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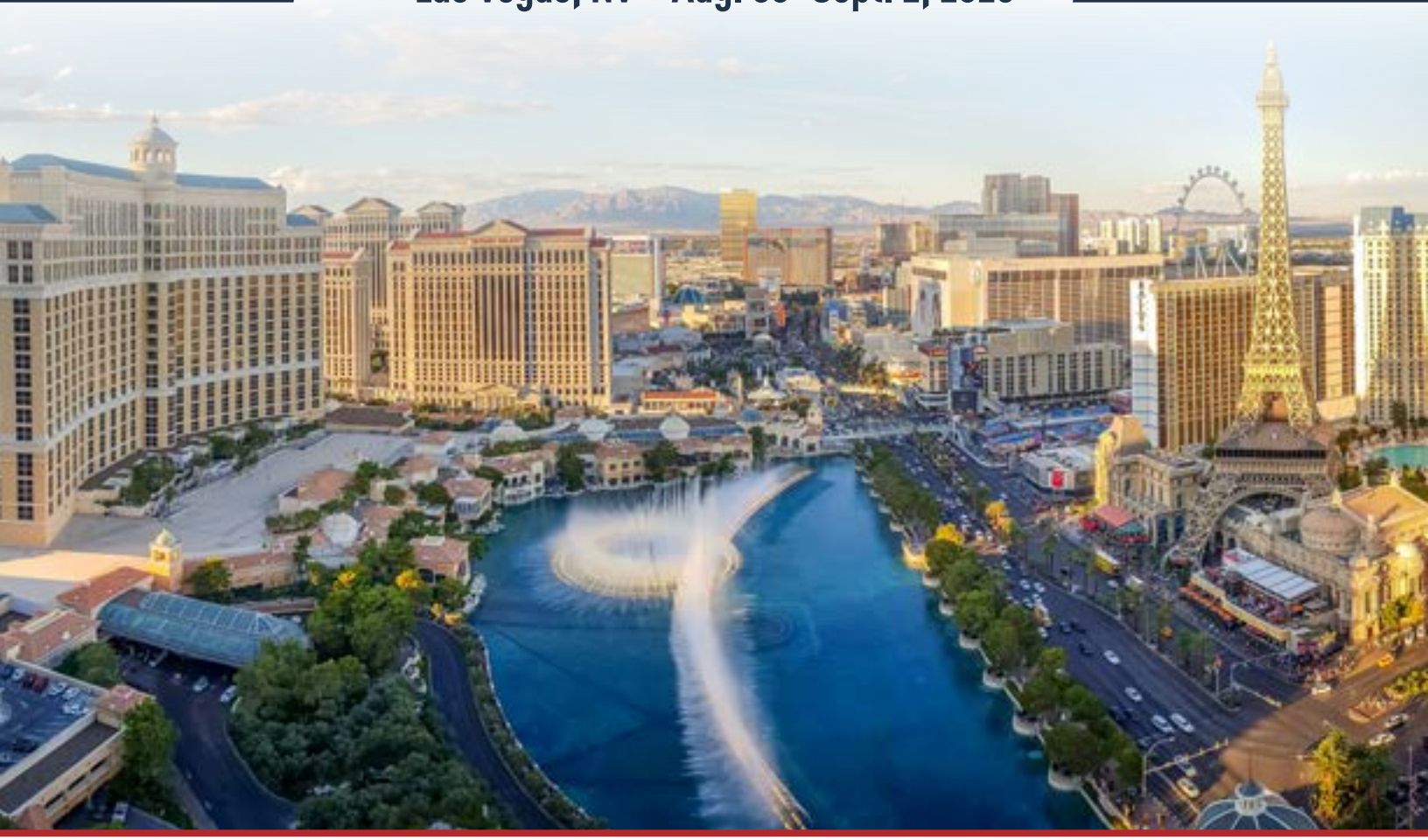
Paralyzed Veterans of America

HEALTHCARE

# SUMMIT + EXPO 2026

*Promoting Excellence, Supporting Clinicians*

**Las Vegas, NV • Aug. 30–Sept. 2, 2026**



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# Dear Summit Attendees:

Welcome to Las Vegas and the 2026 PVA Healthcare Summit and Expo! We have assembled a diverse program this year that provides learning opportunities at all levels: from poster presentations to half day preconference workshops. This year's program includes the latest in research, innovative technology and best practices in spinal cord injury and disorders (SCI/D), multiple sclerosis (MS) and amyotrophic lateral sclerosis (ALS) care across the continuum. We have a strong slate of keynote speakers, whose presentations stretch across the continuum of care and research. We are excited about our program and would like to thank each of our keynote, platform, symposia, and poster presenters for taking part in this year's Summit.

This book contains the Proceedings of the Summit, including scientific abstracts for the Summit presentations, platform, and posters. These will help you determine the sessions you want to attend, as well as serve as references for when you return home and want to put some of these ideas into practice. Our goal with the Summit is to provide educational opportunities to health care providers to improve the quality of care for our veterans and others living with spinal cord injuries and diseases.

We challenge you to learn as much as you can over these four days and to share your knowledge with your team and implement best up-to-date practices as your local centers.

Thank you for attending this year's Healthcare Summit, and for your commitment to providing the best possible care for veterans and other individuals living with spinal cord injuries, multiple sclerosis, amyotrophic lateral sclerosis, and other spinal cord dysfunctions.

Sincerely,

Ken Lee, MD,
Co-Chair

Lindsay Perlman, MPH
Co-Chair

# Session Abstracts

# PC-261: Participatory Action Design and Engineering in Motion: Gamified Educational Interventions to Improve Access to Transportation

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**Interactive session**: Participants will actively engage with experts from the Human Engineering Research Laboratories (HERL) to learn about gamified interventions for community wheelchair skill training. Participants will also receive a demonstration and hands-on training of a first-of-its-kind gamified educational tool to improve utilization of transportation resources in communities.

**Background:** Low alignment between stakeholders' needs and assistive technology or healthcare services can reduce satisfaction and usage. Participatory Action Design and Engineering (PADE) actively engages stakeholders as co-designers in iterative engineering processes to create practical, socially responsive solutions. In rehabilitation engineering, PADE-based products enhance end-users' independence and autonomy, helping to reduce caregiver burden.

**Purpose and content:**

This preconference will introduce participants to the PADE approach and its application in developing gamified interventions for individuals with physical disabilities, their care partners, health professionals, engineers, and community advocates.

- Session 1: Understand PADE concept and its application in developing assistive devices and educational interventions.
- Session 2: Comprehend gamified interventions (i.e., HERL-Town) for community wheelchair skills training and their educational benefits.
- Session 3: Consider implementation and adaptation to address the additional needs of people with disabilities and the practitioners working with them.
- Interactive session: Learn about the barriers faced by mobility device users and strategies to address them in real-life environments through the HERL-Town game.

**Methods:**

· Session 1: Theoretical basis of HERL-Town will be presented, along with example outcomes of PADE approach, including development and validation processes of the game.

· Session 2: Quantitative evidence of the game's educational benefits will be presented, based on findings from veteran wheelchair users, their travel companions, rehabilitation trainees and engineering students.

· Session 3: Qualitative evidence of the game's benefits, along with ongoing implementation and adaptation efforts, will be shared.

· Interactive session: Participants will play the HERL-Town game (i.e.,board or digital) in groups of 4 to 6 for 60 minutes, with three moderators. Depending on the audience volume, additional moderators will be available. A 15-minute group debriefing will follow the game session.

**Results:**

· Session 1: HERL has applied PADE approach to design and engineering multiple technologies, including the Powered Personal Transfer System (PPTS), Mobility Enhancement Robot (MEBot), and HERL-Town game.

· Session 2: Two types of the HERL-Town are currently available (i.e., board and digital), featuring 58 validated educational game scenarios. The Model for the Evaluation of Educational Games indicated good to excellent educational potential for veterans and travel companions (board game: 57.10-77.55, digital game: 58.15-59.30). After approximately 60 minutes of gameplay, OT and engineering students showed significant improvements in knowledge, empathy, and awareness ($ps < .05$).

· Session 3: Focus group participants, including veteran mobility device users and their travel companions, assessed the game as engaging and educationally beneficial. Culturally adapted versions developed and in progress.

· Interactive session: Participants will learn about 20 real-world transportation scenarios, practical strategies to overcome them, and game moderation.

**Conclusions:**

The HERL-Town game, developed using PADE framework, is an educational tool for learning about the community mobility experiences of mobility device users, including veterans and their healthcare providers.

**Learning Objectives**

- Identify at least three common transportation barriers that mobility device users face in their daily mobility.
- Describe at least four patterns of strategies that mobility device users typically use to overcome the real-life transportation barriers.

- Explain how the PADE framework is useful in guiding the development of new technologies for people with disabilities.
- Assess how the HERL-Town game can be applied both for their own learning and for training clients and trainees in their practice settings.

# PC-262: Power Up! Optimizing Manual Wheelchair Performance with Power-Assist and Add-On Technologies

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**Background and Issues:** Manual wheelchair users who have Spinal Cord Injury/Disease (SCI/D) increasingly rely on power-assist and power add-on devices to extend mobility, reduce upper extremity strain, and improve daily and community participation. The rapid expansion of available technologies—including push-rim–activated assist wheels, rear-drive assist units, and front-mounted power add-on systems—provides great opportunities, but also creates challenges in decision making for clinicians who must determine which device best aligns with each user's functional abilities and goals. These systems vary widely in their motor behavior, control demands, and training requirements. Rehabilitation therapists often have limited hands-on experience, which may lead to uncertainty about appropriate user prerequisites, and a lack of tools to guide safe training and clinical decision-making. These gaps can lead to safety concerns, suboptimal equipment matching, and decreased long-term device use.

**Purpose:** The purpose of this workshop is to provide rehabilitation clinicians and others who support Veterans with SCI/D with comprehensive, hands-on education in evaluating, selecting, and training manual wheelchair users for power-assist and power add-on technologies inclusive of: push-rim–activated power-assist wheels, rear-drive assist units, and front-mounted power add-on systems. Participants will gain practical strategies to match device characteristics with user capabilities and wheelchair skills and to implement effective, evidence-informed training progressions.

**Methods:** The workshop will utilize a structured, multi-station hands-on format. Hands-on experience will include:

1. **Push-rim–activated power-assist systems:** Focus on propulsion mechanics, braking control, turning precision, and programming of assist levels.

2. **Rear-drive assist units (e.g., single-wheel push assist):**Emphasis on speed regulation, navigation strategies, starting/stopping control, and adjustments based on user fatigue or upper extremity limitations.

3. **Front-mounted power add-on systems:** Training includes evaluation of weight-shift readiness, trunk stability assessment, steering mechanics, and environmental scanning demands. Participants practice safe acceleration/deceleration and maneuvering in challenging environments.

Across stations, attendees will use structured clinical tools including a prerequisite skills checklist, a device-matching flowchart, and quick-reference guides. Participants will practice identifying functional readiness, adjusting device settings for individualized performance, and teaching key safety elements such as emergency stopping, incline management, and controlled directional changes.

**Results / Lessons Learned:** Participants will demonstrate increased confidence in selecting appropriate power-assist technologies, identifying essential user skills, and implementing device-specific training strategies. Hands-on exposure

will clarify differences between device types, especially regarding required trunk control and upper extremity function and coordination.

**Conclusions:** Effective integration of power-assist and power add-on technologies requires a structured approach to assessment, device selection, and mobility training. Clinicians will benefit from standardized tools that link device demands with user skills and from opportunities for hands-on practice. This workshop will provide informed decision-making resources and enhance competency in guiding manual wheelchair users with SCI/D toward successful adoption of power-assist mobility solutions.

**Learning Objectives**

- describe specific wheelchair skills required for safe use of power assist devices
- identify specific criteria for each type of power assist device to match with client characteristics
- utilize hands-on learning activities to experience front mounted, push-rim activated, and rear-assist drive power assist
- identify resources to implement in clinical practice to assist in clinical decision making for use of power assist

# PC-263: SCI 101; ALS 101; MS 101: Nuts and Bolts of Understanding and Managing SCI&D from onset to throughout life

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Roles: Presenter

The VA Spinal Cord Injury & Disorders (SCI/D) System of Care is committed to promoting lifelong health, independence, quality of life, and productivity for individuals living with SCD/D and related complex neurologic conditions. This clinical track workshop provides a practical, foundational overview of spinal cord injury (SCI), multiple sclerosis (MS), and amyotrophic lateral sclerosis (ALS), with emphasis on tthe unique interdisciplinary approaches required to optimize function and prevent complications across the lifespan.

This pre-course is designed for clinicians who are new to SCI/D care, or who have limited exposure to integrated SCI/D clinical practice. This session highlights both the shared and distinct clinical management priorities across SCI, MS, and ALS.

The SCI portion reviews spinal cord anatomy, common spinal cord syndromes, and early management principles. Participants will learn core elements of the International Standards for Neurologic Classification Spinal Cord Injury (ISNCSCI), review the motor and sensory examination, and discuss rehabilitation, management of complications such as neurogenic bowel and bladder, autonomic dysreflexia, pressure injuries, and spasticity.

The MS section addresses diagnosis and disease monitoring, including the role of MRI, relapse recognition and treatment, disease-modifying therapist, and evidence-informed management of common symptoms affecting mobility, sensation and cognition.

The ALS section focuses on progressive motor neuron degeneration and its functional implications for patients and caregivers. Practical management strategies for communication impairment, dysphagia, and respiratory support are reviewed, along with case-based discussion of ethical challenges requiring thoughtful team-based decision-making.

SCI, MS, and ALS coverage across the VA's SCI centers, where coordinated interdisciplinary care is essential. By strengthening clinnicians' understanding of best practices across these conditions, this pre-course equips participants to deliver higher-quality, patient-centered care that supports long term function and quality of life.

**Learning Objectives**

- Understand best practices management of SCI, MS, and ALS
- Recognize the differences and similarities among SCI/D, MS, and ALS and key practice issues
- Gain a working knowledge of SCI, MS, and ALS
- Consider and discuss the role of multidisciplinary care

# PC-264: A Practical Framework for Progressive Strengthening After Spinal Cord Injury

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Participant discloses the following relationships:

- AbbieRoad Physical Therapy LLC: Owner

**Background and Issues:** Individuals with spinal cord injury (SCI) are frequently discharged from formal rehabilitation once basic safety and mobility are achieved, leaving a substantial gap between inpatient recovery and long-term functional improvement. After discharge, access to specialized SCI clinicians is limited, and many motivated individuals rely on generalized exercise programs, cycling, or nonspecific strengthening that does not adequately target the neuromuscular re-education required for transfers, standing, and walking.

Clinically, therapists face persistent challenges in identifying the most relevant strengthening targets, progressing difficulty without repeated failure, reducing compensatory strategies, and teaching patients how to continue high-volume, task-specific practice outside the clinic. These challenges contribute to plateaus in recovery and underutilization of remaining neuromuscular capacity.

**Purpose:** The purpose of this project is to present a practical, patient-teachable framework for progressive strengthening after SCI that applies across a wide range of clinical presentations, including ambulatory and non-ambulatory individuals, and those with visible movement and those without. The framework is designed to support continuous strengthening after discharge by translating foundational neurorehabilitation principles into a structured, repeatable approach that clinicians and patients can implement.

**Methods:** The framework is organized into five core pillars: (1) progressive overload ("if it moves, we can make it stronger"), (2) high-volume repetition and motor recruitment, (3) shifting weight from arms to legs with stability before mobility, (4) training at the cusp of ability by controlling degrees of freedom and improving functional range of motion without repeated failure, and (5) forced use through task-specific practice. Instructional methods include structured education and case studies to learn programming strategies that increase repetition volume beyond traditional clinic dosing, strategic use and progression of orthotics/assistive devices to appropriately support movement form and pacing required for neurological re-education, and graded task practice supported by environmental setup and caregiver assistance to maintain safety while reducing compensations.

**Results:** Results include clinicians who are appropriately equipted to: (1) teach patients the purpose and functional relevance of each intervention for better long-term compliance and functional ganis; (2) understand strengthening must prioritize foundational movements rather than defaulting to easily observed/documented movements; (3) provide recommendations on orthotic and assistive device selection and progression to better influence motor demand and facilitate neuromuscular recovery; (4) recognize best form and pacing essential for improving mobility control and movement quality; and (5) identify progressions of degrees of freedom to train foundational control before introducing complexity.

**Conclusions:** A practical framework for progressive strengthening after SCI should emphasize continuous progression, patient education for autonomy, and task-specific forced use supported by appropriate equipment and safety planning. Clinicians should prioritize extremity loading, stability before mobility, and reduction of compensations to support long-term strengthening and functional gains across the SCI continuum.

**Learning Objectives**

- Describe the five core pillars of a practical framework for progressive strengthening after spinal cord injury and explain how each pillar addresses the appropriate stimulus for progression.
- Analyze individuals with SCI to identify priority neuromuscular targets, compensatory strategies, and failure points that limit functional carryover.
- Apply the learned pillars to design task-specific and long-term focused strengthening progressions for ambulatory and non-ambulatory patients.
- Select and justify orthotic and assistive devices that appropriately support movement while optimizing motor demand, form, and pacing for neurological re-education.

# PC-265: In Focus: Capturing A Yearlong Photography Project for Veterans with Spinal Cord Injury and Disorders

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**Background:** Veterans with Spinal Cord Injury and Disorders (SCI/D) frequently experience a range of challenges in psychosocial adjustment, social engagement, accessible leisure exploration, and community reintegration, which can significantly impact overall quality of life. Participation in creative, occupation-based interventions can support mental resilience, emotional well-being, community building, and social participation in an effort to reduce feelings of isolation and promote a stronger sense of autonomy. However, evidence for programs of this manner and within this population remains limited.

**Purpose:** This pilot program aimed to explore the feasibility, repeatability, and preliminary qualitative outcomes of a hybrid photography program for Veterans with SCI/D. The program aimed to balance meaningful therapeutic intervention and skill building goals while exploring the reality and practicality of clinical implementation and replication.

