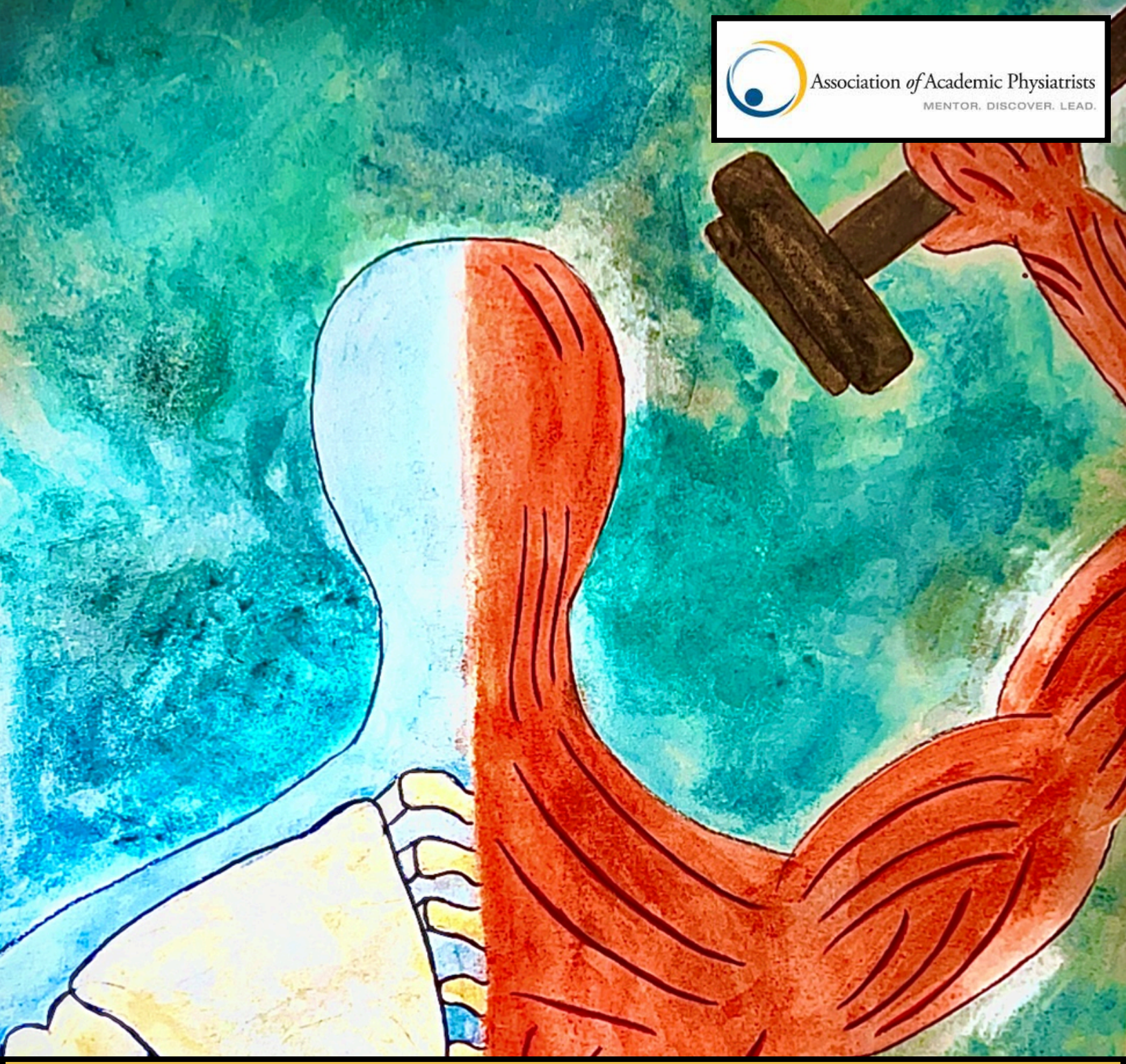

Association of Academic Physiatrists
MENTOR. DISCOVER. LEAD.

PHYSIATRY IN MOTION

WINTER 2026

Contents

About the Cover

The cover art was completed by Taylor Aldeghi

Taylor Aldeghi is an MS3 at the University of Central Florida College of Medicine with a B.S. in Biomedical Sciences. She is interested in many fields of PM&R, valuing a holistic approach to optimizing strength, movement, and function to enhance quality of life.

The art is reflective of the theme for this issue of Physiatry in Motion, “Adaptation”.

Association *of* Academic Physiatrists
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Letter from the Editor

It is my honor to welcome you to the Winter 2026 issue of Physiatry in Motion, the official newsletter of the Association of Academic Physiatrists Resident/Fellow Council (AAP RFC).

The theme for this issue of Physiatry in Motion was "Adaptation". This theme celebrates the essence of Physical Medicine & Rehabilitation, the art and science of helping people adapt, recover, and thrive. This issue invites contributors to explore how adaptation defines our specialty, from patients adjusting to new realities, to clinicians leveraging technology and creativity to optimize function, and researchers developing innovative tools that push the boundaries of rehabilitation science. The goal is to showcase how physiatrists, engineers, therapists, and patients collaborate to create adaptive solutions, whether through assistive technology, adaptive sports, novel surgical interventions, or innovative models of care.

