core, CARA gives clinicians back the most valuable thing a healthcare encounter can offer: their undivided attention. It does so through three functional platforms:

- **Ambient listening** — CARA transcribes and summarizes conversations in real time, allowing clinicians to maintain eye contact, listen actively, and engage fully. The result is not just greater efficiency — it transforms the relational quality of every encounter.

- **Referral note summarization** — Using optical character recognition and custom prompts, CARA distills referring providers' records and surfaces what matters most for O&P care. Clinicians arrive at every encounter fully informed and prepared.

- **Clinical narrative generation** — CARA integrates referral notes, ambient transcripts, and structured medical record data into a draft clinical note. Clinicians review and refine with CARA as a collaborative writing partner, producing notes that are faster to complete, more clinically individualized, and more responsive to payer documentation standards.



CARA Clinical Adoption

Figure 12: AI Utilization within Hanger Clinic including Ambient Listening sessions (bars) and Referral Note Summary sessions (lines). The latter have the most compelling trend with a sharp increase in Q1 2026 and a March figure that is nearly double the best month in all of 2025.

Modern healthcare demands justifications grounded in whole-person health. Under the direction of the Institute, CARA was built for exactly this environment — connecting the science, the medical record, and the patient's perspective so clinicians can do their best work while maintaining a healthy work-life balance.

CARA Justification Assistant (CARA J.A.)

Introduced in late 2025, CARA J.A. extends this logic to the device authorization process. It ties feature-based clinical reasoning directly to specific L-codes — combining prescribed device features, medical records, clinical assessment findings, and documented patient conversations to produce medical necessity documentation that is faster, more accurate, and more deeply personalized than ever before. Expansion to lower-limb orthotic users is already underway, broadening access to targeted, thoughtfully designed care while continuing to support clinicians at every step.

Why Now: The Evidence That It Is Working

Adoption across Hanger's national network has been substantial. Ambient listening has emerged as the most widely and rapidly adopted capability since launch (Figure 12) — a meaningful signal in itself. Tools that genuinely improve the clinical experience do not require mandates. They spread because clinicians choose them.

Hanger has pursued CARA adoption and evidence integration in parallel. The introduction of Hanger Institute's research findings into CARA has created a feedback loop between evidence generation and clinical practice that is distinctive in healthcare — translating scholarly priorities directly into platform improvements that keep the clinician-patient relationship at the center of every encounter. In a recent example the Institute's AFO-specific shared decision-making instrument (Fylstra et al., 2025), presented at the AOPA National Assembly, gives clinicians a structured framework for aligning with patients on their preferences, priorities, and goals. Combined with CARA's ambient listening and record summarization capabilities, these richer, more patient-centered conversations now happen seamlessly — even in the busiest clinic.

The evidence is confirming what the original rationale predicted: when clinicians are equipped with the right tools and the right evidence at the moment of decision, they are more present, more informed, and more capable of delivering relationship-centered care. That is what defines the Hanger Institute's approach to AI — not simply streamlining current operations, but elevating clinical care to what it has always aspired to be.

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Helping Every BODY to Move

The Hanger Institute has played a pivotal role in advancing the So Every BODY Can Move (SEBCM) initiative — a coordinated national effort to expand insurance coverage for activity-specific prosthetic and orthotic devices and reframe physical activity as a medical necessity. Through research, advocacy, and clinical innovation, Hanger Institute has been a driving force in the movement to ensure that individuals with limb loss and limb difference have equitable access to the devices they need to live active, fulfilling lives.

At the heart of Hanger Institute's contributions is a robust body of research designed to build the evidence base necessary to demonstrate medical necessity for activity-specific devices. This work has included identifying and validating appropriate outcome measures — including modified versions of the PLUS-M, PROMIS, and IPAC instruments — and collaborating with the University of Washington to develop population-specific PROMIS measures tailored to the O&P patient population. Additional research exploring early prosthetic fitting, the relationship between mobility and employment, and the impact of physical activity on health outcomes — including among individuals with significant comorbidities — has meaningfully informed both clinical practice and policy discussions at the state and national level.