**Methods:** The pilot program ran for one year under the guidance and direction of an occupational therapist and recreational therapist who co-facilitated each of the in-person and virtual sessions. Participants used cameras as available on their personal smartphones. For veterans who did not have a smartphone a loaner iPad was provided for participation in group sessions. Interventions included dual-themed photography assignments, structured group discussions, in-person learning activities, and community re-integration outings to foster creative expression, introspection, peer connection, and social support. Adaptive strategies were utilized as needed to ensure equitable accessibility for all participants. The pilot program concluded with an on-site photo exhibit at the James J. Peters VA Medical Center, showcasing participants works and serving as a platform for community engagement. Data was collected primarily through qualitative methods, including participant reports, group dialogue, and session observations.

**Results:** Participants reported increased self-expression, enhanced social connection, and new skill acquisition. Moreover, the hybrid model was determined to be feasible and allowed for participation across a wide range of Veterans with SCI/D despite mobility limitations, differing socioeconomic backgrounds, and geographical barriers. Group discussions and peer feedback were particularly valued, supporting a sense of shared accomplishment and community.

**Clinical Significance:** With no cost to start, this hybrid photography program focused on creative therapeutic intervention and skill building as a feasible and impactful means for engaging Veterans with SCI/D to support psychological well-being, skill development, and peer engagement. Lessons learned from this pilot program serve as actionable guidance for clinicians seeking to develop or replicate creative, occupation-based interventions in SCI/D rehabilitation settings. This pilot program demonstrates the potential of creative, therapeutic interventions in clinical practice to enhance both individual and group outcomes for Veterans with complex needs.

**Interactive Component:** Audience members will participate in an occupation-based learning lesson and photography assignment similar to one that was offered during the pilot program in order to gain an understanding of the Veteran experience and the benefits of photography as a meaningful and therapeutic intervention.

**Learning Objectives**

- Explain the structure and components of a pilot photography program for Veterans with SCI/D using both in-person and virtual formats for engagement
- Identify key therapeutic goals of photography interventions for Veterans with SCI/D, including psychosocial engagement, self-expression and community reintegration
- Examine the benefits and challenges of implementing and delivering creative, occupation-based rehabilitation programming to Veterans with SCI/D
- Discuss adaptive strategies and accessibility considerations to facilitate participation across a range of functional abilities
- Apply lessons learned from this pilot photography program to inform the development and replication of creative, occupation-based programming for Veterans with SCI/D across the country

# PC-266: Implementation and Future of Artificial Intelligence in the Veterans Health Administration

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Participant has indicated the following discussion of unapproved drug or product uses:
Artificial intelligence tools in development to enhance mobility, functioning, or communication.

**Background and Issues:** Artificial intelligence (AI) is profoundly changing the contemporary technological landscape. While healthcare is generally a slow adapter of new technology, the influence of AI in healthcare is increasing, and will grow dramatically in the next few years. Care of patients with spinal cord injuries (SCI), multiple sclerosis (MS), and amyotrophic lateral sclerosis (ALS) is no exception.

**Purpose:** The Veterans Health Administration (VA) artificial intelligence program office was founded in 2023. VHA's AI vision focuses on improving outcomes and experiences for Veterans by developing trustworthy, safe, and effective AI capabilities that support healthcare delivery, customer service, and internal efficiency. It empowers employees across VHA—clinical staff, administrators, and innovators—to adopt and use AI tools responsibly as part of their work. VA emphasizes responsible and trustworthy AI by aligning with federal standards and principles to ensure safety, privacy, fairness, accountability, and transparency in AI use.

**Methods:** The VHA tracks hundreds of AI initiatives being piloted or in use across the agency—ranging from diagnostics to administrative automation—as an enterprise resource and accountability measure. All AI implementations continue to require human interaction and oversight.

**Results:** Current AI applications in VHA include risk prediction, diagnostic support, medical imaging analysis, clinical documentation automation, and data extraction and analytics from natural language processing of the medical record. AI is also used administratively for taking meeting minutes, drafting and summarizing documents, and for assistance in coding.

New applications of AI will address the needs of veterans with SCI, MS, and ALS. Massive increases in processing power and speed are supporting explosive AI growth. AI will increasingly be viewed not just as an application, but as a platform upon which other applications will be built in the future. This will allow software customization to the needs of a specific clinical service or even individual user as never before. Integration of AI within the physical world will allow deployment of robots as individual assistants and allow intelligent augmentation of residual motor ability and patients with SCI and other causes of neurogenic weakness. Power mobility devices will be adaptive, providing smarter navigation and allowing more flexibility in operator control. For Veterans with ALS and MS with impaired communication, enhanced communication tools leveraging predictive AI is now a reality. This includes exciting nascent work in direct brain computer interfaces.

**Conclusions:** In VHA, AI applications that reduce disability and improve the lives of Veterans with neurological disorders will proliferate. This program will conclude with a discussion of how AI is currently integrated into the attendee's clinical workflow and how its use might be enhanced in the future. Rather than replacing employees, AI should be seen as a way to enhance their effectiveness and reach.

**Learning Objectives**

- Identify the administrative structure and oversight requirements of the VHA's artificial intelligence initiatives.

- Discuss how rapid advances in hardware and software support expanded impact and integration of AI-based tools and devices.
- Describe potential novel applications of AI to improve the lives of patients with SCI, MS, and ALS, and how they might be integrated into the participants' workflow.
- Assess the impact of AI on the employee's work environment, including the need for revisions to workflow, change management, and acquisition of new skills.

# 2601: From Crisis to Capability: Vision and Action in Modernizing Veteran Care Delivery

**Dr. Indra Sandal, PhD, MBA**
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Bio: Dr. Indra Sandal is a nationally recognized healthcare innovation leader with over 20 years of experience driving transformative initiatives across federal, academic, and private sectors. She currently serves as Chief Innovation Officer and Center Director of the National Center for Transformational Innovation (NC4TI) at the James A. Haley Veterans' Hospital in Tampa, FL, where she leads enterprise-wide programs focused on improving access, quality, and outcomes for Veterans through cutting-edge technologies and public-private collaborations.

Dr. Sandal is the architect of several landmark initiatives, including the VA–Uber Health Connect Program, which has provided over 1million rides to Veterans across 110+ sites, reducing missed appointments and generating more than $500 million in cost savings. She also founded the Veterans Health Venture Studio, a first-of-its-kind innovation pipeline uniting 94 organizations across 47 states and territories to advance AI-enabled solutions for critical challenges such as suicide prevention, medication safety, and workforce efficiency. Her leadership extends to pioneering efforts in drone-based medical supply delivery and autonomous vehicle mobility programs, in collaboration with Tampa International Airport and City of Tampa enhancing care access for thousands of Veterans.

Dr. Sandal serves on the American Legion's "Be the One" suicide prevention advisory council and collaborates with leading partners such as Microsoft, MIT Hacking Medicine, and The American Legion to accelerate innovation and address urgent healthcare challenges.

Prior to her current role, Dr. Sandal served as Chief of Innovation at the Tampa VA and Director of Innovation at the Memphis VA Medical Center, where she spearheaded national strategies and elevated the site to Innovators Network status. Her academic career includes serving as Assistant Professor of Medicine at the University of Utah and research roles at Virginia Tech, where she secured $9M+ in grants and authored 21 peer-reviewed publications, 17 patents, and multiple book chapters.

Dr. Sandal's contributions have earned her numerous prestigious honors, including being chosen as one of Tampa Bay Business Journal's 2026 BusinessWomen of the Year, the 2025 SFC Jared C. Monti Medal of Honor: Above and Beyond the Call of Duty, 2025 Federal Excellence in Healthcare Management Award, 2024 Jack A. Kolosky Healthcare Innovator Award, and VA's highest innovation honor, the Dr. Robert L. Jesse Award for Excellence in Innovation. She has been featured in national media outlets and is a frequent speaker at forums such as the American College of Healthcare Executives Congress and AMSUS.

A dedicated mentor and faculty member for the Catalyst Fellowship at MIT LinQ, Dr. Sandal holds a Ph.D. in Biotechnology from Guru Nanak Dev University and an M.B.A. from Northwestern University's Kellogg School of Management. She is passionate about building inclusive innovation ecosystems and advancing technologies that modernize healthcare delivery for Veterans.

# 2603: Embodied Healing: Cultivating Whole-Person Care in SCI Medicine Education

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Roles: Submitter; Presenter

**Background and Issues:** Spinal cord injury (SCI) represents a complex, lifelong condition characterized by high burdens of pain, recurrent infections, cardiometabolic complications, and pressure injuries. Although biomedical advances have improved survival, quality of life remains limited by persistent mental health comorbidities and fragmented care. At the same time, SCI Medicine (SCIM) faces declining fellowship enrollment, even though SCIM-trained physicians are associated with improved outcomes. Integrative medicine—combining conventional care with evidence-based complementary approaches—may better address the whole-person needs and preferences of individuals with SCI. However, no clear or actionable framework exists for embedding integrative competencies within SCIM fellowship training.

**Purpose:** This project aims to explore attitudes toward integrative medicine among key SCI stakeholders—including individuals with SCI, caregivers, SCIM physicians, trainees, and prospective fellows—to inform development of integrative competencies grounded in the concept of embodiment, which emphasizes the inseparability of mind, body, and lived experience.

**Methods:** We will (1) summarize the historical evolution of integrative medicine; (2) review current evidence on integrative approaches used in SCI care; and (3) present a proposal to assess stakeholder perspectives on incorporating integrative medicine into SCIM fellowship training. This work will guide the development of consensus competencies, curriculum elements, and implementation strategies.

**Results / Lessons Learned:** We anticipate generating: (a) a consensus-driven set of integrative medicine competencies mapped to SCIM milestones; (b) an implementation blueprint for fellowship programs, including didactics, supervised clinical exposure, interprofessional collaboration, and experiential practices; and (c) metrics for evaluating trainee learning and patient-centered outcomes. Early engagement suggests that a structured, evidence-informed training pathway may enhance fellowship appeal and increase learner engagement while supporting self-management and patient experience.

**Conclusions:** Integrating evidence-based integrative medicine within SCIM training offers a promising approach to addressing persistent gaps in whole-person care for individuals with SCI. A clear, stakeholder-informed framework may strengthen fellowship recruitment and enrich the skill set of future SCIM physicians. This work supports a recommended position that integrative competencies be intentionally incorporated into SCIM fellowship curricula to improve both trainee preparation and patient outcomes.

**Learning Objectives**

- Explain the foundational principles and historical development of integrative medicine and its relevance to SCI Medicine (SCIM) training and practice.
- Summarize current evidence on integrative strategies used in SCI care and identify gaps in how these approaches are incorporated into fellowship training.
- Explain how embodiment-based practices (e.g., mindfulness, breathwork, adaptive movement) can be integrated into SCIM curricula to address pain, sleep, and cardiometabolic health.

- Discuss behavioral and psychosocial strategies—such as motivational interviewing, resilience-building, and culturally responsive communication—to enhance patient engagement and mental health after SCI.

# 2604: Balancing Patient Autonomy and Staff/Caregiver Safety in Safe Patient Handling and Mobility Practices

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**Background:** The Spinal Cord Injury (SCI) Unit at VA Long Beach Healthcare System supports veterans with complex care needs requiring individualized repositioning and skin protection strategies. Safe Patient Handling and Mobility (SPHM) practices are central to maintaining staff safety and preventing patient injury. However, ethical and operational challenges arise when veterans decline recommended repositioning methods or resist evidence-based care interventions, creating tension between patient autonomy (PA) and caregiver safety. VA Long Beach will share the success achieved in engaging an interdisciplinary approach resulting in positive outcomes for all.

**Problem:** The SCI nursing team faced an ongoing challenge with a veteran who repeatedly refused standard repositioning protocols and wound care recommendations. His preferred positioning method required manual handling lasting over an hour per session, significantly increasing staff fatigue and musculoskeletal injury risk. Despite education, ethics consultation, and collaborative discussions, he continued to decline recommended practices, resulting in worsening skin integrity concerns. The situation required balancing the veteran's decision-making rights with staff safety and adherence to facility standards.

**Purpose/Objectives**: The goal of this project was to establish an ethical, safe, and sustainable approach for managing care situations where a veteran's preferences conflict with SPHM standards. The initiative aimed to: (1) protect staff from preventable injury, (2) respect patient autonomy, (3) clarify boundaries around refusals based on safety concerns, and (4) promote consistent, compliant care practices across the unit.

**Methods**: A multidisciplinary approach was implemented involving nursing leadership, the SPHM Program, Risk Management, Ethics, and the Prevention and Management of Disruptive Behavior (PMDB). The team conducted safety huddles, case reviews, and bedside discussions to identify risk areas and solutions. A Patient Care Agreement (PCA) was developed to outline staff limitations, patient expectations, and accountability measures. Educational interventions included staff training on proper lift utilization, ergonomic techniques, and documentation of refusals. Turn logs and a buddy system were introduced to enhance safety monitoring. Data from incident reports, feedback sessions, and team meetings guided ongoing modifications to the care plan.

**Results (Lessons Learned)**: The PCA improved communication, role clarity, and consistency of care. The use of structured tools such as turning logs and a buddy system reduced confusion and improved adherence to safety protocols. Collaboration across departments fostered shared accountability, while continuous patient education supported transparency and rapport. The project highlighted the value of early interdisciplinary intervention, staff empowerment to refuse unsafe tasks, and thorough documentation to maintain ethical and professional integrity.

Balancing patient preferences with staff safety requires a structured and collaborative approach. Establishing clear expectations through care agreements, reinforcing SPHM education, and maintaining strong leadership oversight can reduce risk while honoring (PA). This framework can serve as a model for other complex care situations, fostering ethical practice and a culture of safety. For spinal cord injury (SCI) veterans, it is essential to provide access to SPHM education and training, along with a variety of safe options that include participation from both the veteran and their home caregivers. This inclusive approach supports treatment goals and enhances quality of life for all involved.

**Learning Objectives**

- Identify strategies to balance patient autonomy with staff safety in complex care situations.

- Apply ethical and administrative principles to guide safe patient handling decisions.
- Develop team-based protocols that reduce staff injury while preserving patient-centered care.
- Evaluate the benefits of structured care agreements for managing high-risk patient interactions.

# 2605: Evaluating Accessibility of Residential Substance Use Treatment for People with Spinal Cord Injuries

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**Background:** Among those with spinal cord injury (SCI), the risk of having a substance use disorder is significantly higher than in the general population. Those with SCI are at increased odds of having alcohol use disorder (OR=4.19, 95% CI, 3.67, 4.80), nicotine disorder (OR=4.66, 95% CI, 4.40, 4.94), opioid use disorder (OR=7.97, 95% CI 6.59, 9.66), and cannabis use disorder (OR=7.83, 95% CI 6.32, 9.69) (Graupensperger, et al, 2020). Prior surveys have suggested that individuals with SCI face significant barriers when attempting to access substance use treatment, and individuals with physical disability can be denied access to substance use treatment facilities, limiting their options for appropriate treatment (West, et al, 2009). In light of national pushes to ensure individuals have timely access to appropriately intensive treatment for substance use disorders, there is a need to understand the current status of treatment accessibility for individuals with SCI.

**Purpose:** To evaluate the physical and programmatic accessibility of residential substance use treatment facilities for individuals with SCI, and to document program denial rates and reasons for denial to the treatment program.

**Methods:** We conducted an audit study, also known as a "secret shopper" study (Lowenstein et al., 2025; Meyerson et al., 2024), where investigators posed as a family member of a 25-year older man with SCI who used a wheelchair for mobility, was medically stable, and was seeking admission for residential treatment for a moderately severe alcohol use disorder. We identified residential substance use treatment programs in 11 Western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming) identified from the Substance Abuse and Mental Health Services Administration treatment locator. Investigators called each residential treatment facility up to three times. Data was collected and stored in Research Electronic Data Capture, a HIPAA compliant, web-based secure research database. Descriptive statistics were conducted across data collected to characterize denial rates and reasons for denial.

**Results:** We contacted 355 residential treatment programs between August, 2025 and January, 2026. Of those contacted, 200 programs responded (56%) with 84 programs (42%) able to accept admission, 94 (47%) denied admission, and 22 (11%) provided indeterminate response. Of the residential treatment facilities who accepted admission, 93% reported wheelchair accessible facilities, with 91% having the ability to provide medical support for SCI-related care. Among those who denied acceptance to their treatment program, reasons included lack of wheelchair accessibility (59%), clinical "mismatch" (36%), or "some other reason" (17%). Acceptance rates varied across states, from 31% in California to 78% in Nevada.

**Conclusions:** Our study identified significant treatment access gaps to residential treatment facilities for individuals with SCI, with many programs denying entry due to lack of wheelchair accessibility. These treatment gaps have serious clinical consequences, as untreated substance use may exacerbate existing physical and psychological conditions and may heighten the risk of hospitalization in the SCI population. The rate of denial of residential treatment services is higher than other groups and may further worsen overall healthcare treatment gaps in the SCI population.

**Learning Objectives**

- Describe the existing literature on substance use among those with spinal cord injury
- Describe the methods of an audit study
- Identify the barriers to residential substance use programs for individuals with spinal cord injury
- Identify the clinical implications of substance use treatment denials within their clinical context

# 2606: Pelvic health for people living with multiple sclerosis: Background, impacts, and current rehabilitation strategies

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**Background:** Multiple sclerosis (MS) is an autoimmune disease of the spinal cord and brain that and affects up to 1,000,000 Americans and over 35,000 Veterans. People living with MS have an increased risk of pelvic health dysfunction (bladder, bowel, and/or sexual), which negatively impacts quality of life. Bladder dysfunction is the most reported pelvic health concern in MS, impacting at least 80% of people, while approximately 50% report bowel and/or sexual dysfunction. While prevalent, pelvic health dysfunction is not frequently discussed in clinical care and research settings, often due to stigma, embarrassment, limited screening, and the prioritization of other symptoms during clinical encounters. Understanding the variable symptoms of these dysfunctions can help clinicians develop effective care plans.