I would like to thank each of the contributors, artists, as well as the technology subcommittee who have worked hard to bring this issue to life. Stay tuned for our summer edition later this year.

Sincerely,
Drew Redepenning, MD
RFC Technology-Digital Media Chair
PGY-3, UPMC Physical Medicine & Rehabilitation

RFC Technology Subcommittee

Julia Carter, MD
PGY-4, Mayo Clinic

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PGY-1, SUNY Downstate/Baylor

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PGY1, MedStar Washington

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Fellow, Mayo Clinic Florida

Bilaal Hassan, MD
PGY-1, Texas Fort Worth

A QUIET ADAPTATION: SEEING MY ROLE THROUGH ASPIRING PHYSIATRISTS' EYES

WINTER 2026 TOP SUBMISSION WINNER
SURIYA LISA, MD
PGY2 AT WESTCHESTER MEDICAL CENTER

Adaptation in medicine is not limited to our patients; sometimes, it happens quietly within us, reshaping how we view the roles we already occupy. For me, that shift came unexpectedly while interviewing candidates for Physical Medicine and Rehabilitation (PM&R) residency. As I listened to aspiring physiatrists describe their excitement and sense of purpose for the specialty, I rediscovered my younger self's awe for physiatry—and realized how much I had stopped noticing what once inspired me.

Like many residents, I had grown accustomed to the rhythm of the day-to-day grind: early mornings, long days, emotional fatigue, and the constant imposter syndrome telling me to "do better". Somewhere between studying for the Self- Assessment Examination (SAE), becoming more efficient with orders, and the constant comparing myself to others, it became habitual to focus on what was exhausting rather than what was extraordinary.

Interviewing residency applicants over the last few weeks changed that narrative. As I spoke with the candidates, I was inspired by their energy—their thoughtful answers, their admiration for our specialty, and their excitement about becoming physiatrists. They spoke about PM&R with intention and hope. They described dreams of supporting patients during vulnerable moments, guiding families through shared responsibility for their loved ones, and even holding a safe space for end-of-life conversations.

Listening to the candidates, I realized something unsettling and grounding: they were dreaming of being exactly where I was. I thought of the times I sat beside Mr. P and his family, explaining stroke rehabilitation. I remembered watching my patients regain function in therapy, the pride and joy in their eyes as they demonstrated their progress.

Something in me shifted. I was no longer just surviving residency—I was living someone else's dream. Not only the applicants', but my younger self's as well.

This interview season reshaped how I approached my daily routine. I remembered my dream of becoming a physiatrist, and now as a trainee, that dream feels closer than ever. I want to carry that earlier version of myself forward, even when residency becomes exhausting. I want to celebrate each day because I get to witness human resilience

daily. I get to guide patients through some of their most difficult journeys and celebrate their wins alongside them. And I get to call myself a PM&R doctor in training—something I had stopped fully appreciating.

This perspective shift was an act of mental adaptation. My daily routine did not change after the interviews ended, but my relationship to the work did. Interviewing applicants taught me that gratitude is not something we arrive at once—it is something we have to practice daily, especially when fatigue and imposter syndrome threaten to overshadow our purpose.

In rehabilitation medicine, we often tell patients that progress begins with a mindset—believing that adaptation is possible. This interview season taught me that the same principle applies to us as clinicians. By seeing my role through the eyes of those aspiring to it, I rediscovered gratitude in my familiar routine.

In a field dedicated to helping others adapt, I was reminded that we too, must continually adapt—to our responsibilities, our exhaustion, and our evolving sense of purpose. Sometimes, all it takes is listening to someone else's dream to remember why we chose our own.

About the author:
Suriya Lisa, MD, MS is a PGY2 at Westchester Medical Center, New York Medical College. Their subspecialty interest are Cancer rehab and Sports Medicine.

ADAPTATION BEGINS WITH PRESENCE: LESSONS FROM INPATIENT REHABILITATION

CHLOE ESCH
OMS3 AT LAKE ERIE COLLEGE OF OSTEOPATHIC MEDICINE

It was early morning pre-rounds, and I was walking alone through the quiet halls of the rehabilitation hospital. This was my first rotation of third year, and I was eager to begin my clinical training in Physical Medicine and Rehabilitation. As a medical student new to the inpatient rehabilitation setting, I had been entrusted with pre-rounding on select patients which was a responsibility that I approached with equal parts excitement and humility.

That anticipation shifted as I entered my first patient's room. He was a young man recovering from a catastrophic spinal cord injury. His affect was flat, and he appeared withdrawn, overwhelmed by the uncertainty of a future that now looked profoundly different. Standing at his bedside, I found myself asking a simple but unsettling question: How can I help him? His prognosis was unclear, his life had been irrevocably altered, and I was still learning what it meant to care for patients in the world of rehabilitation.