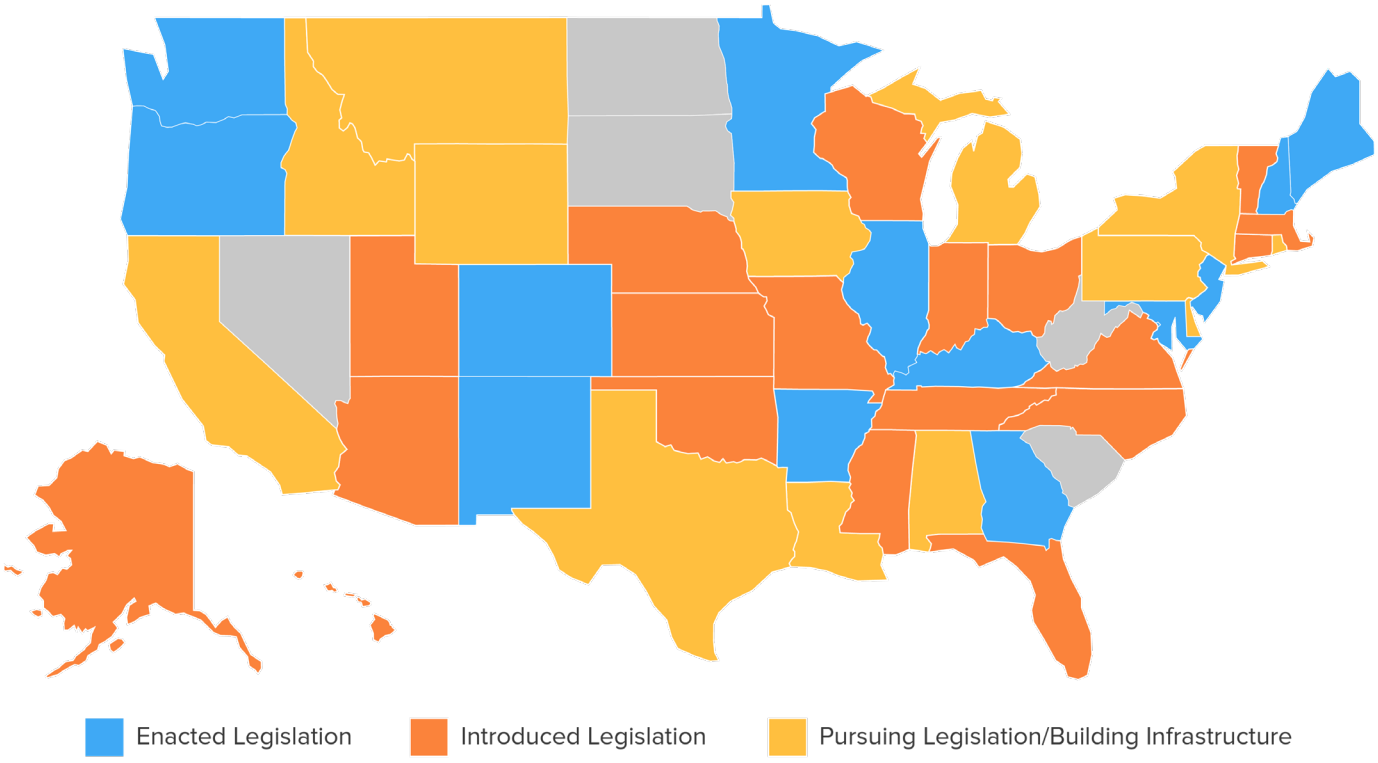
Hanger Institute member, Molly McCoy, celebrates successful passage of So Every Body Can Move Legislation with other state leads at the Washington state capitol.