Despite the availability of evidence-based rehabilitation and behavioral strategies to address pelvic health dysfunction in people with MS, substantial gaps in provider and patient knowledge and access to care persist, resulting in significant underutilization of pelvic health rehabilitation. Barriers may include limited awareness among patients and healthcare providers, variability in referral pathways, and limited access to specialized pelvic health services.

More education and discussion around pelvic health rehabilitation may empower patients, inform clinical decision-making, and promote interprofessional collaboration in the treatment of pelvic health dysfunction for people with MS. Therefore, providing an overview of the prevalence, symptoms and current rehabilitation research on pelvic health in people with MS will be helpful for patients, healthcare providers and researchers.

**Purpose:** The purpose of this presentation is to provide education on the background, impacts and current rehabilitation strategies for pelvic health dysfunction in people with MS.

**Methods:** The objectives for the proposed presentation are that attendees will be able to: 1) Define the roles of the central nervous systems and pelvic floor in bladder, bowel and sexual function, 2) Identify how MS can impact bladder, bowel and sexual function and list common symptoms, 3) Describe current evidence and opportunities for rehabilitation research related to bladder, bowel and sexual function in people with MS, and 4) Discuss screening tools, interprofessional collaboration, and rehabilitation strategies to promote effective management of neurologic bladder, bowel and sexual function.

**Results:** During this presentation, we will define neurogenic bladder, bowel, and sexual dysfunction and discuss the specific impact of MS on these symptoms. We will also provide an update on current evidence and existing gaps in the areas of pelvic health rehabilitation management, provider and patient knowledge, and access to care. Lastly, we will explore how screening tools and interprofessional collaboration can help identify appropriate referral pathways for this population.

**Conclusions:** Disseminating education around pelvic health and rehabilitation would help to increase the knowledge and effectiveness of health professionals in the MS community and empower people with MS with overall knowledge of pelvic health, thereby improving quality of life among people living with MS.

**Learning Objectives**

- Define the roles of the central nervous systems and pelvic floor in bladder, bowel and sexual function
- Identify how MS can impact bladder, bowel and sexual function and list common symptoms,
- Describe current evidence and opportunities for rehabilitation research related to bladder, bowel and sexual function in people with MS
- Discuss screening tools, interprofessional collaboration, and rehabilitation strategies to promote effective management of neurologic bladder, bowel and sexual function.

# 2607: Race as an Independent Predictor of Accelerated Brain Aging and Functional Loss in Multiple Sclerosis

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- Connected Research: Consultation
- Genentech: Clinical Research for organization
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**Background:** Multiple Sclerosis (MS) involves chronic Central Nervous System (CNS) damage and neurodegeneration. While racial differences in MS clinical presentation are recognized, the specific impact of race on quantitative structural, metabolic, and brain-aging biomarkers, and how these relate to functional outcomes remains underexplored.

**Purpose:** This study aims to investigate racial disparities in indicators of neurodegeneration (brain-predicted age gap), metabolic function, and functional performance (cognitive and motor) between African American (AA) and White individuals with MS.

**Methods:** In this cross-sectional study of 121 MS patients (59 AA, 62 White), we employed a multimodal imaging approach. Structural MRI was analyzed using FreeSurfer (v7.2) for volumetrics and *brainageR* (v2.1) to calculate the brain-predicted age. Microstructural integrity was assessed via Fractional Anisotropy (FA) in normal-appearing white matter (NAWM) using DTIStudio. Metabolic status was measured by tNAA/tCr ratios via Proton Magnetic Resonance Spectroscopy (1H-MRS, LCModel v6.3). Functional assessments included the Symbol Digit Modalities Test (SDMT), Paced Auditory Serial Addition Test (PASAT-3), 9-Hole Peg Test (9HPT), and MS Quality of Life-Physical Summary (MSQOL-PS). Multivariate linear regression was performed to determine if race independently predicted accelerated brain aging, adjusting for the following potential confounders: age, sex, BMI, disease duration, and DMT status.

**Results:** Demographics were comparable (age p=0.083; gender p=0.128). AA patients had a significantly shorter disease duration than White patients (median: 5.5 vs. 8.0 years; p=0.013). Despite this, AA patients exhibited more profound neurodegeneration, with significantly lower Gray Matter (GM) volume (p<0.001) and thinner global cortical thickness (p=0.031). Metabolic integrity (tNAA/tCr) was significantly reduced in the AA cohort (p=0.001), as was microstructural integrity (FA in NAWM, p=0.001). Critically, multivariate regression confirmed that Race is a robust independent predictor of accelerated brain aging; AA patients exhibited an additional 6.019-year increase in their brain-predicted age gap compared to White patients (p=0.009) after controlling for all confounders. Functionally, AA patients showed significant deficits in cognitive processing (SDMT p<0.001; PASAT-3 p=0.007) and motor function (9HPT-dominant p=0.003; non-dominant p=0.020). Quality of life (MSQOL-PS) was also significantly lower in the AA group (p=0.027).

**Conclusions:** African American patients experience more aggressive neurodegeneration and accelerated brain aging earlier in the disease course compared to White patients. These structural and metabolic disparities translate directly into poorer cognitive and motor outcomes. These findings underscore the urgent necessity for race-specific approaches in MS clinical management and resource allocation to address these inequitable health outcomes.

**Learning Objectives**

- Describe the significant differences in structural (Gray Matter volume) and metabolic (tNAA/tCr) markers of neurodegeneration between African American and White MS patients.

- Explain the utility of the "brain-predicted age gap" as an independent biomarker for assessing disease burden and racial disparities in MS.
- Analyze the relationship between accelerated brain aging and clinical functional decline in cognitive (SDMT) and motor (9HPT) performance.
- Discuss the impact of racial disparities on MS-related quality of life and identify strategies to implement more equitable interdisciplinary care models.

# 2608: ALS Management Mastery: Interdisciplinary Strategies for Complex Cases

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**Background**: ALS is a progressive neurodegenerative disease with a highly variable presentation of physical and cognitive deficits. Team-based multidisciplinary care is the gold standard treatment model for individuals with ALS. Due to their military service, veterans with ALS are a unique and complex subset of this patient population. Individual characteristics such as socioeconomic status, health literacy, and social support can quickly add to the complexity of these patients to challenge even the most experienced ALS teams.

**Purpose**: The purpose of this presentation is to demonstrate the handling of complex ALS case studies by a panel of interdisciplinary subject matter experts.

**Description**: This presentation will be delivered by a panel of clinicians composed of several different interdisciplinary ALS clinics. The talk will be conducted using case studies of veterans with ALS. Each case study will have personal and health characteristics which present significant challenges to an interdisciplinary ALS team. In a round table format, the panel will demonstrate practical examples of interdisciplinary communication, assessment, and plan of care development. These cases will highlight areas where clinicians must be adaptive and creative to successfully negotiate the VA system, leverage the VHA ALS Directive and VHA ALS System of Care to provide high quality care for these patients. Finally, the audience will be encouraged to act as an additional member of the team during the presentation by proposing treatment options, considerations, and questions for each case.

**Conclusions**: ALS is a highly complex disease that requires exceptional interdisciplinary communication and coordination to manage.

**Learning Objectives**

- Identify differences between a multidisciplinary team and an interdisciplinary team.
- Describe the importance of effective interdisciplinary communication and role sharing.
- Analyze unique cases of veterans with ALS and identify the highest areas of need.
- Describe strategies to manage veterans with ALS when resources and team members are limited.

# 2609: Interdisciplinary Approaches to Women's Health After Spinal Cord Injury: A Panel Discussion

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**Background and Issues:** Women with spinal cord injury/related disorders (SCI/D) represent a small but growing number of the civilian and Veteran population, accounting for approximately 20% of SCI incidence and 3–6% of SCI/D patients within Veterans Health Administration (VHA) systems.[1,2] Many women sustain SCI during their reproductive years and encounter unique sexual and reproductive health (SRH) challenges, including menstrual changes, fertility concerns,

contraceptive decision-making, and perimenopausal/menopausal transitions. Despite these realities, SRH concerns remain insufficiently addressed within rehabilitation settings, and many providers report limited preparation or discomfort discussing women's health early after injury and across the continuum of care.

Menstrual management following SCI is a significant yet underrecognized activity of daily living (ADL). Approximately one-third of women with tetraplegia require caregiver assistance for menstrual care, compared to fewer than 10% of women with paraplegia.[3] These needs are often not anticipated or discussed during inpatient rehabilitation, leaving women and caregivers unprepared for post-discharge realities and increasing risk for secondary health complications and psychological distress.[4] Contraceptive counseling is complex, as an emphasis on safety may unintentionally constrain shared decision-making and delay proactive contraceptive planning.[5] Additionally, limited research on the perimenopausal and menopausal transitions among women with SCI may delay clinical intervention.

Within the VHA, responsibility for comprehensive SRH care has expanded alongside the growing population of women veterans. Interdisciplinary sexual health initiatives using structured frameworks, including the PLISSIT model, Sexuality Healthcare Competency (SHC) Model, and the Disability-Affirmative Sexual Health Care Model (DASH-CM), have demonstrated improved patient satisfaction and feasibility across VA sites, highlighting the need for coordinated, team-based approaches.[6,7] While these models provide a solid foundation for assessment and treatment, it is important to recognize the unique experience of disabled women's sexuality.

**Purpose:** The purpose of this panel presentation is to demonstrate women-affirmative, interdisciplinary approaches to assessment and treatment of SRH concerns following SCI, with an emphasis on menstrual management, contraceptive care, perimenopause/menopause, and caregiving considerations across civilian, active-duty, and Veteran populations.

**Methods:** This panel brings together rehabilitation professionals from physical therapy, occupational therapy, speech-language pathology, and psychology to address interdisciplinary management of women's SRH following SCI/D. This session will highlight discipline-specific roles and team-based interventions using case-based examples grounded in current practice standards and informed by the PLISSIT, SHC, and DASH-CM frameworks to promote person-centered, coordinated care across the rehabilitation continuum.

**Results/Lessons Learned:** Interdisciplinary collaboration facilitates earlier identification of SRH concerns, improves caregiver preparedness, and supports patient-centered, affirmative care. Case-based examples will illustrate how coordinated approaches enhance assessment, clarify referral pathways, and increase clinician confidence, contributing to improved patient satisfaction. Practical tools and resources will be provided to support implementation into clinical practice.

**Conclusions:** Rehabilitation teams can implement women-affirmative practices by integrating established frameworks into practice.[6,7,8] Early intervention through education, problem-solving using assistive devices, and psychological support offers a practical pathway to improving SRH outcomes and advancing equitable rehabilitation care for women with SCI.

**Learning Objectives**

- Identify key sexual and reproductive health challenges experienced by women with SCI/D, including menstrual management, contraceptive care, and perimenopausal/menopausal transitions, across the rehabilitation continuum.
- Describe discipline-specific roles and contributions of physical therapy, occupational therapy, speech-language pathology, and psychology in addressing women's sexual and reproductive health following SCI/D.
- Apply established sexual health frameworks (PLISSIT, Sexuality Healthcare Competency Model, and DASH-CM) to interdisciplinary assessment and referral planning for women with SCI/D.
- Integrate a woman-affirmative, interdisciplinary approach to addressing a sexual or reproductive health concern (e.g., menstrual management or contraceptive decision-making) using a case-based scenario.

# 2610: How do Clinicians Assess Concern About Falling in People Who Use Wheelchairs and Scooters?

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**Background:** Concern about falling (CaF) is a psychological aspect of falling among people who use wheelchairs and scooters (WC/S) full-time (FT), with a prevalence of 64%. CaF can develop due to a fall or independently. While a modest level may be protective, excessive concern can lead to activity avoidance, deconditioning, and ultimately greater fall risk. Global fall-prevention guidelines for older adults emphasize assessing CaF as part of multifactorial practice; however, few tools are tailored to evaluate CaF among WC/S users. Moreover, existing measures lack clear guidance for interpreting CaF severity and informing intervention in this population.

**Purpose:** To explore how clinicians assess/interpret CaF among adults who use WC/S, and how CaF information guides intervention.

**Methods:** An exploratory qualitative design was performed. Clinicians who had expertise in evaluating CaF or worked with people who use WC/S FT, including those with relevant clinical experience across various settings, or with prior

publications in this area, were recruited. Four focus groups were conducted with two researchers analyzing transcripts through thematic analysis.

**Results:** Seventeen Clinicians (13 female; 6 occupational, and 11 physical therapists) described routinely inquiring about CaF, particularly for outpatient clients. CaF discussions were also prompted when people who use WC/S explicitly expressed concern, set higher-risk mobility/transfer goals, or presented with indicators such as fall-related injuries, damaged equipment, or notable curtailment in activity. Three interconnected themes emerged on factors associated with CaF: (1) personal-level factors such as history of falls/fall-related injuries and status of health condition; (2) environmental parameters such as accessibility, WC/S fit, and social and institutional support; and (3) activity-related patterns such as engagement in pressure relief tasks and meaningful activities. To assess and interpret CaF, clinicians used a combination of informal, standardized, and performance-based strategies. These included direct questions about concern, informal conversations about falls, and incorporating caregiver input when cognition limited self-report. Some clinicians supplemented interviews with generic self-report scales (e.g., balance confidence or fear-avoidance measures) and paired them with functional mobility assessments (e.g., sitting balance, wheelchair skills, and transfers) to compare perceived versus observed fall risk. Across groups, clinicians emphasized the lack of validated objective CaF tools designed specifically for WC/S users and the absence of interpretation standards. Therefore, they relied primarily on subjective clinical judgment, with standardized tools functioning as secondary support, given their development primarily for ambulatory populations. Clinicians used CaF findings to guide intervention by identifying mechanisms and contexts of falls/near falls, tailoring mobility and equipment interventions, and integrating confidence-building and behavior-change strategies. Some approaches involved interprofessional collaboration.

**Conclusions:** Clinicians view CaF among WC/S users as a multidimensional construct shaped by personal, environmental, and activity-related factors. CaF information is used to individualize fall-prevention interventions. However, there are limited WC/S-specific tools and interpretive frameworks to accompany clinicians' subjective judgment. These findings highlight the need for validated, objective WC/S-specific CaF measures with clear scoring and interpretive standards to distinguish protective from under-/overprotective CaF and to better guide rehabilitation strategies for this population.

**Learning Objectives**

- Identify common prompts that lead clinicians to inquire about concerns about falling (CaF) in people who use wheelchairs and scooters (WC/S), including those living with spinal cord injury (SCI) and multiple sclerosis (MS).
- Explain various personal, environmental, and occupational factors that shape CaF in people who use WC/S, including those living with SCI and MS.
- Describe how clinicians assess and interpret CaF using informal, standardized, and performance-based approaches for people who use WC/S, including those living with SCI and MS.
- Apply CaF-related information to plan and adjust fall-prevention and rehabilitation interventions for people who use WC/S, including those living with SCI and MS.

# 2611: What Could Go Wrong? Strategic Management of Mobility Related Adverse Events

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**Background and Issues:** Due to inherent impairments resulting from SCI/D, clients often use one or more technologies for mobility assistance in varied environments. Whether resulting from a small mistake or gross negligence, adverse events involving mobility assistive devices are common and often result in detrimental consequences ranging from minor inconvenience to catastrophic injury including death. With a strategic and organized approach, clinical professionals working with mobility technologies can evaluate actual adverse events and "close call" incidents to avoid repeat challenges and/or mitigate potential harm to clients.

**Purpose:** The purpose of this session is to support SCI/D clinicians to understand processes for managing adverse events, to proactively identify actions to avoid harm to clients, and to access available data sources to objectively evaluate mobility technologies for safety and performance.

**Methods:** During this interactive educational session, key issues surrounding adverse events related to mobility technologies will be discussed and recommendations will be shared to manage safety concerns. Examples of well-known adverse events related to mobility devices that will be reviewed include device malfunction and failure, component design flaws, falls during device use or transfers, skin compromise and both acute and chronic musculoskeletal injury. While safety incidents have been studied and reported in the literature, it is highly likely that the actual number of events is under reported, including those resulting in identifiable harm and others where harm was avoided, also known as a near miss or close call. Evaluating safety events and concerns with an approach aligned with High Reliability Organizations (HRO) supports awareness of the factors leading to an actual or potential adverse event and identification of the options to prevent or mitigate the same from happening again. The applied HRO principles of 1) sensitivity to operations; 2) reluctance to simplify; 3) preoccupation with failure; 4) commitment to resilience; and 5) deference to expertise provide the foundational structure for understanding and managing inherent safety risks for consumers using mobility technologies. During this session, practical approaches for mobility technology interventions will be shared with an emphasis on understanding and mitigating real and potential harm. Targeted topics will include access to and review of relevant data sources, strategies to evaluate adverse events including Root Cause Analysis, managing device recalls and corrective actions, human behaviors and communication that impact safety awareness and actions, and human factors engineering applied to technology design. Additionally, relevant literature will be emphasized, and education and training recommendations will be included to recognize and manage risk, avoid real and potential harm, report events, mine data sources and implement strategies to mitigate adverse events related to mobility technologies.

**Results:** Attendees will be empowered to proactively mitigate harm through appropriate actions, investigate advents occur to learn and implement preventative actions, and access open-ource data options to objectively evaluate mobility devices and related challenges.

**Conclusions**: Clinician awareness of recommended methodologies to manage adverse events under the HRO context facilitates optimized safety for Veterans and others with mobility impairments that rely on technology for participation.

**Learning Objectives**

- Identify three options for reporting adverse events related to mobility technologies used by individuals with SCI/D.
- Discuss three reasons that reporting actual and near-miss incidents supports safety awareness and avoidance of future harm.

- Outline two scenarios where concepts from High Reliability Organizations can be directly applied to the field of technology evaluation to manage risk.
- List three steps for accessing data about previously reported adverse events for specific technologies of interest.

# 2612: Enhancing Cognitive Wellness in Multiple Sclerosis: Evidence-Based Strategies for Mental Health Providers

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**Background and Issues**: Cognitive and psychological symptoms are prevalent among people with multiple sclerosis (PwMS), affecting quality of life, daily functioning, and disease self-management. These symptoms often include difficulties with cognitive functioning, as well as mood disorders such as depression and anxiety. Despite their frequency and clinical significance, there is a shortage of mental health providers with specialized knowledge of MS and its neuropsychological complexities. This contributes to underdiagnosis, insufficient intervention, and missed opportunities to support cognitive resilience and emotional well-being.