This experience quickly revealed that rehabilitation is rarely a linear path. Even when a comprehensive plan is in place, progress is not always measured in immediate gains. For this patient, adaptation began long before visible physical improvement. Before celebrating physical improvement, he had to learn to tolerate uncertainty, process sudden loss, and gradually redefine expectations for daily life. Early in our interactions, I struggled to understand how best to support him. While treatments were thoughtfully adjusted, pain and emotional distress remained significant components of his early recovery. Daily conversations focused on therapy goals and incremental progress, yet these traditional markers of improvement felt distant and insufficient in reflecting his lived experience.

Through this experience, I came to understand that adaptation in PM&R begins with addressing the human reality of injury alongside the medical one. Supporting this patient meant helping him navigate uncertainty, adjust to sudden changes, and find small victories in daily life. It was a humbling introduction to the human side of recovery and reshaped my understanding of what it truly means to care for patients in Physical Medicine and Rehabilitation.

I realized that while I could not change the extent of his injury, I could control how I showed up for him each day. I felt that he needed an additional voice advocating for his needs, so I began arriving at the

hospital earlier to spend unhurried time at his bedside. Without an agenda, I focused on listening, creating space for him to express his fears, frustrations, preferences, and restoring a sense of control during a time when so much felt out of his hands. I was intentional about treating him with dignity and reminding him that his voice mattered and that our role was to support him, not simply treat him.

Over time, this approach led to a gradual development of trust and connection. I began to notice subtle but meaningful changes in his demeanor. He became more engaged, more animated, and more open during our conversations. We talked about his favorite movies and his pets, moments of normalcy that brought light into his day. He shared that sudden knocks and door openings startled him and exacerbated his pain, so we placed a sign outside his room asking staff to knock quietly. Small adjustments like this made a tangible difference. He expressed gratitude for being heard and for having space to be honest, vulnerable, and encouraged. In that room, adaptation began not with movement, but with presence. Through these moments, I learned that adaptation sometimes means redefining the role of the clinician, and that healing can occur even when physical recovery is limited.

This experience reshaped my understanding of adaptation within Physical Medicine and Rehabilitation. I came to see that rehabilitation is not solely about restoring function, but about helping patients navigate new realities with dignity, autonomy, and purpose. Adaptation in PM&R is rarely predictable; it requires patience, creativity, and a willingness to meet patients where they are rather than where we expect them to be.

About the author:
Chloe Esch is a OMSIII at the Lake Erie College of Osteopathic Medicine in Bradenton, FL. They are interested in inpatient rehabilitation.

ADAPTIVE SPORTS

JENNY XU, MD
PGY4 RESIDENT AT JOHNS HOPKINS

Physical activity has been shown to provide health benefits that include decreased risk of cardiovascular disease, stroke, and type two diabetes, decreased depression and anxiety, and higher quality of life (Diaz, et al., 2019) (National Institute on Aging, 2025). Despite this, people with disabilities participate in physical activity at a lower rate than able bodied individuals (Diaz, et al., 2019). This can be due to a variety of factors including medical considerations, cost, and lack of transportation, equipment, or opportunities to participate in sports. Given the mental and physical health benefits, it is important to encourage participation and provide access to adaptive recreational activities.

Multiple worldwide and nationwide organizations are dedicated to improving access to adaptive physical activity. These include the Special Olympics, which offers more than 30 sports ranging from alpine skiing to bocce to roller skating, Achilles International, which organizes workouts and competitions for athletes and volunteer guides, Move United, which has over 246 member organizations across 46 states and many more, including local organizations that provide individuals with the opportunity to participate in regular physical activity and develop community, and may even provide equipment such as sports specific wheelchairs to borrow at no cost (Special Olympics, n.d.) (Achilles International, n.d.) (Move United, n.d.) (University of Maryland Rehabilitation and Orthopaedic Institute, n.d.).

People with disabilities who participate in adaptive sports and physical activity have reported not only increased quality of life but also increased self efficacy, community integration, psychological benefits, and positive impacts on body image (Diaz, et al., 2019). This includes a positive relationship between quality of life and number of years participating in exercise, sports, and recreation since the onset of disability as well as higher self esteem scores in athletes who participated in team events in one cross sectional study whose participants were veterans with disabilities (Diaz, et al., 2019) (Laferrier, et al., 2015). Similarly, children with disabilities participating in sports reported statistically significant higher quality of life scores for physical, emotional, and social functioning compared to parental reports on the child's quality of life (Diaz, et al., 2019) (Shapiro & Malone, 2018).

Given these benefits, it is important to gauge interest and provide patients with disabilities resources on physical activity and sports available in the community. Special Olympics, Achilles International, and Move United have local programs in most states in the United States and worldwide (Special Olympics, n.d.) (Achilles International, n.d.) (Move United, n.d.). Move United also has resources on obtaining adaptive sports equipment (Move United, n.d.). Opportunities to improve adaptive sports include providing access to adaptive equipment and accessible training aids for blind sports, as well as tracking conditioning and performance and optimizing wheelchair customization and maintenance for wheelchair-based sports (Khurana, et al., 2019). Medical considerations prior to returning to physical activity and participating in adaptive sports include pre-participation physical examinations, understanding medical complications, and injury prevention and treatment in people who have diagnoses including spinal cord injuries, limb deficiencies, cerebral palsy, intellectual disabilities, and visual impairment (Beutler & Carey, 2017).