Hanger Institute member Todd Castleberry, Hanger Clinic Area Director Jake Terrebonne, and others marked an important step forward as Louisiana HB 1235 cleared the House Insurance Committee and passed the House floor by a 95–3 vote.

Beyond research, Hanger Institute has actively supported coordinated advocacy strategies that are accelerating legislative progress across the country. A standout moment came during the 52nd Annual Meeting of the American Academy of Orthotists and Prosthetists, where members of the Hanger Institute supported and attended an SEBCM event drawing more than 150 participants, raising critical funding and amplifying the voices of patient advocates and policymakers alike. This kind of engagement reflects Hanger Institute's commitment to bridging the gap between clinical evidence and meaningful policy change.

Hanger Institute has also advanced research in shared decision-making to ensure that as access to activity-specific devices expands, clinical care keeps pace. Recognizing that designing prosthetic and orthotic solutions for physical activity presents distinct challenges compared to basic mobility devices, the Institute has developed and evaluated practical tools to support collaborative, patient-centered decision-making between clinicians and the individuals they serve.

These combined efforts — spanning outcomes research, legislative advocacy, and clinical innovation — position Hanger Institute as a cornerstone of the SEBCM movement. As the initiative works toward its goal of enacting legislation in 28 states by the 2028 Paralympic Games in Los Angeles, Hanger Institute remains committed to providing the evidence, tools, and advocacy support needed to turn that vision into reality for patients across the country (Figure 13).



State-by-State Progress on SEBCM Legislation

Figure 13: Map shows state-level progress on SEBCM legislation, including enacted laws, introduced bills, and ongoing advocacy efforts.

Conference Participation

The Hanger Institute strategically leverages premier professional conferences as key platforms to disseminate groundbreaking research findings and drive the advancement of O&P care across the broader healthcare and rehabilitation landscape.

By engaging directly with physicians, therapists, orthotists, and prosthetists at the forefront of their fields, the Institute ensures that cutting-edge evidence reaches the multidisciplinary teams best positioned to translate it into transformative patient care.

This year, Hanger Institute speakers made impactful contributions at the following educational conferences:

Bretta Fylstra, PhD, speaks at the International Society for Prosthetics and Orthotics (ISPO) World Congress.

Louisiana Association of Orthotists and Prosthetists

Baton Rouge, LA | May 28-30, 2025

- Current research in O&P (Castleberry, T.)

International Society for Prosthetics and Orthotics (ISPO) World Congress

Stockholm, Sweden | June 16-19, 2025

- Patient-reported health outcome profiles of lower limb orthosis users (Balkman, G., Stevens, P., Weber, E., Morgan, S., Salem, R., Bamer, A., & Hafner, B.)
- Validity and reliability of four patient-reported outcome measures for lower limb orthosis users (Balkman, G., Stevens, P., Weber, E., Morgan, S., Salem, R., Bamer, A., Fylstra, B., & Hafner, B.)
- Advancing measurement in lower limb orthotics: Development, testing, and clinical implementation of the OPRO-M survey instrument (Balkman, G. S., Stevens, P. M., Weber, E. L., Fylstra, B., & Hafner, B. J.)
- PLUS-M T-score maps: Response probabilities of PLUS-M scores for individuals with lower limb amputation (Fylstra, B.)
- Prosthetic mobility curves: Lifetime mobility values following lower limb amputation (Fylstra, B.)
- Usage patterns of orthoses and assistive devices among individuals utilizing lower limb orthoses (Stevens, P., Hafner, B., Weber, E., Morgan, S., Bamer, A., Salem, R., & Balkman, G.)
- More than mobility: The impact of prosthetic mobility on well-being, fall risk, and employment (Stevens, P. M., Fylstra, B., & Wurdeman, S.)
- Assessing outcomes with microprocessor knee utilization in a K2 population (ASCENT K2): Trial results for 107 individuals with above-knee amputation (Wurdeman, S.)