**Purpose**: The purpose of this workshop is to equip mental health professionals and allied providers with practical, evidence-based strategies for developing and implementing cognitive wellness programming tailored to the needs of PwMS. The session aims to enhance provider competence in recognizing cognitive and psychological symptoms, designing individualized intervention plans, and integrating cognitive wellness approaches into routine clinical practice. A particular emphasis will be placed on person-centered care that incorporates each individual's identities, values, and goals.

**Methods**: The workshop will use a combination of didactic instruction, interactive exercises, and live demonstrations. Participants will learn how to create psychoeducational materials, cognitive wellness programs, and structured cognitive rehabilitation interventions suitable for both individual and group settings. Instruction will focus on evidence-based strategies for addressing core cognitive domains affected by MS, including attention, processing speed, memory, and executive functioning. The session will also highlight methods for fostering patient engagement, applying compensatory strategies, and incorporating technology-assisted tools to optimize outcomes. Guidance will be provided on identifying when more intensive neuropsychological assessment or referral to specialized care is warranted. A dedicated component will address the unique needs of Veterans with MS, including service-related factors, common comorbidities, and strategies for enhancing access to care within the Veterans Health Administration.

**Results**: Participants will gain practical tools for identifying and addressing cognitive and psychological symptoms in PwMS. They will develop skills for implementing targeted cognitive wellness and rehabilitation strategies, supporting coping and psychological adjustment, and promoting cognitive resilience across the disease course. Attendees will also strengthen their ability to tailor interventions for diverse populations, including Veterans, and to collaborate effectively within interdisciplinary teams. By the end of the session, providers will be better prepared to integrate cognitive wellness programming into their clinical practice and to recognize when specialized assessment or referral is needed.

**Conclusions**: This workshop expands the clinical repertoire of clinicians working with PwMS by offering actionable, evidence-based approaches to cognitive and psychological care. By enhancing provider knowledge and intervention

skills, the session aims to improve access to specialized support and promote comprehensive, person-centered care that addresses both the neurological and psychological dimensions of MS. Ultimately, the workshop seeks to strengthen the network of clinicians equipped to meet the cognitive and emotional needs of PwMS.

**Learning Objectives**

- Identify at least two common cognitive domains affected by MS and explain their impact on daily functioning.
- Develop a structured cognitive wellness plan that incorporates psychoeducational interventions and compensatory strategies tailored to individuals with MS.
- Apply evidence-based techniques for integrating cognitive and psychological interventions into routine clinical practice.
- Determine when to refer individuals with MS for comprehensive neuropsychological assessment or specialized intervention, using provided guidelines.

# 2613: Addressing Fatigue During Eating: Practical Approaches for ALS Mealtime Independence

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Fatigue during eating is a significant barrier to independence for individuals living with amyotrophic lateral sclerosis (ALS). As physical effort increases and endurance decreases, individuals often experience growing difficulty sustaining the movements, posture, and coordination required for mealtime participation. These challenges can reduce autonomy, increase caregiver involvement, and affect overall quality of life. This presentation provides practical, non-device-specific approaches to supporting mealtime independence in ALS from an assistive technology and functional perspective, emphasizing environmental setup, task simplification, and energy conservation strategies.

The session will explore how activity demands—such as repeated reaching, maintaining an upright position, and managing table-level tasks—can intensify fatigue during eating. Participants will learn how to observe functional indicators that an individual may be experiencing increased effort or declining mealtime endurance, including slowed task performance, difficulty completing meals without rest, changes in posture, and increased reliance on external support. These observations guide the selection of strategies that can help reduce physical burden and promote more efficient participation.

A range of practical approaches will be discussed, including optimizing seating and table positioning to minimize exertion, restructuring the mealtime environment for ease of access, and integrating energy conservation techniques such as pacing, sequencing, and task modification. Generic categories of assistive equipment—such as low-tech adaptive utensils, stabilizing supports, and positioning aids—will be reviewed in the context of how they can reduce fatigue without referencing or promoting any specific products. The presentation will also address how these strategies may evolve alongside functional changes, and how to incorporate them into collaborative care planning with interdisciplinary team members.

Recognizing that mealtime independence carries emotional and social significance, the session also addresses psychosocial considerations associated with fatigue-related changes in eating performance. Guidance will be provided for supporting autonomy, dignity, and participation during meals, as well as for facilitating communication around mealtime preferences, shared decision-making, and transitions in support needs.

Through case examples and practical reasoning frameworks, this presentation equips attendees with actionable, scope-aligned strategies to help individuals with ALS navigate mealtime fatigue and maintain meaningful participation for as long as possible.

**Learning Objectives**

- Describe functional indicators of fatigue that may affect mealtime independence for individuals with ALS.
- Explain how environmental setup, seating, and task demands influence effort and endurance during eating.
- Discuss practical strategies—including pacing, task modification, and positioning—to support energy-efficient mealtime participation

- Identify psychosocial factors associated with changes in eating independence and apply approaches that promote dignity, autonomy, and patient-centered engagement.

# 2614: Sleep as an Occupation: A Technology-Enabled Framework to Improve Function in ALS and MS

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**Background:** Sleep disruption affects over 70% of individuals with Amyotrophic Lateral Sclerosis (ALS) and Multiple Sclerosis (MS) and is strongly associated with fatigue, cognitive decline, and reduced participation in daily activities (Veauthier, 2015; Lo Coco et al., 2011). In ALS, sleep disturbance is commonly influenced by respiratory insufficiency, pain, and nocturnal positioning challenges, while MS-related disruption is often linked to circadian rhythm disturbance, spasticity, heat sensitivity, and cognitive fatigue. Despite increasing availability of sleep-related technologies, including wearable monitors, environmental automation, and adjustable sleep systems, these tools are rarely integrated into occupation-focused, interdisciplinary care. Consequently, sleep is frequently addressed reactively rather than as a foundational occupation supporting neurological performance and participation. This framework is intended for adults with ALS and MS, including Veterans receiving interdisciplinary outpatient and specialty care.

**Purpose**: This presentation synthesizes current evidence examining how technology- enabled sleep hygiene influences neurological performance, fatigue, and participation among individuals with ALS and MS. Sleep is reframed as an essential occupation, and a practical interdisciplinary framework is presented to guide selection and sequencing of sleep-related technologies, environmental modifications, positioning, and routines based on disease stage, symptom burden, and functional goals. Interdisciplinary considerations relevant to sleep-related care are highlighted to support sustainable, function-focused interventions.

**Methods**: A narrative synthesis of peer-reviewed literature was conducted, emphasizing technology-enabled sleep interventions. Randomized controlled trials, observational studies, and clinical guidelines addressing sleep hygiene, circadian rhythm regulation, positioning, environmental modification, and wearable technologies were reviewed (Sadeh, 2011; Bianchi et al., 2013). Findings were integrated with interdisciplinary clinical practice insights to develop a function-focused framework for applying sleep interventions across disease stages.

**Results**: Evidence indicates that wearable sleep monitoring provides actionable insight into rest–activity patterns and supports fatigue management and adherence (Sadeh, 2011; Bianchi et al., 2013). Smart environmental controls such as automated temperature and lighting systems, reduce nocturnal awakenings and support circadian regulation (Figueiro & Rea, 2010; Krauchi et al., 2006). Adjustable beds and positioning systems improve respiratory comfort and reduce pain-related sleep disruption in ALS (Bourke et al., 2006). Remote monitoring platforms and telehealth-enabled feedback enhance caregiver support and allow clinicians to tailor interventions (Dorsey et al., 2016). When aligned with functional goals and occupation-focused practice, these technologies improve fatigue management, cognitive endurance, and participation, underscoring the need for a structured, occupation-focused sleep hygiene framework that integrates interdisciplinary considerations.

**Conclusion**: Sleep is a critical yet underutilized foundation for neurological performance and participation in ALS and MS. Technology-enabled sleep hygiene, through wearable monitoring, environmental automation, adjustable positioning devices, and telehealth-enabled monitoring, offers a scalable approach to improving fatigue management and quality of life. Occupational therapy and interdisciplinary teams are uniquely positioned to operationalize these technologies into veteran-centered care models that enhance participation across disease stages. This framework equips clinicians to integrate sleep-focused interventions into routine care to support function, participation, and quality of life.

**Learning Objectives**

- Describe the relationship between sleep quality, neurological performance, fatigue, and participation in individuals with ALS and MS.
- Explain how technology-enabled sleep interventions including wearable monitoring and environmental supports, can be beneficial when integrated into interdisciplinary care.
- Identify modifiable environmental, positional, and routine factors influencing sleep and daytime function across ALS and MS disease stages.
- Discuss behavioral and psychosocial influences on sleep participation and adherence, including habits, routines, anxiety, and caregiver dynamics.

# 2615: Impact of biological sex on the epidemiology, pathophysiology, and outcomes after spinal cord injury.

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Roles: Submitter; Presenter

**Background:** The incidence and prevalence of spinal cord injury (SCI) is typically higher in males than in females worldwide. The effects of individuals' biological sex on their recovery after SCI appear to vary depending upon the outcome measure. Moreover, there are conflicting results in pre-clinical and clinical literature regarding sex-related differences in outcomes after SCI.

**Purpose:** This presentation will review the current literature on the potential effects of biological sex on access to optimal care, survival, degree of impairment and disability, secondary medical conditions, as well as on axonal survival after SCI.

**Methods:** This presentation will integrate and appraise data on the potential effects of biological sex that were derivate from population-based cohort studies on access to optimal care and clinical outcomes, as well as histopathological and immnohistochemical studies of postmortem spinal tissue. This work includes: (1) data analyses on access to optimal care, survival, degree of impairment and disability and disposition after inpatient rehabilitation using datasets from large clinical trials and a national registry in Canada; (2) data analyses on the effects of sex on secondary medical conditions following SCI; and (3) data analyses on axonal preservation and extent of degeneration using histopathological and immunohistochemical examination of postmortem spinal cord tissue from cases of cervical/high-thoracic SCI and control cases without prior injury or disease of the central nervous system (CNS).

**Results:** Pre-clinical evidence suggests that estrogen and progesterone may have neuroprotective effects by activating pro-survival cell pathways, as well as by promoting anti-inflammatory and antioxidant pathways. In contrast, the role of androgens in the recovery after SCI has been less studied and it remains largely uncertain whether

testosterone has a neuroprotective or detrimental effect. Despite some sex-related differences in the epidemiology of SCI, the current clinical literature does not support the notion that females have any substantial advantage (or disadvantage) over males in regards to survival and recovery of their impairment and disability related to the SCI. Yet, the results of prior studies suggested sex-related differences in frequency of secondary medical conditions after SCI that should be considered in the spinal cord rehabilitation protocols. For instance, deep venous thrombosis and psychiatric disorders were more commonly detected in females after SCI during their admission in acute care hospital than their male counterparts. While there were no major sex-related differences in the access to optimal care, females had a shorter waiting time for assessment for surgical spinal cord decompression than males in the acute spine trauma center. Notably, biological sex did not affect the inflammatory response, oligodendroglial apoptosis and axonal survival after SCI.

**Conclusions:** The current literature suggests that biological sex does not have any significant impact on survival, and neurologic and functional recovery after traumatic SCI when data analysis is adjusted for potential confounders. Furthermore, biological sex does not significantly affect axonal survival after traumatic SCI. Nevertheless, there are some sex-related discrepancies in the secondary medical conditions after SCI that should be considered in the treatment and rehabilitation protocols.

**Learning Objectives**

- Describe the influence of biological sex on the survival after traumatic spinal cord injury (SCI).
- List the effects of biological sex on the neurological and functional outcomes following traumatic SCI.

- Identify the effects of biological sex on secondary medical conditions after traumatic SCI.
- Discuss the impact of biological sex on axonal survival following traumatic SCI.

# 2616: Increasing Participation in Clinical Trials Among Individuals with Disabilities

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**Background:** Enrollment in clinical trials among individuals with spinal cord injury (SCI), multiple sclerosis (MS), and amyotrophic lateral sclerosis (ALS) remains markedly low, with only about 3% of eligible individuals participating. This gap limits the development of evidence-based therapies and slows the translation of scientific advancements into clinical practice.

**Objective:** To identify major barriers to clinical trial enrollment for disabled individuals and outline strategies to improve recruitment, informed consent, and participant retention.

**Approach:** Key logistical, medical, and ethical challenges were examined, including safety concerns, treatment washout requirements, caregiver and transportation dependencies, employment constraints, and the complexity of informed consent. Strategies to overcome these barriers—such as participant-centered protocol design, enhanced communication among stakeholders, virtual visit options, and home-based assessments—were explored for their potential impact on increasing participation.

**Findings:** Individuals with SCI, MS, and ALS encounter several obstacles to participation:

- Heightened safety risks, especially when discontinuing current therapies

- Rigid or frequent study visits that conflict with caregiver availability, transportation needs, or work schedules

- Informed consent challenges requiring tailored, accessible communication

**Conclusion:** Increasing clinical trial participation among individuals with disabilities requires targeted, participant-centered strategies that prioritize safety, accessibility, and communication. Strong partnerships among researchers, clinicians, industry leaders, and disability communities are essential to producing meaningful evidence and advancing care for individuals living with SCI, MS, and ALS.

**Learning Objectives**

- Describe why participation in clinical trials is important in the disabled community
- Cite three challenges to participation in clinical trials
- List three strategies to overcome barriers to clinical trial participation
- Discuss ways the informed consent process can be improved to increase participation in clinical trials

# 2617: Get Up, Stand Up: Novel Wheeled Mobility Device Impacts Participation and Wellbeing

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Participant has indicated the following discussion of unapproved drug or product uses:
We intend to discuss a mobile in standing and a non-mobile standing wheelchairs are that currently not FDA approved devices.

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Participant has indicated the following discussion of unapproved drug or product uses:

We intend to discuss two wheelchairs that are currently not FDA-approved medical devices.

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We Intend to discuss two non-FDA approved devices wheelchairs.

**Dr. Andrew Hansen, PhD**
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**Background:** Standing devices and exoskeletons continue to become more prevalent, providing Veterans with Spinal Cord Injuries and Disorders (SCI/D) access to the benefits of physical activity and potentially greater access to their environment. Recommendations for physical activity and standing time are similar, but less than 50% of those living with spinal cord injury report meeting physical activity guidelines. Allowing manual wheelchair users to be mobile-in-standing may allow users to achieve greater time in standing to simultaneously access physical activity benefits, enhanced participation, and greater environmental access. However, there are currently no mobile-in-standing manual wheelchairs on the market. The Rehabilitation & Engineering Center for Optimizing Veteran Engagement &

Reintegration (RECOVER) has created a mobile-in-standing version of a manual wheelchair to better understand its impact on standing time and health outcomes.

**Purpose:** This presentation will provide broad context about standing habits and share results of a clinical trial comparing standing time, utility, health outcomes, and participation across mobile and non-mobile standing manual wheelchairs for Veterans with SCI/D.

**Methods:** Twenty-four Veterans with SCI/D participated in this mixed methods, multi-site, randomized controlled trial. Participants who used a standing device at baseline had their devices instrumented with an accelerometer for eight weeks. Participants were randomized to receive either a mobile-in-standing or a non-mobile in standing manual wheelchair, which was also instrumented for an eight-week take home trial. Outcome measures were collected at baseline and completion of the study regarding device utility, participation, standing-related health outcomes, and device satisfaction. Semi-structured interviews were used to explore participant experiences in the study chair.

**Results:**

Session 1: Literature review: A comparison between historic measurements and sensor-based measurements of standing device use will provide historical understanding of standing time and health benefits. A summary of standing guidelines and recommendations will be presented for additional context of our research findings.

Session 2: Research Findings: While standing time did not differ significantly between mobile and non-mobile standing wheelchairs, both standing wheelchairs improved standing time compared to baseline standing devices. Additionally, standing wheelchairs improved satisfaction with a range of activities, and participants reported perceived health-related benefits, with the most predominant being wellbeing (71%). Users' device satisfaction identified two main areas of strength for the experimental wheelchair design, safety and durability, and two areas of improvement, weight and dimensions. Due to size and weight constraints, access to activities outside the home was greatly limited; this likely diminished both standing time and potential health outcomes.

Session 3: Mixed Methods Analysis: Using data from semi-structured interviews, we will outline the meaningful standing activities, benefits, barriers and facilitators identified by participants. We will examine mixed methods results that may impact clinical decision making regarding standing devices, such as, participant attributes associated with higher standing times and the impact of standing wheelchairs on participation.

**Conclusions:** Mobility in standing may provide more satisfaction with functional and meaningful activities rather than increase standing dosage, however with ongoing technology improvements in weight and dimensions may allow users to access standing devices in more environments, positively impacting standing time.

**Learning Objectives**

- Explain the historic ways standing device use has been measured and how that might impact our understanding of benefits of standing after an injury.
- Compare the standing time results across three differing standing devices (standing frame, mobile in standing wheelchair, non-mobile in standing wheelchair).
- Describe barriers to implementation or use of the current mobile-in-standing manual wheelchair.
- Identify at least two ways mobility in standing may be superior to a static standing device.
- Discuss how the mixed methods results could impact clinical decisions regarding standing device prescriptions for Veterans with Spinal Cord Injury or Disorder.

# 2618: Accessibility and Air Travel Experiences Among Wheeled Mobility Device Users: Barriers by Device Type

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Roles: Submitter; Presenter

**Background:** Wheeled mobility device users (WMDUs) face significant challenges to air travel due to functional limitations, inaccessible environments, and inadequate assistance from airport and airline staff. Unpleasant experiences and uncertainty are key reasons for avoiding or minimizing air travel. Despite this, many WMDUs say they would fly more often if these barriers were addressed. Reported barriers occur across all stages of air travel. However, prior research has not examined commonly experienced and device-specific differences; a more complete understanding of these experiences may identify opportunities to improve air travel for WMDUs and help stakeholders use existing resources more effectively.