Overall, physical activity provides a variety of mental and physical health benefits, however, people with disabilities have decreased participation rates due to barriers including cost, transportation, equipment, and lack of opportunities. Participating in adaptive physical activities and adaptive sports results in improved quality of life, self efficacy, community integration, and positive body image for people who participate (Diaz, et al., 2019), highlighting the importance of promoting adaptive sports and recreational opportunities.

About the author:

Jenny Xu, MD, is a PGY-4 resident at Johns Hopkins interested in General PM&R.

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ADAPTATION IS THE CURRICULUM: A PM&R PERSPECTIVE AT SPECIAL OLYMPICS MEDFEST

LOGAN KARLEN
MS3 AT UNIVERSITY OF CALIFORNIA, RIVERSIDE SCHOOL OF MEDICINE

Introduction

Disability is a common life experience across the patient population, yet meaningful exposure to individuals with disabilities remains limited in most US medical school curricula. Approximately one in four US adults reports living with a disability, including hearing, vision, cognitive/mental, mobility, independent living, or self-care limitations.[1, 2] Individuals with intellectual and developmental disabilities (IDD) experience persistent disparities in access to care, quality of care, and health outcomes.[3-5] Despite this prevalence, disability-focused education is inconsistently incorporated into medical training and is often delivered through brief, standardized didactic sessions rather than experiential learning opportunities.[6]

Physical Medicine and Rehabilitation (PM&R) is uniquely positioned at the intersection of disability, function, and longitudinal care. As a specialty centered on optimizing participation, independence, and quality of life, PM&R emphasizes skills that are essential for caring for individuals with disabilities across the lifespan. Interventions in PM&R demonstrate reduction of impairments, activity limitations, and participation restrictions, with the goal of teaching patients to reach optimal participation through maintenance and behavioral changes.[7] This makes physiatrists uniquely well-positioned as disability education champions given their training and experience.[8] Community-based service-learning experiences may offer a hands-on approach to addressing this educational gap while promoting function-focused, disability-inclusive, and patient-centered care.[9]

Medical Education and Disability: The Gap

Nationwide assessments of U.S. medical schools reveal substantial variability in disability-related education, with many programs offering minimal formal instruction on caring for individuals with disabilities. When disability content is included, it is often limited in scope, with few opportunities for meaningful, hands-on engagement. As a result, medical students frequently report low confidence in communicating with patients with disabilities, planning appropriate accommodations, and understanding lived experiences, particularly for individuals with IDD.[10] Notably, 33% of graduating medical students report inadequate exposure to disability management and rehabilitative care.[11]

Prior studies suggest that structured exposure to disability-focused educational experiences can

improve medical students' confidence, attitudes, and perceived preparedness. In response to recognized curricular gaps, a range of educational interventions has emerged, including the use of standardized patients with disabilities, narrative-based curricula, and experiential electives.[12-14] These approaches have demonstrated positive effects on student comfort, empathy, and readiness to care for patients with disabilities. However, many of these interventions remain limited in availability, optional in nature, or disconnected from real-world clinical and community settings.

Special Olympics MedFest: A Community-Based Learning Model

The Special Olympics Healthy Athletes program provides a structured model for addressing gaps in disability education through community partnership. MedFests are part of the Healthy Athletes Initiative organized by Special Olympics. These events offer free health screenings to Special Olympics athletes and are staffed by volunteer physicians, medical students, and other healthcare professionals. Student volunteers engage directly in patient care activities, including medical history taking, vital sign assessment, medication review, vision screening, and general physical examinations.

Importantly, MedFest requires students to adapt traditional clinical approaches when caring for individuals with IDD. Communication must be individualized, physical examinations are often modified, and caregiver input is incorporated to ensure accurate and respectful care. Rather than prioritizing pathology-centered diagnostics, students are encouraged to assess function, participation, and overall health within a supportive, athlete-centered environment. This framework aligns closely with rehabilitation principles and offers early exposure to function-focused, disability-inclusive care.

Reflections from a MedFest Volunteer

At my medical school, students have volunteered in numerous MedFest events, allowing for repeated engagement with individuals with IDD. These experiences brought together students from diverse specialties and interests, mirroring the interdisciplinary collaboration central to PM&R. As a medical student with a growing interest in PM&R, I had approached MedFest with limited formal training in disability-inclusive care. MedFest therefore served as an early, formative exposure to function-focused, dignity-centered care.

Through these encounters, I learned that effective physical examination in disability care begins with respect for patient autonomy. Even when caregivers were present, directing questions to the athlete whenever possible promoted self-advocacy and reinforced the athlete's role as the primary participant in their care. This approach preserved dignity and often improved history-taking accuracy while also empowering athletes to communicate their own preferences.