Texas Society of Orthotic and Prosthetic Professionals

Dallas, TX | August 22-23, 2025

- Current research in O&P (Castleberry, T.)

AOPA National Assembly

Orlando, FL | September 3-6, 2025

- Outcomes from the clinical application of an externally powered pediatric KAFO (Carroll, K., & DiBello, T.)
- Facilitating exercise in prosthesis and orthosis users: How clinicians and researchers can support active lifestyles (Castleberry, T., Steffensen, E., Brisebois, M., & Stepp, K.)
- Qualitative research to guide quantitative research (Fylstra, B., & Steffensen, E.)
- Shared decision-making in O&P: How to incorporate patient preference (Fylstra, B., & Steffensen, E.)
- Hydraulic ankle-feet are associated with increased mobility for individuals classified as K2 (Fylstra, B., England, D., Khan, J., & Wurdeman, S.)
- Maximizing practice efficiency: The power of assistants (Negri, C., & O'Brien, E.)
- The power of assistants (O'Brien, E. M., Burcham, R., & Negri, C.)
- Will they stay? Considerations for early-career clinician retention (O'Brien, E. M., Mullen, A., Diamond, M., & Sakakini, B.)
- Use of clinical diagnostics to inform decision-making care (Sions, M., Fylstra, B., & Heckman, J.)
- Microprocessor knee receipt within 12 months post-amputation is associated with greater odds of employment for individuals living in distressed communities (Steffensen, E.)
- Comprehensive craniometry for sagittal synostosis (Stevens, P. M., & Ramsey, J.)
- Injurious falls among individuals prescribed lower limb orthoses (Stevens, P. M., England, D., & Carroll, K.)
- Development of a microprocessor KAFO patient care protocol (Weber, E., Carroll, K., McCoy, M., & Kannenberg, A.)

AAPM&R Annual Assembly

Salt Lake City, UT | October 22-25, 2025

- Consensus clinical standards for the prosthetic management of unilateral transradial amputation (Stevens, P. M.)
- Injurious falls among individuals prescribed lower limb orthoses: Relationships with mobility, pain interference, lower limb strength, sex, and age (Stevens, P. M., England, D., & Carroll, K.)
- Prosthetic mobility curves: Lifetime mobility values by amputation level & etiology, age, and sex (Stevens, P. M., & Fylstra, B.)

Global Consensus Conference on Osseointegration (GCCO)

Charlotte, NC | November 7-8, 2025

- Attention among individuals using bone-anchored prosthetics: A pilot qualitative study (Stevens, P. S., Brousseau, L. M., Bhargava, T., Halsne, E. G., Hafner, B. J., Darter, B. J., & McDonald, C. L.)

Phil Stevens, PhD, CPO, joins panel at the 2025 Global Consensus Conference on Osseointegration.

Amputee Coalition National Conference

Las Vegas, NV | January 13-15, 2026

- Boulder together: Conversations that move us (Carroll, K., & Green, L.)
- Socket to me: Redefining fit, freedom, and function (Carroll, K., & Green, L.)
- Empowering movement: Practical prosthetic and orthotic solutions for active living (Remington, W.)

American Academy of Orthotists and Prosthetists (AAOP) 52nd Annual Meeting and Scientific Symposium