**Purpose:** This cross-sectional survey study assessed barriers encountered by three different types of WMDUs (Power Wheelchair=PW, Manual Wheelchair=MW, and Electric Scooter=ES) across eight stages of air travel (planning, check-in, TSA, airport, restroom, boarding, inflight, and destination).

Hypothesis 1: Across the eight stages of travel, the number of barriers significantly differs by mobility device type.

Hypothesis 2: Within each of the eight stages of travel, the number of barriers significantly differs by mobility device type.

Hypothesis 3: The perceived primary barrier to airline travel differs among wheeled mobility device user type.

**Methods:** To be included in this study, the surveyed participant must be 18 years of age or older and use a wheeled mobility device (e.g., PW, MW, and ES) as one's primary means of mobility. They must also have reported the use of air travel in the US in the past three years. They then completed an online survey which assessed barriers reported by respondents across each of the eight stages (planning, check-in, TSA, airport, restroom, boarding, inflight, and destination) of air travel. Descriptive statistics (mean, standard deviation and ratios) of air travel utilization and barriers were reported. Inferential statistics including one-way ANOVA were used to assess differences in the number of barriers experienced by mobility device type (e.g., PW, MW, and ES).

**Results:** Data from 115 WMDUs were included in this analysis (PW=40, MW=60, ES=15). The only statistically significant difference in number of barriers experienced between mobility device user type occurred during the check-in process with PW endorsing an average of 2.3 barriers, MW 1.47 barriers, and ES 1.67 barriers ($F(2,112) = 4.03$, $p=0.02$)). Across all other travel stages, the number of barriers did not significantly differ between mobility device types. The inflight stage demonstrated the greatest barrier burden among users of all three mobility device types with PW endorsing 47%, MW endorsing 40%, and ES endorsing 41% of barriers surveyed.

**Conclusions:** Results indicate there are a vast number of barriers and pain points device users encounter throughout airline travel, regardless of device type. However, addressing in-flight-related barriers may be the most efficient and highest priority approach for assisting WMDUs as this was the greatest barrier burden endorsed by all device users. Doing so would help ensure mobility device users of all types can continue to function as independently as possible.

**Learning Objectives**

- Identify the most commonly reported airline travel barriers and pain points among wheeled mobility device users.
- Compare primary barriers to commercial air travel across wheeled mobility device types (MW, PW, and ES).

- Evaluate differences in the frequency and relative impact of reported pain points by mobility device type.
- Apply study findings to inform targeted strategies for improving accessibility and airline staff practices for wheeled mobility device users.

# 2619: Overview of Diagnosis and Treatment of Eye Movement Disorders in Multiple Sclerosis

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Participant has indicated the following discussion of unapproved drug or product uses:
gabapentin, memantine, baclofen, 4-amynopiridine can be used outside their FDA label to treat nystagmus and other ocular oscillations

**Background and Issues:** Multiple sclerosis (MS) remains a leading cause of non-traumatic disability in young adults. While disability in MS is commonly quantified using standardized clinical scales, these instruments may underrepresent the functional impact of eye movement disorders on daily activities such as reading, balance, mobility, and visual comfort. Eye movement abnormalities are frequent in MS, correlate with higher levels of neurological disability, and are increasingly recognized as markers of disease burden, network disruption, and prognosis.

**Purpose:** To review the bedside presentation and pathophysiology of common eye movement disorders encountered in MS and to provide an updated overview of pharmacological and rehabilitative treatment strategies.

**Methods:** This presentation provides a systematic, anatomy-based classification of eye movement disorders in MS, organized by involvement of brainstem pathways, cerebellar structures, and higher-order cortical control networks. For each syndrome, underlying pathophysiological mechanisms are reviewed, and available therapeutic interventions are discussed.

**Results:** All classes of eye movements may be affected in MS. Pathological strabismus may present as exotropia, often associated with internuclear ophthalmoparesis (INO); esotropia, commonly due to sixth nerve palsy; or vertical strabismus, typically reflecting skew deviation. Fixation instability may manifest as gaze-evoked nystagmus, acquired pendular nystagmus, upbeat or downbeat nystagmus, or saccadic intrusions and oscillations. Saccadic abnormalities are common, including dysmetria, adduction slowing in INO, and horizontal gaze palsy. Vestibular dysfunction may present with spontaneous or positional vertigo and impaired vestibulo-ocular reflexes. Deficits in smooth pursuit, optokinetic responses, and eye–head coordination are also frequently observed. Pharmacological treatments with demonstrated efficacy, based on known pathophysiology, are available for selected ocular motor syndromes in MS. Gabapentin and memantine are effective for acquired pendular nystagmus; 4-aminopyridine is beneficial for downbeat nystagmus and may improve INO; baclofen may be considered for periodic alternating nystagmus, and memantine may reduce saccadic intrusions and oscillations. Vestibular rehabilitation has demonstrated benefits for balance and postural control in MS and commonly incorporates gaze-stability and eye–head coordination exercises, although evidence for direct improvement of specific eye movement abnormalities remains limited. Advances in quantitative eye-tracking enable sensitive, objective assessment of eye movement dysfunction supporting their use as outcome measures for future interventional studies. Technology-assisted and home-based rehabilitation platforms are increasingly feasible, but their efficacy for treating ocular motor deficits in MS has yet to be established.

**Conclusions:** Recognition of eye movement disorders in MS aids diagnosis, lesion localization, monitoring of disease progression, and assessment of functional disability. Because the physiology and anatomical networks underlying eye movement control are well characterized, and quantitative eye-tracking enables precise measurement in laboratory settings, eye movements are well positioned as sensitive functional biomarkers and clinically meaningful outcome measures in MS. Combining pharmacologic and rehabilitative approaches may further improve quality of life and functional vision in patients with MS.

**Learning Objectives**

- Identify common eye movement disorders encountered in multiple sclerosis (MS)
- Explain the pathophysiology and anatomical localization of eye movement abnormalities in MS, including brainstem and cerebellar control networks
- Review evidence-based pharmacological treatments for eye movement disorders in MS
- Discuss the potential of rehabilitative strategies for eye movement dysfunction in MS

# 2620: Retinal Layers as Non-Invasive Biomarkers of Accelerated Brain Aging and Clinical Disability in Multiple Sclerosis

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Participant discloses the following relationships:

- Connected Research: Consultation
- Genentech: Clinical Research for organization
- NIH: Research
- TG Therapeutics: Clinical Research for organization

**Background:** Brain aging and neurodegeneration are hallmarks of multiple sclerosis (MS). Retinal thinning, detectable non-invasively through OCT, is increasingly recognized as a peripheral marker of central nervous system neurodegeneration. Understanding how these retinal changes relate to accelerated brain aging is crucial for validating OCT parameters as robust biomarkers of neurodegeneration and disease progression.

**Objectives:** To evaluate the association between OCT-derived retinal layer thicknesses, the brain-predicted age gap (BA minus chronological age), and clinical disability (EDSS) in patients with MS.

**Methods:** This cross-sectional study enrolled **87** MS patients who completed both whole-brain MRI on a SIEMENS 3T system and OCT scans using a Heidelberg SPECTRALIS platform. The *brainageR* package was utilized to process 3D T1-weighted images and calculate BA. Spearman's correlations were used to evaluate the relationships between retinal measures and BA, age gap, and various clinical assessment scales. Multivariate Analysis of Covariance (MANCOVA) was used to evaluate relationships while controlling for age, race, BMI, and disease duration.

**Results:** Significant negative correlations were observed between BA and multiple retinal measures, including global thickness (G) ($r=-0.310$, $p=0.003$), papillomacular bundle (PMB) ($r=-0.338$, $p=0.001$), retinal nerve fiber layer (RNFL) ($r=-0.258$, $p=0.016$), and ganglion cell and inner plexiform layer (GCIPL) ($r=-0.269$, $p=0.012$). The age gap showed similarly significant negative associations with G ($r=-0.257$, $p=0.016$), PMB ($r=-0.400$, $p<0.001$), RNFL ($r=-0.296$, $p=0.005$), and GCIPL ($r=-0.281$, $p=0.008$). The same negative correlations were also observed with the disease duration. Furthermore, higher EDSS scores correlated negatively with temporal thickness ($r=-0.228$, $p=0.033$) and RNFL thickness ($r=-0.230$, $p=0.032$). MANCOVA showed a significant effect of race ($p=0.009$) and obesity- race interaction ($p=0.002$) on the combined OCT measures. Univariate tests showed that race was associated only with RPE and ORL $p<0.05$. Obesity was associated with INL $p=0.046$. The race-obesity interaction affected INL $p=0.033$.

**Conclusions:** Retinal measures, specifically the RNFL and GCIPL, are strong indicators of accelerated brain aging and clinical disability. The significant correlation between peripheral retinal thinning and the MRI-derived Brain Age Gap validates OCT as a reliable, non-invasive tracking tool for monitoring neurodegenerative burden.

**Learning Objectives**

- Describe the relationship between retinal layer thicknesses (OCT) and MRI-derived brain-predicted age in MS patients.
- Explain the clinical significance of the PMB and GCIPL as specific biomarkers for neurodegenerative burden.
- Analyze how peripheral retinal thinning correlates with clinical disability scores (EDSS) and disease duration.

- Identify clinical strategies to integrate OCT monitoring into interdisciplinary care to integrate longitudinal OCT tracking into routine MS assessments and enhance patient education and treatment engagement.

# 2621: Voice Preservation in the 21st Century: Current Updates in Augmentative Communication in ALS

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**Background and Issues:** A majority of people living with ALS (pALS) will experience deterioration and/or loss of speech abilities as an artifact of disease progression. While no restorative intervention has been identified to date, a pALS's ability to participate across communication contexts can be significantly enhanced with the provision of augmentative-alternative communication (AAC). Voice preservation (e.g., voice banking) has been a long-standing aspect of this care. The rapid advancement of artificial intelligence (AI) presents innovative opportunities for enhancing and personalizing the communication experience. Unfortunately, pALS may be missing opportunity to engage in meaningful AAC interventions that enhance communication, healthcare participation, and quality of life if their clinical providers are not abreast of these updates.

**Purpose**: This presentation will update current practice trends and future directions in the area of voice preservation (e.g., voice cloning) as a means to leverage AI to preserve personal voice characteristics and ensure continuity of identity in communication. Ethical considerations will be highlighted, such as informed consent and patient autonomy. Evidence to support early referral to the speech-language pathologist (SLP) will be reviewed.

**Methods:** Two SLPs with expertise in AAC, expertise in care unique to pALS, and authors of a recently-invited peer-reviewed journal article on this topic will present an overview of updated practice recommendations on the topic of voice preservation. This includes the clinical and technological underpinnings of voice cloning, as well as an overview of how AI can synthesize natural and individualized vocal profiles. Clinical rationale for incorporating voice preservation into SLP practice will be explained, highlighting the support and counseling required when assisting individuals in voice creation. Emphasis will be placed on understanding the psychosocial implications of voice loss and the therapeutic benefits of voice preservation. A review of motor speech changes in ALS will be included to help illustrate the expected trajectory of change across sub-types and the limitations of the clinical exam.

**Results:** Voice preservation is an integral part of AAC and positively impacts AAC acceptance, communication participation, and sense of agency. With advancing technologies come a duty to consider ethical considerations that may impact an individual user's decision regarding pursuit of preferred AAC solutions, including equity and access, which requires that providers stay abreast of these quickly evolving clinical updates.

**Conclusions:** pALS should be afforded skilled, technologically current opportunities to preserve aspects of their communication preferences to maintain one's agency, participation in their healthcare decisions, and beyond. Early referral to SLP is essential to successful integration of AAC, including considerations for voice preservation. This session will provide evidence-based recommendations and best practices for providers working with AI technologies within AAC frameworks. Attendees will leave equipped with a nuanced understanding of AI's capabilities in voice preservation, informed by empirical data and real-world experiences.

**Learning Objectives**

- The learner will define voice preservation, as it applies to the use of augmentative-alternative communication.
- The learner will identify speech changes expected to occur in ALS across subtypes and the current state of predicting speech deterioration based on clinical exam.
- The learner will describe the collective literature that supports early referral to speech-language pathology for maximizing communication participation in pALS.
- The learner will list ethical principles as they apply to the provision and use of AI-driven voice cloning.

# 2622: Technology Ethics: Considerations for Veterans with ALS Using High-Tech Augmentative and Alternative Communication

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**Background and Issues:** Veterans living with life-limiting conditions such as amyotrophic lateral sclerosis (ALS) frequently experience progressive deterioration or complete loss of natural speech. This loss profoundly affects communication participation and personal identity. The skilled provision of Augmentative and Alternative Communication (AAC) offers opportunities to restore aspects of life participation through individualized, high-tech solutions. However, the integration of advanced AAC technologies introduces complex ethical challenges that are often underexamined or deprioritized in favor of patient safety and life prolongation, including issues related to privacy and autonomy.

**Purpose:** This presentation will provide an overview of AAC interventions for individuals with ALS, emphasizing ethical considerations associated with high-tech AAC use.

**Methods:** Two speech-language pathologists (SLPs) with expertise in AAC and ALS care will provide a comprehensive update of current communication modalities, pragmatic implications of AAC integration, and ethical concerns observed in clinical practice. The discussion will include how the integration of AAC can impact natural communication exhanges and the ethical considerations that the presenters have observed, acknowledged, and addressed while providing care within their ALS Care Team Center of Excellence. The skilled evaluation for and provision of AAC by SLPs will be reviewed, highlighting how ethical dilemmas may influence user interactions with communication partners, predicting potential challenges and identifying strategies for proactive problem-solving.

**Results:** Although high-tech AAC significantly enhances communication participation for individuals with ALS, ethical considerations—such as privacy, autonomy, and dignity—remain insufficiently addressed. These issues can affect access to appropriate AAC solutions, independent engagement in healthcare, and the preservation of identity in daily communication contexts.

**Conclusions:** Healthcare providers, care partners, and family members interacting with individuals with ALS should recognize and address ethical challenges inherent in AAC use. SLPs, in particular, bear responsibility for anticipating potential dilemmas, advocating for patient preferences, and upholding the Communication Bill of Rights as part of ethical clinical practice.

**Learning Objectives**

- Define augmentative-alternative communication (AAC) as it applies to high-tech solutions for restoring communication participation in ALS.
- Describe changes in natural communication exchanges resulting from high-tech AAC use.

- Identify ethical dilemmas encountered by healthcare stakeholders when AAC replaces natural speech.
- Apply ethical principles to these dilemmas and develop proactive solutions.

# 2623: A Brave New World: Partnering with patients to promote health and wellness in the age of technology

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Behavioral interventions support health and wellness and reduce suffering. Rapidly changing technologies offer opportunities to improve the access and reach, but also bring unprecedented challenges. This talk will review a program of research examining telehealth-based behavioral interventions in MS and some of the opportunities and challenges moving forward.

**Learning Objectives**

- Identify common symptom targets for behavioral interventions in MS
- Identify different behavioral strategies to promote behavior change in MS
- Identify evolving technologies to facilitate interventions
- Identify challenges and opportunities associated with newer behavioral technologies for MS care.

# 2624: Improving Health Equity Through Mobility Screening: Lessons from VA Mobility Screening And Solutions Tool Adaptation

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**Background and Issues:** The VA Safe Patient Handling and Mobility (SPHM) program is instrumental in advancing staff and patient safety across inpatient environments such as rehabilitation units, acute care, and community living centers. The SPHM program has facilitated widespread VA adoption of assistive technologies. Research shows that SPHM interventions not only reduce staff injuries but also encourage more frequent patient movement. Increased mobility helps prevent complications such as pressure injuries, falls, and urinary issues, while improving mood, boosting participation, and reducing behavioral resistance. To sustain these benefits, effective SPHM programs require practical tools that enable frontline staff to quickly assess real-time mobility limitations and guide safe handling decisions. One such tool is the Veterans Administration (VA) Mobility Screening and Solutions Tool (VA MSST). Pilot testing of the VA MSST revealed a need to modify the tool for persons with paralysis and/or limb loss.

**Purpose:** The purpose is to describe VA MSST and identified modifications for persons with paralysis and/or limb loss.

**Methods:** The VA MSST fills gaps identified by bedside staff who were using a variety of mobility assessment tools available within the VA. The VA MSST includes four mobility levels to screen patients quickly, in any environment, to facilitate safe mobility. Once the screener determines a patient is unable to complete a task, the screening ends. At each mobility level, there are equipment suggestions intended to support safe mobility. This evidence-based flowchart is a common language screening tool that enables healthcare workers to accurately determine and communicate patient mobility and transfer equipment needs across disciplines and settings. The first presentation will describe the development of the original VA MSST, including validity and reliability information. The second presentation will describe the collaborative environmental scan approach used to identify modifications to the VA MSST. This approach included a review of published and grey literature and subject matter expert input collected virtually during meetings

and individual interviews. Together, these data informed modifications of the VA MSST for persons with paralysis and limb loss (PALL), referred to a VA MSST-PALL.

**Results:** Modifications to the VA MSST were informed by the environmental scan, group consensus from subject matter experts including RNs (n=14), PTs (n=8), OTs (n=5), KTs (n=2) and one MD, and interview data from physical therapists (n=2) and nurses (n=2) pilot testing the VA MSST in acute care rehabilitation. All data sources identified the need for modification. The main modification to the VA MSST is at level 2, where the patient is asked to stretch and point at least one lower extremity. Modifications were made to address specific equipment and mobility needs of persons with paralysis and limb loss.

**Conclusions:** The development of the VA MSST filled a need for supporting safe patient handling and mobility within the VA. Through a collaborative, data-driven approach, modifications were identified to improve safe mobility for those with paralysis or limb loss. This work's clinical significance includes health equity and mobility advancements. The work translates research into practice and promotes scalable solutions for patient-centered care.