I also became more attentive to nonverbal cues, including body language, facial expressions, and gestures. Many athletes communicated discomfort or understanding through nonverbal means, requiring heightened attentiveness and flexibility by the examiner. Engaging caregivers proved equally essential, as they provided critical insight into daily routines, baseline functioning, and effective communication strategies, complementing the athlete's perspective.

Finally, these experiences emphasized the importance of flexibility in examination techniques. Standard physical exams often required modification, such as breaking tasks into smaller steps, adjusting positioning, shortening examination segments, or allowing additional time. This shift

from checklist completion toward individualized assessment reinforced a core principle of physiatry: prioritizing function and participation over rigid protocols.

Collectively, these experiences challenged my implicit assumptions about disability and reinforced that rehabilitation extends beyond restoring function to understanding what movement, competition, and participation uniquely mean to each individual. Hearing athletes describe how competition and physical activity remain central to their identity, regardless of physical or cognitive limitations, deepened my appreciation for PM&R's role in supporting purpose, autonomy, and quality of life. Overall, MedFest functioned less as volunteer work and more as an informal curriculum; one that taught adaptability, communication, and function-focused care more effectively than any lecture I had attended.

Adaptation in Practice: Lessons from MedFest

This service-learning experience illustrates how community-based engagement can address a critical gap in medical education while reinforcing the core principles of rehabilitation medicine. Participation in MedFest promoted confidence in skills foundational to PM&R, including adapting the physical examination, individualizing communication, collaborating with caregivers, and prioritizing function and participation over diagnosis alone.

Unlike traditional clinical encounters that emphasize efficiency and standardized workflows, MedFest required students to slow down and adopt a flexible, strengths-based approach focused on athletes' abilities. Through partnership with Special Olympics, trainees contributed to health equity while learning directly from the community they served, reinforcing disability care as a collaborative process.

Implications for PM&R Training

Special Olympics Healthy Athletes programs, with chapters dispersed throughout the US, represent a scalable, universally adoptable opportunity for PM&R residency programs and trainees to integrate education, advocacy, and community service. Partnerships with local Special Olympics organizations can reinforce early exposure to rehabilitation principles while modeling advocacy, community engagement, adaptability, inclusive communication, and function-focused care as core components of physiatric identity.

Early and repeated engagement in community-based disability care may also enhance recruitment into PM&R by exposing trainees to the values and scope of rehabilitation medicine prior to residency and advancing disability education, health equity, and preparedness for caring for individuals with complex, chronic, and function-limiting conditions across the continuum of care.

A Path Forward

Community-based service-learning experiences, such as Special Olympics MedFest, position adaptation as a core clinical competency rather than an ancillary skill. By centering function, flexibility, and individualized communication, MedFest embodies the foundational principles of physical medicine and rehabilitation and offers a practical model for disability-inclusive training. Intentional integration of these experiences into medical education and residency outreach can shape physician identity early, cultivating clinicians who are not only comfortable caring for individuals with disabilities, but who approach complexity with adaptability, equity, and a sustained focus on participation across the lifespan.

About the author:

Logan Karlen, BS is a third-year medical student at the University of California, Riverside School of Medicine with a strong interest in Physical Medicine and Rehabilitation. His interests include disability advocacy; musculoskeletal, sports, and spine-related rehabilitation; and community-based, function-focused care

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AMPUTATION: WHAT ARE THE BARRIERS TO PROVIDING CARE?

ZAID MANTEEN, OMS3
AMEER QADRI, OMS4
AYAH SYEED, OMS4

Patients with limb loss represent a growing population in the United States and require longitudinal, coordinated rehabilitation care.[1,5] Physiatrists frequently manage these patients across inpatient rehabilitation, outpatient amputee clinics, and long-term follow-ups.[3,18] Understanding the functional and medical barriers faced by individuals with limb loss is necessary to optimize rehabilitation outcomes and preserve independence.[3,11]

In the United States, approximately 2.3 million individuals live with limb loss, and an additional 3.4 million live with limb difference.[1] Following amputation, patients must adapt to altered biomechanics that affect mobility, endurance, and performance of activities of daily living.[2,6] These changes often persist beyond the immediate postoperative period and require ongoing rehabilitation support as functional demands evolve over time.[3,18]

Individuals with lower-limb amputation commonly demonstrate gait asymmetry and compensatory movement patterns that increase the energy cost of ambulation and contribute to early fatigue.[2,8] Residual limb muscle volume changes following amputation further reduce strength and functional reserve, impairing balance and limiting mobility tasks beyond level walking.[6,9] Studies have demonstrated that residual limb strength is closely associated with functional performance in individuals with unilateral transtibial amputation, with weakness contributing to difficulty with mobility tasks such as transfers, stair negotiation, uneven-surface ambulation, and prolonged standing.[10] As prosthetic use progresses, functional demands change, requiring rehabilitation strategies that are adjusted as mobility, endurance, and balance improve.[3,18]