Nashville, TN | February 18-21, 2026

- Outcomes from clinical application of an externally powered pediatric KAFO (Carroll, K.)
- Transfemoral socket concepts and comfort – Certificate module (Carroll, K.)
- Clinical outcomes of 3D-printed versus thermoformed cranial remolding orthoses: A retrospective matched cohort analysis from routine orthotic practice (Carroll, K. M., O'Shea, S. J., Fylstra, B. L., & Wurdeman, S. R.)
- User-complexity and decision-making in upper limb prosthesis selection: Measurement tool development (Castleberry, T.)
- Quality of care in O&P: What it is and why you should care (Finco, G., Schultea, F., Kannenberg, A., & Wurdeman, S.)
- Changing O&P policy: How evidence drives policy change (Fylstra, B., Baumer, M., White, A., & Sachs, S.)
- Shared decision-making in O&P: How to incorporate patient preference in clinical decision-making in upper limb prosthetics, lower limb orthotics, and beyond (Fylstra, B., McCoy, M., Steffensen, E., Castleberry, T., & Mullen, A.)
- Rising professionals: From student to specialist – Charting your first five years (Gilhooly-Senczyszyn, A., Thach, S., Carroll, K., Ezell, S., & Rhymer, J.)
- Shaping health disparities research in orthotics and prosthetics (McDonald, C., Clemens, S., Fylstra, B., Rhett, A., Walker, N., & Cave, J.)
- Unlocking the power of clinical extenders (O'Brien, E. M., & Schultea, F.)
- Diagnosing and fixing problems with transfemoral alignment (Remington, W.)
- Lower limb orthosis users: Health profiles and the relationships between mobility, pain interference, fall risk, and wellbeing (Steffensen, E., Stevens, P. M., & Balkman, G.)
- Real-world experience with microprocessor knee-ankle-foot-orthoses: Clinical outcomes, patient selection, and shared decision-making (Weber, E., Carroll, K., & McCoy, M.)

Molly McCoy, CPO, Kathleen Carroll, MS, MSPO, CPO, FAAOP, and Eric Weber, L/CPO, FAAOP(D) speak at the AAOP 52nd Annual Meeting and Scientific Symposium.

Kevin Carroll, MS, CP, FAAOP(D) speaks at the 2026 Amputee Coalition National Conference.

Peer-Reviewed Publications

Bone Anchored Prosthetics

- Earley, E. J., Milius, D. W., Awad, M. E., Milton, D. H., Ahmed, K., Leijendekkers, R. A., Potter, B. K., Stevens, P. M., Gaffney, B. M. M., Christiansen, C. L., & Stonebeck, J. W. (2025). Establishing consensus for prescription of prosthetic components for transfemoral bone-anchored limbs: An international Delphi method study. *Archives of Physical Medicine and Rehabilitation*, 106(10), 1565-1574.
- Earley, E. J., Milius, D. W., & Stevens, P. M. (2025). Prosthetic component selection and fitting for bone-anchored limbs: Why new guidelines are needed. *Journal of Prosthetics and Orthotics*, 37(4S), P86-P92.
- Garibaldi, M. G., Thompson, G., Milius, D., Kafedžić, H., & Stevens, P. M. (2025). Bone-anchored prosthesis implant connectors, fail-safe mechanisms, and alignment. *Journal of Prosthetics and Orthotics*, 37(4S), P77-P85.
- Stevens, P. M., & Prasso, L. G. (2025). Rehabilitation from short to full-length bone-anchored prostheses. *Journal of Prosthetics and Orthotics,* 37(4S), P70-P76.

Lower Limb Orthotics

- Balkman, G. S., Hafner, B. J., Bamer, A. M., Salem, R., Morgan, S. J., Stevens, P. M., & Weber, E. L. (2025, February). Evaluating patient-reported health outcome profiles of lower limb orthosis users. *Disability and Rehabilitation*, 1-9.
- Balkman, G. S., Stevens, P. M., Weber, E. L., Bamer, A. M., Salem, R., Fylstra, B. L., Morgan, S. J., & Hafner, B. J. (2025). Evaluating the construct validity and test-retest reliability of the Orthotic Patient-Reported Outcomes–Mobility (OPRO-M) short forms in lower limb orthosis users. *PLOS ONE*, 20(8), e0330334.
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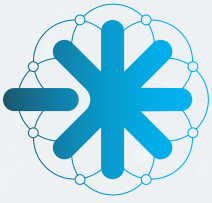

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