**Learning Objectives**

- Describe the development and purpose of the VA Mobility Screening and Solutions Tool (VA MSST) and its role in safe patient handling.
- Identify gaps in the original VA MSST when applied to patients with paralysis and/or limb loss.
- Demonstrate how modifications to the VA MSST (VA MSST-PALL) address mobility screening challenges for patients with paralysis and limb loss.
- Evaluate how the adapted VA MSST promotes health equity and interdisciplinary communication in SCI, MS, and ALS care.

# 2625: Standing with Confidence: Aligning Evidence Based Frameworks to Optimize Standing Related Complex Rehab Technology Selection

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**Background:** Standing is a goal for many individuals with spinal cord injury (SCI), but participation in standing often requires the use of complex rehab technology (CRT). Masselink et al. (2025) identified that supported standing devices are integral for the health and function of individuals who are unable to achieve standing independently. Despite CRT's critical role in enabling participation in standing activities, its clinical implementation remains inconsistent. Effective selection demands more than expertise and product knowledge; it requires synthesizing the user's medical necessity with their environmental realities, personal goals, social determinants of health, device usability, and home program recommendations to proactively mitigate the risk of abandonment. Up to 30% of assistive technology is abandoned - often due to a mismatch between the user's goals, needs, and available technology solutions. Evidence supports the use of structured, systematic, user-centered approaches to reduce this risk.

These challenges highlight the need for clearer guidance on clinical decision-making for supported standing CRT. As a result, familiarity with structured frameworks and models, including the "Policy, Human, Activity, Assistance, Technology, Environment" (PHAATE) framework and Shared Decision-Making (SDM) model, may strengthen clinical decision-making and help clinicians select technology to optimize user independence, participation, and long-term adherence to standing programs.

**Purpose:** This education session aims to equip clinicians with knowledge of evidence-based frameworks, such as the PHAATE and SDM models, and clinical strategies to align user-centered approaches and factors when recommending supported standing devices. Shifting the focus beyond device features to a comprehensive, user-centered decision-making approach may help clinicians optimize device selection, user satisfaction, and compliance, and address factors that may reduce the risk of device abandonment.

**Methods:** This session is informed by a comprehensive literature review of supported standing devices and utilizes complex case studies analyzed using the PHAATE and SDM models to demonstrate real-time decision-making. Presenters draw from a combined 25 years of experience in SCI rehabilitation and CRT, providing insights from their unique clinical, regional, and national leadership roles.

**Results:** Attendees will leave equipped with a systematic toolkit for standing device selection, moving beyond basic product knowledge to advanced clinical reasoning. By better understanding the PHAATE and Shared Decision-Making (SDM) models, clinicians will learn to enable true user-centered care. This structured approach enables providers to develop robust justifications that align medical necessity with the user's

specific goals and environment, ultimately enhancing usability and participation in the individual's home environment.

**Conclusion:** Confidence in recommending standing devices can be achieved through structured clinical reasoning. Attendees will leave this session with a better understanding of the evidence and key clinical decision-making considerations for supported standing devices for adults with SCI. By integrating the PHAATE and SDM models, clinicians will be better able to navigate complex rehab scenarios to optimize participation, outcomes, and user satisfaction.

## Learning Objectives

- Describe the current evidence base for supported standing devices and their benefits for individuals with spinal cord injury across functional and chronic health domains.
- Identify key factors that influence standing device selection, including medical considerations, functional goals, usability, environmental fit, access, and risks for device abandonment.
- Explain the core components of the PHAATE framework and the Shared Decision-Making (SDM) model and their relevance to user-centered CRT selection.
- Apply the PHAATE and SDM frameworks to diverse clinical scenarios to justify medical necessity and mitigate abandonment risk.

# 2626: Introduction and Update on the Multiple Sclerosis Prodrome

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Participant has indicated the following discussion of unapproved drug or product uses:
I will discuss failed trials of various drugs used to treat multiple sclerosis including: Cyclophosphamide, rituximab, laquinimod, tolebrutinib, opicinumab

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**Background:** Multiple sclerosis (MS) is now recognized to have a prolonged prodromal phase characterized by subtle clinical manifestations, distinct healthcare utilization patterns, and emerging biomarker signatures years before clinical symptom onset. A better understanding of the prodrome could have major implications for prevention, and an earlier diagnosis of MS.

**Purpose:** This session will provide an overview of the MS prodrome and address how patterns of pre-diagnostic healthcare utilization, symptom clusters, and biomarkers can be used to identify individuals at high risk for MS, including those with a radiologically isolated syndrome (RIS) or clinically isolated syndromes (CIS).

**Methods:** Evidence will be drawn from recent population-based cohorts and large prospective biorepositories that have characterized the MS prodrome. We will also review the contemporary diagnostic criteria for MS and related syndromes.

**Results:** Multiple convergent findings support an MS prodrome. Before a first demyelinating event, most patients follow moderate to high-level healthcare-use pathways, but approximately 10% exhibit recurrent contacts with neurologists, neurosurgeons, ophthalmologists, or psychiatrists, suggesting missed opportunities for earlier MS recognition. Among military personnel, physical, cognitive, and mental health symptoms may appear years before an MS diagnosis. The 2025 updates to the MS diagnostic criteria allow for an earlier diagnosis by utilizing novel MRI markers, use of the optic nerve and tracts as a fifth anatomical site, and expanded cerebrospinal fluid testing assays. Early identification of high-risk individuals using integrated clinical, imaging, and fluid markers (including serum neurofilament light chain (sNfL) and antigen specific autoantibody profiles) could allow earlier initiation of effective disease modifying therapies.

**Conclusions:** The MS prodrome is characterized by heterogeneous but recognizable constellations of health-care utilization, clinical symptoms, and emerging biomarker signatures years before first symptom onset. For clinicians, recurrent pre-diagnostic visits to neurologists and other providers should prompt consideration of MS or RIS and more timely MRI-based evaluation. For Veterans, system-level strategies that couple population-based surveillance of prodromal patterns with aggressive risk factor management, and optimized access to high-efficacy therapies may shift MS toward a preventable or at least substantially modifiable neuroimmunologic disease.

**Learning Objectives**

- Describe the emerging concept of the multiple sclerosis (MS) prodrome, including common clinical and biomarker patterns that precede first symptom onset.

- Identify patterns of healthcare utilization and symptom clusters that may signal individuals at high risk for MS or related syndrome.
- Discuss an approach integrating clinical, imaging and fluid biomarkers (e.g. serum neurofilament light chain) for earlier identification and diagnosis of MS.
- Explain the 2025 revisions to the MS diagnostic criteria for earlier recognition, and prevention strategies for MS integrating unique military demographics, experiences and exposures.

# 2627: Non-MS Patients in MS Practice – Rare Neuro Disorders- Case Discussions

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- Connected Research: Consultation
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**Background and Issues:** The diagnosis and management of rare neuroimmunological and neurodegenerative disorders present significant challenges in clinical practice, particularly in settings focused on multiple sclerosis (MS). These disorders often mimic MS in presentation, leading to misdiagnoses that delay appropriate treatment. Conditions such as CADASIL, neuromyelitis optica spectrum disorder (NMOSD), and leukodystrophies are among those that may be erroneously diagnosed as MS or other common neurological conditions. Misdiagnoses can result in inappropriate therapies, progression of disease, and suboptimal outcomes. This abstract discusses three cases illustrating these diagnostic challenges: CADASIL misdiagnosed as MS for a decade, NMOSD initially diagnosed as stroke, and leukodystrophy misdiagnosed as NMOSD.

**Purpose:** The goal of this project is to highlight the importance of recognizing atypical clinical features, leveraging advanced diagnostic tools, and maintaining a broad differential diagnosis in MS practices to improve accuracy and outcomes for patients with rare neuro disorders.

**Methods:** A detailed review of clinical histories, diagnostic evaluations, imaging findings, and laboratory data was carried out for three patients referred to an MS practice. Case 1 involved a patient with CADASIL misdiagnosed as MS for 10 years based on nonspecific white matter lesions. Case 2 described a patient with NMOSD initially diagnosed as stroke due to acute onset of hemiparesis and a lack of early spinal imaging. Case 3 focused on a patient with leukodystrophy misdiagnosed as NMOSD following recurrent episodes of neurological decline and ambiguous MRI findings. Diagnostic criteria for MS, NMOSD, and other rare disorders were critically applied, alongside genetic and serological testing.

**Results: Lessons Learned:** Key lessons from these cases include: (1) the importance of revisiting diagnoses when clinical progression or response to MS-specific therapies is atypical; (2) the utility of genetic testing, such as NOTCH3 mutation analysis for CADASIL, and aquaporin-4 antibody testing for NMOSD; and (3) the critical role of advanced imaging in distinguishing leukodystrophies from inflammatory demyelination. Early misdiagnoses in all three cases resulted in prolonged delays in appropriate treatment, underscoring the need for vigilance in identifying red flags inconsistent with MS.

**Conclusions:** These cases illustrate the necessity for MS clinicians to remain vigilant for rare neuro disorders that mimic MS. A multidisciplinary approach, routine reassessment of atypical cases, and the use of advanced diagnostics are crucial for improving outcomes. Clinicians should develop a systematic approach to recognizing and addressing diagnostic uncertainty to avoid prolonged mismanagement of non-MS patients in MS practices.

**Learning Objectives**

- Identify clinical and imaging red flags that differentiate rare neuro disorders (e.g., CADASIL, NMOSD, leukodystrophies) from multiple sclerosis.
- Recognize the importance of revisiting diagnoses in cases of atypical disease progression or poor response to MS-specific therapies.

- Apply advanced diagnostic tools, including genetic testing and antibody analysis, to improve diagnostic accuracy for rare neuroimmunological and neurodegenerative disorders.
- Develop a systematic approach for evaluating and managing non-MS patients in MS clinical practices.

# 2628: Navigating Complex Conversations-A Workshop for Professionals

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**Background:** Discussing disease progression and care in life-limiting illnesses like ALS can be challenging for professionals, yet few resources exist to support them and the conversation they have with their patients and caregivers. Roundtable discussions with ALS providers emphasized the need for supporting the professional delivering the diagnosis or involved in these complex conversations. Topics discussed included: Do you ever feel like you need to "pick up the pieces" after a complex conversation? What are your coping mechanisms for the loss/constant disappointment in treating patients? How do you care for yourself as a provider? Who do you/can you turn to for support with these conversations?

Recognizing the need for professional support and guidance in conducting these types of conversations, one resource, "How to break the news in amyotrophic lateral sclerosis/motor neuron disease: practical guidelines from experts," was created to address the need for professional guidance and support in the delivery and aftermath of a diagnosis. This workshop builds on that resource, and extends it by creating and discussing ways for the provider to support themselves in these conversations.

**Purpose:** Guide ALS professionals in: 1) engaging in complex conversations, 2) caring for themselves amidst on-going tragedy and loss with this patient population.

**Methods:** Through the Veteran ALS Action Committee, this presentation includes ALS clinical providers across disciplines discussing ways to prepare and care for yourself as an ALS professional. The team will present real life examples of navigating complex conversations, actively engaging the audience in navigating their own complex conversations. This will be guided by the A-L-S-PIKES protocol which provides easy-to-follow, stepwise guidelines to effectively deliver

difficult news to Veterans through: Advance Preparation; Location & Setting; Patient's Perceptions; Invitation; Knowledge; Emotion & Empathy; and Strategy & Summary.

**Results:** Participants will leave with resources, guidance, and support for having complex conversations. Moreover, principles and guidance from this workshop will support the ALS professional in providing self-care and awareness for dealing with stress.

**Conclusions:** Experiencing repeated stressful and complex conversations coupled with the loss of patients to a devastating disease like ALS can lead to emotional fatigue for ALS providers, particularly when little support is available to the provider. Review of ways to handle stress and loss will help providers better cope with the changing relationship they have with patients in the ALS population. In addition, using the A-L-S-PIKES protocol provides professionals with the framework necessary to facilitate more effective communication when having delicate conversations regarding care, enhancing rapport between Veterans and professionals and creating a more positive experience for all involved. The resulting increased trust enables more informed and confident decision-making and can help guide providers through these conversations, ultimately leading to less stress.

**Resources:**

1. O'Connell, C., Kavanaugh, M. S., Cummings, C., & Genge, A. (2025). How to break the news in amyotrophic lateral sclerosis/motor neuron disease: practical guidelines from experts. Amyotrophic lateral sclerosis & frontotemporal degeneration, 26(1-2), 5–14. https://doi.org/10.1080/21678421.2024.2397517

2. Buckman R. Breaking bad news: the S-P-I-K-E-S strategy. Commun Oncol. 2005;2:138–42.

**Learning Objectives**

- Integrate self care after having a difficult conversation with a PLWALS.
- Understand how to be prepared for the stress of having a difficult conversation and how to avoid a loss of trust with a PLWALS.
- Identify situations which would benefit from the A-L-S-PIKES protocol across illness and injury.
- Demonstrate effective use of the A-L-S-PIKES protocol.
- Better cope with the emotional fatigue and loss in caring for the ALS population.

# 2629: Moral distress and ethical responses after a patient stops eating desiring to die

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**Background:** According to Varcoe et al., moral distress is defined as "the experience of being seriously compromised as a moral agent in practicing in accordance with accepted professional values and standards" (2012). We experience moral distress when we feel like we are not doing the right thing and there is little we can do about it. When patients engage in behaviors that we believe is harmful, a natural response is to try to stop it, or not be involved. Similarly, how should we respond when our team makes decisions that we feel are morally unjustifiable, yet we are part of "the team"? This presentation will review ethical principles through the narrative of a veteran with quadriplegia for 35 years who decides to voluntarily stopping eating and drinking (VSED) with intention to hasten his death. Some staff argued that permitting this was akin to suicide, some stated permitting VSED is full expression of legal freedoms, and some pointed to the inherent bias with disability and quality of life, especially when related to how disability may impact end of life choices and care. Highlighted content includes ethics of autonomy, decision making capacity, limits to a patient's choice, conscientious objection, and the importance of the professionalism required in a team model.

**Purpose:** Elucidate concepts of moral distress using case-based learning to review concepts of moral distress, ethics surrounding disability bias and end of life decisions, and educate about the difference between VSED, euthanasia, and suicide.

**Methods:** Information will be disseminated through a de-identified case narrative and attendee participation regarding current literature on content related to VSED, moral distress for treatment teams, personal biases on profound disabilities, and ethics of patient autonomy and clinician autonomy.

**Results:** Cultural appreciation and conceptualization of moral distress was aided by deeply differentiating between suicide vs. letting die vs. euthanasia. Reflection and discussion of personal, professional, and ethical values expanded personal perspectives and mindfulness of biases. A working guideline and model for healthcare teams was helpful to address the ethical issues and moral distress that resulted from this case experience.

**Conclusion:** Ethical-legal principles can facilitate appreciation and conceptualization of differences in moral distress that influence interdisciplinary approaches to care. Team programming approaches to help identify, affirm, assess, and respond to feelings of moral distress among healthcare staff in similar patient care situations can be helpful.

**Learning Objectives**

- Describe two different experiences of moral distress.
- Explain reasons for and impact of moral distress.
- Explain how voluntarily stopping eating and drinking to hasten death can be morally and legally permissible.

- Describe ways you can manage maintaining professional integrity if you experience moral distress.

# 2630: Neurogenic Lower Urinary Tract Dysfunction: Cutting Edge Care and Guidelines Update

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- AbbVie: Researcher, Consultant
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**Background and Issues:** Neurogenic lower urinary tract dysfunction (NLUTD) is a major source of morbidity in individuals with spinal cord injury, multiple sclerosis, and other neurologic conditions. Clinical challenges include balancing symptom control, prevention of upper tract deterioration, and optimizing patient quality of life. Controversies persist regarding the timing and selection of pharmacologic versus device-based interventions, evolving definitions of neurogenic bladder, and the integration of patient-reported outcomes into care pathways. Advances in urodynamic assessment, minimally invasive therapies, and guideline-driven management highlight the need for updated, evidence-based approaches.

**Purpose:** The goal of this presentation is to synthesize current best practices and guideline updates in the management of NLUTD, emphasizing innovations in diagnosis, treatment, and interdisciplinary care. The session aims to equip clinicians with actionable strategies to optimize outcomes, reduce complications, and align care with evolving standards.

**Methods:** This project involved a comprehensive review of recent international guidelines, consensus statements, and high-impact clinical trials published within the last five years. Key interventions analyzed include pharmacologic therapies (antimuscarinics, β3 agonists), intradetrusor botulinum toxin, neuromodulation techniques, and surgical options. Criteria for analysis included efficacy, safety, patient-centered outcomes, and applicability across diverse clinical settings. Special attention was given to guideline recommendations from the American Urological Association (AUA), European Association of Urology (EAU), and International Continence Society (ICS).

**Results / Lessons Learned:** Findings demonstrate that guideline-concordant care significantly improves patient outcomes, particularly when individualized to disease etiology and patient preference. Lessons learned include:

- Early risk stratification using urodynamics and imaging reduces long-term renal complications.
- Multimodal therapy, combining pharmacologic and procedural interventions, enhances durability of symptom control.
- Patient-reported outcome measures are increasingly recognized as essential in guiding therapy selection.

- Emerging technologies, such as implantable neuromodulation devices and digital health monitoring, show promise but require careful integration into practice.
- Interdisciplinary collaboration between urology, rehabilitation, nursing, and psychology is critical for sustained success.

**Conclusions:** Cutting-edge care for NLUTD requires adherence to updated guidelines, integration of novel therapies, and a patient-centered approach. Clinicians should adopt evidence-based strategies that prioritize both functional outcomes and quality of life. Recommendations include routine incorporation of guideline updates into practice, proactive monitoring of renal function, and expanded use of interdisciplinary care models. As innovations continue to reshape the therapeutic landscape, ongoing education and adaptation will be essential to ensure optimal management of NLUTD across populations.

**Learning Objectives**

- Participants will be able to summarize current guideline recommendations (AUA, EAU, ICS) for the diagnosis and management of NLUTD, including risk stratification and monitoring strategies.
- Participants will be able to apply evidence-based interventions (pharmacologic, procedural, and surgical) to optimize outcomes in patients with NLUTD, with attention to safety and efficacy.
- Participants will be able to integrate interdisciplinary approaches (urology, rehabilitation, nursing, psychology) into care pathways to improve long-term patient outcomes and reduce complications.
- Participants will be able to demonstrate effective communication strategies that incorporate patient-reported outcomes and shared decision-making into NLUTD management, ensuring care is patient-centered and responsive to individual preferences.