In addition to mobility limitations, individuals with lower-limb amputation are at increased risk for secondary physical conditions that may interfere with rehabilitation and long-term function.[3,11] Altered biomechanics and long-term prosthesis use are associated with secondary musculoskeletal conditions and pain, which can limit therapy participation and reduce functional gains.[11,12] Individuals with traumatic leg amputation also have an increased risk of cardiovascular disease, necessitating rehabilitation strategies that address both functional capacity and medical comorbidity.[13] Major lower extremity amputation is further associated with high mortality risk; contemporary

cohort studies report one-year mortality rates exceeding 30% following major lower extremity amputation.[14] Progression of comorbid disease and deconditioning can limit rehabilitation participation and negatively affect long-term independence.[3,11]

Access to rehabilitation and follow-up care represents an additional barrier for many patients with limb loss. Individuals with physical disabilities experience persistent disparities in access to timely health care and unmet needs, which may compound challenges in obtaining primary care, specialty care, prosthetic services, and rehabilitation follow-up.[16] These challenges are particularly significant during periods of prosthetic adjustment, residual limb volume change, or skin breakdown, when close monitoring and intervention are required.[3,18] Delays in care may result in reduced prosthetic tolerance, preventable complications, and loss of functional progress.[3,11,18] During the COVID-19 pandemic, additional disruptions to access were reported among individuals with diabetes and lower-limb amputation, highlighting the vulnerability of follow-up pathways to system-level barriers.[17]

Several of these barriers can be addressed through coordinated rehabilitation care led by physiatrists. Evidence-based rehabilitation guidelines emphasize step-by-step care following lower-limb amputation, including early residual limb management, prevention of joint contractures, progressive strengthening, balance training, and gait re-education.[3] Close coordination with prosthetists allows rehabilitation plans and prosthetic prescriptions to be adjusted as functional status and mobility needs change over time.[3,18] Incorporating secondary prevention strategies into rehabilitation may further support long-term function and reduce preventable decline.[3,11]

Addressing barriers to care for individuals with limb loss requires rehabilitation models that are longitudinal, coordinated, and responsive to changing functional needs.[3,18] PM&R physicians play a central role in managing these adaptations and supporting patients as they progress through recovery, prosthetic integration, and community reintegration.[3,18]

About the authors:

Zaid Mateen is a third year medical student at A.T Still University, School of Osteopathic Medicine in Arizona who is interested in general PM&R and interventional pain management

Ameer Qadri is a fourth year medical student at Midwestern University, Chicago College of Osteopathic Medicine who is interested in general PM&R, brain injury, and health care accessibility.

Ayah Syeed is a fourth year medical student at Ohio University, Heritage College of Osteopathic Medicine who is interested in inpatient PM&R, pediatric rehabilitation and women's health rehabilitation.

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POINT-OF-CARE 3D PRINTING OF ADAPTIVE TOOLS IN THE HOSPITAL

REBECCA COX, MD
PGY2 ATMEDSTAR NATIONAL REHABILITATION HOSPITAL/GEORGETOWN UNIVERSITY

Adaptive tools are fundamental to rehabilitation medicine, enabling participation in activities of daily living and supporting functional independence across a wide range of diagnoses. Frequently hospital access to adaptive devices has depended on standardized equipment, inventories, external vendors, and insurance-driven timelines. Advances in point-of-care additive manufacturing, particularly 3D printing, can reshape this paradigm by allowing rehabilitation teams to design, fabricate, and refine adaptive devices during a patient's inpatient stay. For physical medicine and rehabilitation physicians and therapists, point-of-care 3D printing represents a clinically relevant and scalable strategy that leverages technology and creativity to deliver timely, customized solutions aligned with functional goals (1-3).

Hospitalization frequently coincides with abrupt functional change. Patients admitted for care after illnesses such as stroke, spinal cord injury, traumatic brain injury, complex orthopedic trauma, limb loss, or progressive neurologic disease often experience new limitations in self-care, mobility, and communication. During inpatient rehabilitation and acute care settings, functional status may evolve rapidly over days rather than weeks. Conventional assistive technology procurement processes are frequently mismatched to this pace, with delays in ordering, customization, and delivery that extend beyond the hospital stay.

Point-of-Care 3D printing embeds fabrication capabilities within the clinical environment, allowing rehabilitation teams to respond to patient's functional barriers as they present themselves. Adaptive devices can be designed and trialed during active therapy sessions, supporting task-specific training at a time when patients are most engaged in recovery. Early access to appropriate adaptive tools may also improve patient confidence, reduce caregiver burden during hospitalization, and enhance continuity of care after discharge (1,4,5).

An example of how point-of-care fabrication can directly translate functional assessment into rapid, patient-specific intervention during the inpatient stay is the following. A 62-year-old right-hand-dominant man was admitted to inpatient rehabilitation following a left middle cerebral artery ischemic stroke, resulting in dense right upper extremity weakness and impaired fine motor control. During occupational therapy sessions, he demonstrated strong motivation to perform self-

feeding but was unable to maintain grip on standard utensils despite adding the standard built-up foam handles. Commercial adaptive utensils available on the unit did not adequately address his limited finger flexion and pronation restriction. The occupational therapist collaborated with a rehabilitation technologist using a point-of-care 3D printing workflow to design a lightweight, angled utensil holder customized to the patient's hand posture and grip pattern. A device was printed overnight and trialed during therapy the following day. Minor adjustments were made to the handle diameter and utensil angle, and a new tool was printed. The patient achieved independent self-feeding for the first time since his stroke using the second 3D printed adaptive tool.

Within hospitals, uses for 3D printing involve low-cost, task-specific adaptive devices designed to address discrete functional limitations. Some examples include customized grip aids for utensils, grooming tools, writing implements, custom orthoses, adaptive holders, walker-mounted holders, and wheelchair attachments (2,5). Within occupational therapy literature, personalized 3D printed assist devices have been associated with improvements in occupational performance and participation when paired with structured training and therapeutic integration (2,6). Comparative studies of 3D printing wrist and hand splints suggest similar or improved comfort and fit relative to traditional thermoplastic splints when designs are appropriately executed. Digital workflows incorporating measurement-based modeling or 3D scanning allow rapid fabrication and adjustment as edema, tone, or range of motion changes occur during hospitalization (3,7,8). These findings reinforce the importance of using assistive technology such as point-of-care 3D printing of adaptive tools during acute hospitalization when possible.

The most significant barriers to sustainable implementation are reliance on employees' knowledge and experience with 3D printing. In many hospitals with 3D printing capabilities, efforts are driven by motivated therapists, clinicians, or trainees working outside formal job descriptions, limiting consistency and long-term sustainability. However, in some hospitals, point-of-care 3D printing is formalized as part of a dedicated role, such as a rehabilitation technologist. The U.S. Department of Veterans Affairs has demonstrated the feasibility of this model through centralized design libraries and local fabrication workflows that extend access to assistive technology across facilities (4,9).

Although many adaptive tools produced in hospitals are low risk, governance and quality oversight remain essential. The U.S. Food and Drug Administration has issued guidance addressing additive manufacturing of medical devices, including point-of-care 3D printing fabrication. Regulatory responsibilities vary based on device classification and intended use, highlighting the need for institutional policies that define scope and escalation pathways (10,11).

Point-of-Care 3D printing offers PM&R physicians and therapists a clinically meaningful extension of rehabilitation practice by enabling rapid, patient-specific adaptive solutions during inpatient stays. This technology aligns with goals of functional restoration, patient-centered care, and operational efficiency. When supported by structured workflows, shared design resources, and dedicated roles, point-of-care 3D printing can function as a scalable quality improvement initiative that enhances independence during hospitalization and supports smoother transitions beyond acute care.

About the author:

Rebecca Cox MD is a PGY2 PM&R resident physician currently in training at MedStar National Rehabilitation Hospital/Georgetown University who graduated from Emory University School of Medicine in Atlanta, Georgia. Her clinical and academic interests include interventional spine and pain medicine, sports and musculoskeletal medicine, and medical education.

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WORDS THAT MOVE: MEDICAL SPANISH AS ASSISTIVE TECHNOLOGY IN REHABILITATION.

AARDHRA M. VENKATACHALAM, MS4
ELY CUBEROS PAREDES, OMS4
VANESSA MOLINA, OMS4

Introduction

Assistive technology is foundational to Physical Medicine and Rehabilitation. Braces stabilize joints, wheelchairs restore mobility, and augmentative and alternative communication (AAC) devices facilitate expression when speech is impaired. These tools are not optional additions to care but rather essential instruments of functional recovery. Yet one of the most powerful tools shaping rehabilitation outcomes is often overlooked: language access.

For patients with Limited English Proficiency (LEP), the absence of shared language serves as a barrier to participation, safety, autonomy, and independence [1,2] . In the rehabilitation setting, where progress depends heavily on repeated instruction, feedback, motivation, and trust, language discordance can quietly undermine even the most carefully designed care plans. Through the lens of PM&R, which prioritizes function over diagnosis alone, Medical Spanish can be reframed as assistive technology: a rehabilitative tool that enables understanding, engagement, and recovery.

Language Barriers as Functional Barriers

In the field of PM&R, function is not restored in a single encounter. Rehabilitation relies on longitudinal relationships, iterative goal setting, and active patient participation. Language barriers disrupt this process at every level [3,4]. Pain cannot be accurately characterized, safety instructions may be misunderstood, and home exercise programs lose effectiveness when patients cannot ask questions or clarify concerns [5,6,7]. Motor learning, the backbone of rehabilitation, depends on clear and repeated verbal cues [8]. When communication is fragmented or filtered through inconsistent interpretation, feedback loops weaken. Patients become passive recipients rather than active agents in their own recovery. From a functional perspective, LEP behaves similarly to a disability within the healthcare system [9]. It restricts access to information, reduces independence, and increases reliance on others to navigate care. Without a full understanding of their diagnosis, goals, or therapy plan, patients are effectively excluded from their own rehabilitation. In this context, restoring function requires more than physical intervention; it requires adaptive communication.