# 2631: Optimizing Neurogenic Bowel Management using Transanal Irrigation: Specialized Home Educational Program with Case-Based Insights

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**Background and Issues:** Neurogenic bowel dysfunction (NBD) is a common complication in indivudals with spinal cord injury (SCI) and is associated with impaired bowel control, constipation, and fecal incontinence. These symptoms significantly affect independence, health, and quality of life. Transanal irrigation (TAI) is frequently introduced as a bowel management strategy for individuals with NBD; however, outcomes vary widely among patients.

Multiple factors influence the effectiveness of TAI. Patient-related characteristics such as physical abilities, level and completeness of SCI, and the presence of additional comorbidities can affect successful bowel evacuation. Environmental and social factors, including access to appropriate equipment, avilability of clinicians trained in TAI, home setting, and caregiver support, also play an important role in long-term adherence and outcomes.

**Purpose:** To describe outcomes, challenges, and clinical lessons learned from a Hospital-in-Home TAI irrigation education program for individuals with spinal cord injury, including selected case examples.

**Methods:** Since 2018, the SCI Hospital-in-Home team has provided individualized training and education on TAI to selected Veterans with NBD. Education focused on proper technique, equipment use, troubleshooting, and integration into existing bowel routines. Program structure, practice adaptations, and challenging clinical scenarios will be hightlighted through case-based discussion.

**Results:** Between 2018 and 2024, 120 patients completed TAI training through the Hospital-in-Home program. Approximately 65% of participants have continued to incorporate TAI into their bowel management regimen. Some individuals modified their use of TAI, while others discontinued the intevention. Reasons included limited home support, lack of perceived benefit, difficulty achieving desired outcomes, or comparable results with previous bowel programs. Among those who continued TAI, clinical benefits have generally been sustained over time. Updated outcome data from 2025 will be included.

**Conclusion:** Outcomes associated with TAI are influenced by a compbination of physical, medical, environmental, and social factors. These findings support the need for a comprehensive patient screening process that extends beyond the diagnosis of NBD to include functional abilities, home environment, and available support. Once an effective bowel mangaement strategy is established, ongoing monitoring and follow-up are essential to ensure continued appropriateness and effectiveness. A Hospital-in-Home education model may support successful long-term use of TAI in appropriately selected individuals

**Learning Objectives**

- Describe common symptoms associated with neurogenic bowel dysfunction

- Identify physical and environmental factors that influence bowel management outcomes
- Explain the role of transanal irrigation in neurogenic bowel care
- Describe the model of Hospital-in-Home training program for TAI

# 2632: Integrated Functional Electrical Stimulation (FES): Theory and Practical Applications for Clinic and Home

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**Background and Issues:** Individuals with neurological injuries commonly experience impaired mobility, deconditioning, and secondary complications associated with prolonged immobility, including muscle atrophy, cardiovascular decline, and reduced functional independence. Although Functional Electrical Stimulation (FES) has been shown to mitigate many of these consequences, inconsistent implementation and limited understanding of system selection and task-specific application remain challenges in clinical practice.

**Purpose:** The purpose of this presentation is to examine the theoretical foundations and clinical applications of FES for individuals with neurological injuries, with emphasis on its role in reducing the long-term sequalae of immobility, supporting task-specific training and functional outcomes, and quality of life.

**Methods:** This presentation will synthesize current clinical approaches to the use of motorized and task-specific FES systems within Activity-Based Therapy (ABT) frameworks. Case examples will be used to show functional integration for both clinic- and home-based use. Emphasis will be placed on aligning FES interventions with patient-centered functional goals and long-term health maintenance.

**Results / Lessons Learned:** Key lessons include the importance of task specificity, appropriate matching of technology to individual impairments and goals, and consistent dosing to optimize neuromuscular activation and cardiovascular

engagement. Participants will gain practical insight into how FES can be used not only for functional training but also as a preventive strategy to address secondary complications such as spasticity, osteoporosis, and cardiorespiratory health.

**Conclusions:** Incorporating FES into long-term rehabilitation offers a viable approach to improving functional outcomes and reducing secondary complications in individuals with neurological injuries. Clinicians are encouraged to adopt structured, goal-driven FES protocols that emphasize task specificity, long-term adherence, and continuity across care settings to support sustained health improvements and reduce rehospitalization risk.

**Learning Objectives**

- Differentiate between motorized and task-specific FES systems based on clinical indications, functional goals, and patient needs.
- Design goal-oriented FES intervention strategies that align with Activity-Based Therapy (ABT) principles for both clinic and home settings.
- Assess how dosing parameters (frequency, intensity, duration, and progression) influence neuromuscular activation, cardiovascular engagement, and functional outcomes.
- Formulate long-term FES integration plans aimed at preventing secondary complications such as spasticity, osteoporosis, and cardiorespiratory health while promoting sustained participation and adherence

# 2633: Low-Intensity Blood Flow Restriction to Improve Upper Limb Strength After Spinal Cord Injury

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**Background:** Individuals living with spinal cord injury (SCI) frequently experience profound upper extremity muscle weakness that limits independence, mobility, and participation in daily activities. Conventional high-intensity resistance exercise can improve strength but is often difficult to perform safely due to compromised neuromuscular control, increased risk of overuse, and limited ability to generate adequate loads. Low-intensity blood flow restriction (LI-BFR) exercise, widely used in Olympic and elite athletes to enhance strength and hypertrophy at significantly lower loads, has not been well studied in individuals with chronic SCI. Introducing LI-BFR into SCI rehabilitation may provide a safer, more efficient approach to improving upper limb function.

**Purpose:** To evaluate the safety, feasibility, and efficacy of LI-BFR forearm strengthening in adults with chronic SCI, and to determine whether this assistive-technology–supported training method produces superior strength gains compared with conventional resistance exercise.

**Methods:** Ten adults with chronic cervical or thoracic SCI (American Spinal Injury Association Impairment Scale [AIS] A–D; age 27–72 years) completed an 8-week upper limb strengthening program. Each participant trained both arms twice weekly for 16 sessions. One arm was randomized to LI-BFR (30% of one-repetition maximum [1RM] at 60% individualized occlusion pressure), and the contralateral arm served as the high-intensity control (50% 1RM, no restriction). Exercises targeted wrist flexors and extensors using a standardized 30/15/15/15 repetition protocol. The primary outcome was hand-grip strength measured with a calibrated dynamometer. Secondary outcomes included participant-reported functional changes, comfort, and the Patient Global Impression of Change (PGIC). Safety was monitored throughout.

**Results:** All participants completed the study without any adverse cardiovascular, neurological, or skin-related events. LI-BFR produced significantly greater improvements in grip strength compared with the control condition (mean increase 7.5 ± 0.36 kg vs. 4.4 ± 0.67 kg; $p < 0.001$). Effect sizes were large for LI-BFR, demonstrating robust adaptation at low mechanical loads. Participants reported improvements in wheelchair propulsion, transfer ability, fine motor tasks, and fatigue resistance. PGIC scores (mean 2.2) indicated meaningful functional gains. Discomfort during LI-BFR was minimal, and participants expressed a strong interest in continuing the method independently. Training adherence was 100%, supporting feasibility for clinical implementation.

**Conclusions:** This completed study demonstrates that LI-BFR is a safe, feasible, and effective rehabilitation method for improving upper extremity strength in individuals with chronic SCI. By enabling significant physiological adaptation using low loads, LI-BFR represents an innovative assistive-technology approach particularly suited for individuals with limited strength reserves or elevated injury risk during high-intensity training. This technology, adapted from conditioning practices used in high-performance athletics, offers a clinically relevant strategy to enhance independence, reduce upper-limb overuse strain, and support long-term functional outcomes. Implementation of LI-BFR within interdisciplinary SCI rehabilitation programs may expand evidence-based treatment options and align with the Summit's mission to advance innovative, patient-centered care for individuals with SCI, Multiple Sclerosis (MS), and Amyotrophic Lateral Sclerosis (ALS).

**Learning Objectives**

- Describe the physiological principles by which LI-BFR enhances muscle strength in individuals with SCI.

- Explain the study methodology, including participant demographics, intervention parameters, and outcome measures used to evaluate upper-limb strength.
- Discuss the behavioral and psychosocial implications of improved upper-extremity function, such as increased confidence, independence, and participation in daily activities, for individuals living with SCI. (Behavioral/Psychosocial Objective)
- Evaluate the clinical significance, safety considerations, and potential integration of LI-BFR as an assistive rehabilitation technology within interdisciplinary SCI care.

# 2634: Beyond the Patient: Elevating Caregiver Well-Being in MS Care Systems

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**Background and Issues:** Caregivers of people with multiple sclerosis (PwMS) —often spouses, partners, parents, or adult children—play a critical role in providing physical assistance, emotional support, sociocultural support, symptom monitoring, and care coordination across the multiple sclerosis (MS) disease trajectory (Okai, et al., 2025). Care for PwMS is estimated to be provided by an informal caregiver in 80% of cases (Hillman, 2013).

Evidence indicates that Caregivers of PwMS experience increased depression, anxiety, fatigue, and social isolation, influenced by disease severity, cognitive impairment, behavioral changes, and uncertainty associated with relapsing and progressive courses of MS. Furthermore, Caregivers of PwMS frequently report not feeling heard or recognized by healthcare providers (HCPs), adding to significant feelings of isolation, burnout, and frustration. Despite providing essential, often full-time care that impacts their own physical and mental health, these individuals often find their needs overlooked by the medical system (Rosalind, et al., 2023). Family and informal Caregivers are essential partners in the care of Veterans, often providing insight and ongoing support for complex medical, mental health, and functional needs. Due to the cumulative demands of caregiving, Caregivers are at increased risk for burnout, which can negatively impact their well-being and Veteran outcomes. However, protective factors such as social support, adaptive coping strategies, and access to tailored educational and psychosocial interventions have been shown to mitigate caregiver distress and empower Caregivers to work with the MS Care Team. In order to provide these interventions on a macro level to Caregivers of Veterans with MS (VwMS), Veterans Health Administration (VHA) Multiple Sclerosis Centers of Excellence (MSCoE) Social Workers presented annual webinars starting in March 2024 for Caregivers of VwMS VA-wide as an educational component of MSCoE.

**Purpose:** This presentation is designed for MS healthcare professionals to enhance clinical recognition and response to caregiver burnout within clinic settings and ways to integrate the Caregiver into the MS Care Team. Learners will be able to identify three key characteristics associated with caregiver burnout and recognize early indicators during routine clinical encounters. The session will review Caregiver support resources available through VHA and other organizations. The presentation will introduce practical, trauma-informed, resiliency-based strategies that can be implemented in VA clinic settings to support Caregivers.

**Methods:** Since March 2024, VHA MSCoE Social Workers have presented annual educational, interactive webinars for Caregivers of PwMS VA-wide advertised by the MSCoE. Content from the participants using chat function and interactive word cloud exercises were analyzed using qualitative methods.

**Results:** The webinars included practical, trauma-informed and resiliency-based strategies, Caregiver support resources and provided valuable written insight and feedback on caregiver stress, burnout, resiliency and support needs.

**Conclusion:** By the conclusion of this presentation, learners will be equipped with actionable tools to support Caregivers through a caregiver-informed approach, leverage VA resources, and understand when to refer to Social Work for

additional support. Addressing the needs of family caregivers through Caregiver-inclusive policies, interdisciplinary interventions, and routine assessment of caregiver well-being is essential to improving outcomes for both Caregivers and Veterans living with MS.

**Learning Objectives**

- Identify resiliency and trauma-informed skills to utilize in clinic-setting with caregivers
- Identify three characteristics related to caregiver burnout
- Determine when to refer to social work for caregiver burnout
- Understand the resources offered by the VA for caregiver support

# 2635: Children and youth as caregivers: Support and Interventions for Hidden Veteran Caregivers across Illness and Injury

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**Background:** Within the military and veteran population, caregiving demands for spinal cord injury, MS or ALS, are often amplified by service-related injury, stigma, and progressive care needs, requiring hands-on care across family members. Between 35-40% of active serve members have dependents, while this number increases in the Veteran community, with the presence of grandchildren — all of whomshare the responsibilities of care and recovery. Indeed, over three million military-connected youth carers are considered “hidden helpers,” provide hands-on or emotional care  wounded, ill, or injured service members or veterans, including those living with spinal cord injury, ALS and MS. Caregiver programs exist for adults — most commonly spouses, and adult children - they often exclude or actively reject the millions of children and youth under 18, who provide daily, hands-on care. Caring for the caregiver is vital and has been shown to improve the overall well-being of those living with illness or injury. Thus, excluding this large subset of caregivers leaves them and their family members without access to critical caregiver support.

**Purpose:** This presentation will guide audience members through an engaging, interactive discussion providing an overview of: 1) young carer experience across illness and injury, 2) current research findings across ALS, SCI and MS, and 3) exploration of programs and implications for young carers of veterans across the US

**Methods:** Research addressing young carers in military and veteran communities has largely focused on ALS and spinal cord injury, given the high rates of each in the veteran community. This presentation will dive into the research adding insights from the civilian community to round off the knowledge of young carers across all populations including MS. Additionally, the recent growth and remaining gaps in programs for young carers (Hidden Helpers) will be discussed, including Global Neuro YCare programs. These programs have stepped in to provide caregiver training, community and school-based interventions, and emotional and mental health support utilizing the findings from these and other relevant programs. A framework for VSOs and VA practitioners to integrate young carers into their existing programs and organizations will be shared.

**Results:** Data shows Hidden helpers provide often intense, daily care and need support and resources, specifically from veteran and military organizations who understand the military connected experiences. When provided, these supports reduce stress, anxiety and provide opportunities for families to manage care alongside their own wellbeing. Partnerships and programs that focus on care programs, includinghidden helpers, can make a clear impact on the health and well-being of not only the youth, but also their families.

**Conclusions:** This presentation provides an overview of research and programming, offering a roadmap for integrating youth into existing care and family-based programs, developing new and innovative supports and providing wraparound care supports for veteran families who have a children and youth assisting in care across illness/injury. Moreover, results support the finding that supporting the mental and behavioral health of young carers can help mitigate secondary trauma, improve family cohesion, and enhance the overall capacity of the military and veteran family system.

**Learning Objectives**

- Identify military and veteran connected young carers (Hidden Helpers)
- Describe the behavioral, emotional, and psychological experiences and needs of military and veteran connected young carers, including the impact of caregiving on development, education, and well-being.

- Discuss evidence-informed and practice-based support interventions that can be used to address the needs of military and veteran connected youth carers.
- Assess organizations', readiness and capacity to integrate military and veteran connected young carers into existing programs, services, and support frameworks.

# 2636: Estimating the Number of Veterans with ALS: Data from the National ALS Registry

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**Objectives:** The primary objective of this study is to determine both the incidence and prevalence of Amyotrophic Lateral Sclerosis (ALS) within the veteran population of the United States. This analysis aims to provide critical insights into the extent of ALS among veterans, a group known to be at higher risk for developing this neurodegenerative disease.

**Background:** The National ALS Registry, established by the Centers for Disease Control and Prevention (CDC), is the largest cohort of self-enrolled ALS patients globally. Since its inception in 2010, the Registry has accumulated data on over 20,000 ALS cases, making it an invaluable resource for researchers. These patients include a significant number of veterans who have served in the U.S. armed forces. Previous studies have indicated that veterans are approximately twice as likely to be diagnosed with ALS compared to the general population. This study represents the first comprehensive analysis of the incidence and prevalence of ALS specifically in this vulnerable demographic, aiming to identify potential risk factors and underlying causes associated with the disease in veterans.

**Methods:** Data for this analysis will be meticulously extracted from multiple sources, including the Registry's self-registrant data, the Veterans Health Administration (VHA), and the Veterans Benefits Administration (VBA). To ensure the integrity of the findings, cases will be cross-analyzed to eliminate any potential duplicates, thus providing a more accurate estimate of the ALS prevalence and incidence among veterans. Statistical methods will be employed to analyze trends and identify correlations between ALS and various risk factors specific to the veteran population.

**Results:** The data collection and initial analysis are currently underway, with findings expected to be finalized prior to the upcoming conference. Preliminary insights suggest a significant incidence rate, which may underscore the urgent need for targeted research and interventions for veterans diagnosed with ALS.

**Conclusions:** This study aims to shed light on the critical issue of ALS prevalence among veterans, contributing to a deeper understanding of the disease's impact on this population. By identifying the incidence rates and potential risk factors, we hope to advocate for enhanced support and resources for veterans affected by ALS. Future research will be essential to explore the underlying mechanisms contributing to the increased risk of ALS in veterans and to improve clinical outcomes through tailored interventions.

**Learning Objectives**

- better understand the incidence in the veteran population.
- better understand the prevalence in the veteran population.
- better understand the risk factors in this vulnerable cohort.
- better understand possible mitigation strategies in this cohort.

# 2637: Diagnostic differences between military veterans and non-veterans: data from the United States National ALS Registry

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**Background and aim**: Military veterans in the United States are at a higher risk of developing amyotrophic lateral sclerosis (ALS) compared to the general population, yet the reasons for this increased risk remain unclear. This study investigates differences in clinical characteristics and diagnostic timelines between male veteran (MV) and non-veteran male (NVM) ALS patients enrolled in the U.S. National ALS Registry (Registry).

**Methods**: We conducted a propensity score-matched analysis using the Registry's self-administered military and clinical surveys collected between 2014 and 2024. Of the 2,891 male ALS patients, MV were matched in a 1:1 ratio with NVM based on smoking history, year of birth, history of head injury and region of residence at diagnosis. Key clinical, associated symptoms and intervention variables were all stratified by veteran status.