Medical Spanish as Assistive Technology

Assistive technology is defined not by its physical form, but by its function. A brace compensates for instability. A wheelchair compensates for impaired

ambulation. An AAC device compensates for speech limitations. Medical Spanish serves a parallel role by compensating for linguistic barriers that limit functional participation.

Like other assistive technologies, Medical Spanish is:

- Purpose built: rooted in rehabilitation specific language focused on movement, safety, pain, and goals
- Context specific: tailored to therapy sessions, functional assessments, and patient education
- Function enabling: improving adherence, engagement, and safety
- Autonomy promoting: empowering patients to actively participate in care and reducing dependence

Conceptualizing Medical Spanish as assistive technology reframes it from a "helpful skill" into a core rehabilitation tool that directly influences outcomes.

Why PM&R Is Uniquely Positioned

PM&R is uniquely suited to reshape our understanding of Medical Spanish. Unlike other specialties, physiatrists and rehabilitation teams engage patients across multiple settings over extended periods. Therapy sessions require real-time communication, motivational coaching, and continuous reassessment of goals [10,11]. This makes episodic language interpretation insufficient for many rehabilitation encounters.

Additionally, PM&R focuses care on what patients want to be able to do, rather than solely on which structures are impaired. Questions such as "What activities are hardest right now?" or "What do you want to get back to?" are foundational to rehabilitation and may be difficult to explore meaningfully without shared language. Because rehabilitation is inherently interdisciplinary, language access must reach beyond the physician-patient dyad to include physical therapists, occupational therapists, speech language pathologists, psychologists, and nursing staff. Communication provides infrastructure to the rehabilitation ecosystem.

The PM&R Medical Spanish Network: Adaptation in Action

Recognizing language as a functional barrier requires systems level adaptation [12]. The PM&R Scholars Medical Spanish Network represents one such adaptive response. This national network moves beyond informal language skills to create a structured and sustainable framework for improving communication in rehabilitation settings.

Core elements include:

- Rehabilitation focused Medical Spanish workshops emphasizing functional assessments, therapy instructions, and safety cues
- Standardized PM&R vocabulary shared across disciplines to improve consistency
- Patient education initiatives that adapt written and verbal materials for Spanish speaking patients
- Training on effective interpreter use, emphasizing collaboration with interpreters as active members of the multidisciplinary team
- Emphasizing how language is intertwined with culture and how this influences pertinent questions to ask throughout the rehabilitation process

However, this network does not replace professional translation services. It instead optimizes their use by teaching clinicians when direct communication is appropriate, when interpreters are essential, and how to work collaboratively while preserving patient

dignity and autonomy.

For medical students and trainees, participation in the PM&R Scholars Medical Spanish Network or similar organizations reframes language learning as clinical skill acquisition, much like learning how to prescribe a brace or fit a wheelchair. Language becomes part of the rehabilitation toolkit rather than an extracurricular interest.

Adaptation, Equity, and Ethics

Language access is not simply a communication issue. It is an equity issue. Patients with LEP are more likely to experience disability, delayed care, and poorer functional outcomes [13]. When language is treated as peripheral, these inequities widen. Treating it as assistive technology, access becomes a matter of functional justice.

PM&R's commitment to maximizing participation and independence aligns naturally with disability justice frameworks that emphasize removing environmental and systemic barriers rather than placing the burden of adaptation on patients alone. Adapting the system through Medical Spanish education, structured networks, and interdisciplinary collaboration reflects the ethical foundations of rehabilitation medicine.

Conclusion: Function Begins with Understanding

Rehabilitation begins not with an exercise, a device, or a procedure, but with understanding. Where recovery is measured in regained independence and meaningful participation, language is a tool of function. Viewing Medical Spanish as assistive technology reframes language access as essential infrastructure rather than optional accommodation.

For medical trainees entering the field of physiatry, this perspective offers a powerful lesson. Adaptation is not only something our patients do. It is something our systems, teams, and clinicians must do as well. When we adapt our communication, we restore more than function. We restore agency.

About the authors:

Aardhra M. Venkatachalam is an aspiring physiatrist with a strong foundation in biomechanics and performance-based movement science. She has particular interests in stroke rehabilitation, movement science, and interdisciplinary, outcomes-driven approaches to care that integrate clinical medicine, health disparities, and functional performance.

Ely Cuberos Paredes is a fourth-year osteopathic medical student at Burrell College of Osteopathic Medicine with interests in spinal cord injury within Physical Medicine & Rehabilitation, medical education, and health equity

Vanessa Molina is a fourth-year osteopathic medical student at Sam Houston State University College of Osteopathic Medicine. Her clinical interests within PM&R are pediatrics and neuromuscular disorders. She aims to integrate medical education, mentorship, and healthcare access advocacy throughout her future career in physiatry.

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