**Results**: A total of 802 MV were matched to 802 NVM. Compared to non-veterans, veterans were more likely to be diagnosed with ALS at an older age and report symptoms such as falls and difficulty swallowing. The mean interval between the first sign of weakness to ALS diagnosis was significantly longer for MV (20.8 months) than for NVM (16.7 months; p=0.0004). The same held true for the first sign of muscle twitches (MV = 22.7 months, NVM = 16.2 months, p=0.0136). MV were more likely to use noninvasive breathing equipment (p=0.0322).

**Conclusions:** These findings highlight significant discrepancies in the clinical presentation, diagnostic pathways, and application of critical therapeutic interventions of ALS among MV and NVM. Enhanced recognition and characterization of symptom onset in veterans may facilitate earlier diagnosis and initiation of disease-modifying therapies. Despite diagnostic delays, these findings support previously reported enhanced access to critical respiratory durable medical equipment for MV.

**Learning Objectives**

- This study investigates differences in clinical characteristics and diagnostic timelines between male veteran and non-veteran male ALS patients enrolled in the U.S. National ALS Registry.
- Explore why military veterans in the United States are at a higher risk of developing amyotrophic lateral sclerosis (ALS) compared to the general population, yet the reasons for this inequality remain unclear
- Highlight significant discrepancies in the clinical presentation and diagnostic pathways of ALS among male veterans and non-veteran males.
- This analysis compares differences in clinical characteristics and treatments of ALS male patients enrolled in the U.S. National ALS Registry stratified by veteran status.

# 2638: Obesity-Associated Leptin Resistance Exacerbates Neuroinflammation in Experimental Autoimmune Encephalomyelitis

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**Background:** The neuroendocrine and immune systems interact bidirectionally through shared ligands and receptors during inflammation. Leptin, a non-glycosylated peptide hormone secreted by adipose tissue and primarily known for regulating appetite and energy balance, is increasingly recognized as an immune modulator, with its receptor widely expressed on immune cells. In diet-induced obesity (DIO), chronic hyperleptinemia leads to leptin resistance, characterized by elevated circulating leptin and impaired central signaling. However, the role of leptin in neuroinflammation under leptin-sensitive and leptin-resistant conditions remains incompletely defined.

**Objectives:** This study aimed to evaluate the role of leptin in neuroinflammation under leptin-sensitive and leptin-resistant conditions using the murine experimental autoimmune encephalomyelitis (EAE) model of multiple sclerosis (MS), and to assess whether conditional adipose-derived leptin knockout improves disease outcomes.

**Methods:** Wild-type (WT) C57BL/6 mice were fed either a high-fat diet for 12–16 weeks to induce DIO-associated leptin resistance or standard chow as controls. Conditional leptin ablation was then induced by two weeks of doxycycline administration, and reduction of circulating leptin levels was confirmed by enzyme-linked immunosorbent assay (ELISA).

Both leptin-reduced and leptin-sufficient (WT) mice were subsequently immunized with $MOG_{35-55}$ emulsified in CFA and administered intraperitoneal pertussis toxin (PTX) to induce EAE. Disease onset and severity were monitored by daily clinical scoring. Flow cytometry of harvested CNS tissue was performed to characterize immune-cell composition across groups.

**Results:** Compared with leptin-reduced mice, leptin-sufficient littermates exhibited a higher risk of developing clinical disease and more severe neurological impairment. This effect was more pronounced in the context of DIO-induced leptin resistance. Similar results were obtained with a neutralizing anti-leptin antibody. On day 18 post-immunization, two mice per leptin-reduced and leptin-sufficient (WT) group with comparable clinical scores were euthanized. Flow cytometric analysis of brain tissue revealed significantly increased frequencies of infiltrating immune cell populations in WT mice, including $CD3^+$ T cells ($CD4^+$ and $CD8^+$), $CD11b^+$ myeloid cells, neutrophils, antigen-presenting myeloid cells, and disease-associated myeloid populations, compared with leptin-deficient animals, despite equivalent clinical severity and disease stage.

**Conclusions:** Elevated leptin levels in obesity exacerbate neuroinflammation and diminish leptin's neuroprotective effects. Our data suggest that higher leptin levels, particularly in the setting of leptin resistance, increased infiltration of immune cell subsets into the CNS during EAE, thereby enhancing disease onset and severity. Targeting leptin signaling in obese patients may represent a promising therapeutic strategy for autoimmune neuroinflammatory diseases.

**Learning Objectives**

- Describe how diet-induced obesity and increased leptin enhance neuroinflammatory processes in the experimental autoimmune encephalomyelitis (EAE) model of multiple sclerosis.
- Compare the effects of leptin signaling on neuroinflammation under leptin-sensitive versus leptin-resistant states.
- assess how conditional adipose-derived leptin deficiency influences immune-cell infiltration and disease severity in autoimmune neuroinflammation.
- Apply these mechanistic insights to evaluate the potential of targeting leptin signaling as a therapeutic strategy for obese patients with autoimmune neuroinflammatory diseases.

# 2639: Closing the Gap: Hospital-in-Home Transitional Program for High-Risk Discharges in Veterans with SCI/D

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Transitions home for Veterans with spinal cord injuries and disorders (SCI/D) present significant challenges, with gaps in care often leading to complications, readmissions, safety concerns, and increased caregiver burden. A systematic review published in *Global Spine Journal* reported 14% and 36% thirty- and ninety-day readmission rates, respectively, after initial traumatic SCI/D discharge. Traditional outpatient models frequently fail to meet the intensive needs during the critical post-discharge window. Literature shows that hospital-in-home transitions reduce hospital utilization, underscoring the need for an integrated, patient-centered approach that ensures safety, education, and resource access during this vulnerable period.

This project emphasizes the impact of an SCI/D Hospital-in-Home (HiH) transition program in reducing hospitalizations, decreasing medical errors, and enhancing medical literacy to support program development.

Patients with newly diagnosed SCI/D or complex medical changes are identified during interdisciplinary inpatient meetings, where transition strategies can be brainstormed early. HC team members then follow the hospitalization to anticipate potential pitfalls before discharge. Upon discharge, the HiH team conducts immediate home visits to assess safety, deliver medical care, and provide patient and caregiver education. Each visit includes medication reconciliation, literacy assessment using teach-back method, fall prevention, oxygen safety, skin integrity checks, pain evaluation, and resource coordination. Weekly interdisciplinary meetings ensure continuity of care and smooth transition to outpatient or HC enrollment. Program evaluation tracks readmission rates and outcomes, with data reported quarterly for quality improvement.

Data from 2023-2025 in Tampa shows HiH consult volume rose 15%, with growth within the transition pathway every year. Currently, transitions account for over 90% of HiH admissions, clear evidence that the HiH transition model is becoming institutionalized to close the inpatient-to-home gap. Additionally, acceptance averaged 93%-96% annually, signaling operational efficiency and strong clinical confidence in the program. Specifically, fiscal year 2025 built momentum quarter-over-quarter, peaking at 37 admissions in quarter four with 97% acceptance. HiH is now positioned as a discharge-to-home bridge for vulnerable Veterans with SCI/D. Key lessons learned during this process include the importance of early engagement, robust interdisciplinary communication, and individualized education tailored to literacy and environmental needs. These facets have been adjusted over time to develop the most efficient process.

The SCI/D HiH transition program closes critical gaps by delivering early, intensive, and interdisciplinary support during high-risk transitions. This model reduces preventable hospitalizations, mitigates medical errors, and improves patient and caregiver understanding of complex regimens – directly addressing our objectives. Beyond clinical benefits, HiH programs yield significant cost savings by decreasing avoidable readmissions and emergency utilization. These outcomes support investment in HiH programs as a scalable, Veteran-centered solution that enhances continuity of care, promotes safety, and improves long-term outcomes.

**Learning Objectives**

- Explain how Hospital-in-Home (HiH) transition program processes reduce hospitalizations and readmissions.

- Identify at least three initial home visit assessments that decrease medical errors and sentinel events based on case scenarios provided.
- Describe two strategies to ensure patient and caregiver medical literacy during transitions of care.
- Communicate at least two actionable recommendations to leadership for developing transitional care programs for Veterans with newly diagnosed SCI/D or significant clinical changes in a written summary or verbal report.

# 2640: Effects of older age and sex on axonal survival within the spinal cord after SCI

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**Introduction:** While aging population has resulted in an escalation of fall-related acute cervical spinal cord injury (acSCI) in the elderly, acSCI continues being more prevalent in males than their female counterparts.

**Purpose:** Given the potential age and sex-related discrepancies in the outcomes after acSCI, we performed a histopathological and immunohistochemical examination of postmortem spinal cord tissue to evaluate whether older age and biological sex are key determinant for axonal survival following acSCI.

**Methods:** This study includes post-mortem spinal cord tissue from 54 cases of acSCI and 45 control cases. Each group was subdivided into younger and elderly individuals (≥65 years of age at the acSCI onset, or death in controls). Alternating 6-microm sections from 2 to 3 segments caudal to the SCI and cervical sections from controls without prior CNS insult were stained for axons using Neurofilament 200 (NF200). The number of axons was counted within the lateral corticospinal tracts (CST), descending vasomotor pathways (DVP) and posterior column (PC) using unbiased stereological techniques.

**Results:** Overall, there were 29 females and 70 males with a mean age of 58.8 years (range age: 16-90 years). Of those with acSCI, 33 individuals were elderly (61.11%) and there were 7 females (12.69%). Among the control cases, there were 18 elderly individuals (40.00%) and 22 females (48.89%).

Younger individuals had significantly greater number of preserved axons within the DVP than elderly individuals after acSCI (809.76±189.51 versus 404.37±117.49, p=0.038). There was a trend towards a greater number of preserved axons after acSCI within the CST and PC in the younger subgroup when compared with the elderly (910.60±229.94 versus 511.00±150.53, p=0.061; and 1749.84±293.73 versus 1012.41±248.17, p=0.078). Nevertheless, there were no significant differences between younger and elderly subgroups regarding the number of axons within the CST (1622.59±179.28 versus 1527.68±249.16, p=0.690), DVP (1537.57±156.85 versus 1425.68±240.31, p=0.840) and the PC (1909.07±201.63 versus 2018.47±295.76, p=0.490) among the controls.

Moreover, there were no significant differences between females and males regarding the number of preserved axons following acSCI within the CST (766.39±234.80 versus 651.51±145.53, p=0.298), DVP (723.17±236.28 versus 543.96±117.72, p=0.261) and the PC (1852.24±486.76 versus 1216.82±210.54, p=0.298). Finally, females showed similar number axons within CST (1623.39±197.15 versus 1548.46±215.84, p=0.925), DVP (1600.21±189.52 versus 1396.40±184.49, p=0.317), and PC (1951.94±225.28 versus 1950.74±250.58, p=0.298) to males among controls.

**Conclusions:** Our results indicate that older age at the time of injury negatively affected axonal survival within descending and ascending spinal cord tracts after acSCI. While an underlying spinal cord disease causing axonal loss in either, or both, ascending and descending tracts could explain at least some of those age-related differences, data from the control cases without a history of CNS insult showed no age-related differences within those spinal cord tracts. Moreover, our results suggested that biological sex might not have any significant impact on the axonal preservation caudal to the epicenter after an acSCI. Overall, our findings support the development and implementation of neuroprotective strategies and rehabilitative programs to overcome those age-related discrepancies that can potentially influence neurological and functional outcomes after acSCI.

**Learning Objectives**

- Summarize the results of the pre-clinical studies on the effects of older age on the recovery after spinal cord injury (SCI).
- Synthesize the results of the pre-clinical studies on the influence of biological sex on recovery after SCI.
- Describe the impact of older age on axonal survival within the spinal cord white matter in humans after acute cervical SCI.
- Describe the effects of biological sex on axonal survival within the spinal cord white matter in humans after acute cervical SCI.

# 2641: Galectin-3 Expression is increased in muscle with heterotopic ossification following spinal cord injury

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**Background**: Heterotopic ossification (HO) refers to abnormal bone growth in soft tissue and is a recognized complication of spinal cord injury (SCI) affecting 10-53% of patients with SCI. SCI-associated HO leads to reduced mobility, increased pain, and impaired functional recovery. Due to the incomplete understanding of its pathophysiology, reliable markers for diagnosis and monitoring are lacking, and molecular targets have not yet been identified for effective treatment. We have developed a clinically relevant mouse model of SCI-associated HO by inducing simultaneous SCI and myotendinous injury (MTI), confirmed by HO formation in the injured quadriceps muscle of the SCI+MTI model at post-injury Week 4.

**Purpose:** This study was undertaken to identify differentially expressed proteins in HO lesions by nonbiased proteomic analysis of quadriceps tissue from the SCI+MTI model.

**Methods**: Ten-week-old female C57BL/J6 mice were subjected to spinal cord transection at T9-10, followed by MTI in the left hindlimbs through crush and tenotomy of the quadriceps. Intact contralateral hindlimbs served as internal controls. Quadricep muscles were frozen on day 1 (D1) and week 1(W1) from a separate cohort for protein extraction and LC-MS analysis. Differential expression and pathway enrichment analysis were performed on the proteomic data, and selected proteins were validated by immunoblotting and immunofluorescence staining.

**Results**: Early ectopic mineralization with poorly crystalline hydroxyapatite was found in the SCI+MTI model at W1 with an increase in hydroxyapatite crystallinity at W4. Proteomic analysis of injured and uninjured muscle identified 3,014 proteins, 240 of which were significantly upregulated at W1 in injured muscle, and 376 which were upregulated at W1 compared to D1. Pathway enrichment analysis showed early activation of tissue repair and extracellular matrix regulation. Of 20 proteins identified to be significantly upregulated, galectin-3 ranked third at W1 in injured versus uninjured muscle, and fourteenth at W1 versus D1. This was confirmed by immunoblotting and immunofluorescence microscopy.

**Conclusions**: The SCI+MTI model reinforces the transition from amorphous calcium phosphate to hydroxyapatite in the progression of pathogenesis of SCI-associated HO. Proteomic analysis shows early upregulation of galectin-3 after injury, identifying it as a potential mechanistic contributor to disease progression, and thus a therapeutic target in SCI-associated HO.

**Learning Objectives**

- Identify current limitations in the prevention and management of spinal cord injury (SCI)-associated heterotopic ossification (HO)
- Describe the value of preclinical models in elucidating the pathogenic mechanisms underlying SCI-associated HO
- List the key pathologic events that precede the development of SCI-associated HO
- Discuss the role of Galectin-3 in HO development and its potential as a therapeutic target

# 2642: Cognitive testing among people with spinal cord injury: accommodation solutions and implementation concerns

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**Background**: People with Spinal Cord Injury (SCI) are at 13 times greater risk for cognitive impairment. This risk can be even higher among veterans due to the high prevalence of traumatic brain injury and post-traumatic stress disorder. Cognitive impairment significantly undermines the effectiveness of SCI rehabilitation, which requires intensive learning of new skills to achieve optimal outcomes. While a clinical guideline recommends reliable cognitive testing during inpatient rehabilitation, standardized cognitive tests were not commonly implemented during SCI rehabilitation. Most tests are difficult to use for people with SCI in a fast-moving clinical environment because of accessibility and implementation challenges due to motor impairment, pain, and fatigue. NIH Toolbox, an iPad-based measurement system comprising 10 reliable, validated cognitive tests, is a potential solution, as it has been used among people with SCI in prior research.

**Purpose**: This study aims to 1) evaluate accessibility challenges of NIH Toolbox cognitive tests and generate feasible accommodation solutions.2) evaluate challenges and facilitators of implementing NIH Toolbox in the inpatient rehabilitation setting

**Methods:** For aim 1) Three focus group interviews (N=9) were conducted with clinicians and researchers with expertise in SCI rehabilitation, assistive technology, and user-centered design. During the focus group interviews, experts either testing in-person or watched demonstration videos on the 10 NIH Toolbox cognitive tests to evaluate the accessibility risk and discuss potential accommodation solutions. In-person field testing with people with SCI is underway to evaluate the usability of these accommodation solutions (N=20). For aim 2), three focus groups are conducted among clinicians in SCI rehabilitation in the VA system (N=10, across disciplines such as occupational therapists, social workers, psychologists, neuropsychologists, nurses, etc) on what should be implemented to engage veterans with SCI to take NIH Toolbox tests in rehabilitation settings.

**Results:** People with high cervical injuries (C1-C4) may use hands-free accommodations such as eye tracking, voice control, and head control, which can be enabled in the built-in accessibility features of the iPad IOS system. However, not all test designs are compatible with these technologies. Secondary accessibility features can be preset to a customized testing experience based on personal preference; these options also raised concerns about reliability and the need for training. For lower cervical injury levels, multiple accommodation solutions are available, such as switch control, trackball, joystick, and stylus. Pilot field testing data showed that individuals, even with similar injury types and levels, may differ in their preferences and tolerance for using these accommodations to complete cognitive tests. The cognitive burden associated with using eye tracking or voice control is high. When implementing cognitive testing among SCI patients, clinicians noted that perceived importance, the availability of resources (e.g., staff) are key to promoting cognitive testing among people with SCI.

**Conclusion:** Several accommodations are available for people with SCI to take cognitive tests in the NIH Toolbox, depending on test design and patient characteristics. Education and training are necessary to help clinicians and people with SCI become aware of the importance of participating in cognitive testing.

**Learning Objectives**

- describe the potential accommodation solutions associated with using NIH Toolbox among people with SCI
- appraise the pros and cons associated with different accommodation solutions

- understand, from patient perspective, the user experiences of taking cognitive tests with accommodation
- understand the challenges and opportunities in implementing NIH Toolbox measures among people with SCI

# 2643: Medication Use Patterns in Spinal Cord Injury (SCI) Admissions and the Impact of SCI-SAFE Mnemonic

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Roles: Submitter; Presenter
Participant has indicated the following discussion of unapproved drug or product uses:
This presentation will discuss many medications and classes of medications. They will be discussed as part of de-prescribing efforts for inappropriate medications in the setting of SCI, and recommended alternatives. We have attempted to summarized medication classes where off label use MAY be discussed. Please note that none of these off label uses of medications are being recommended, rather, these medications may have been prescribed for off label uses, and this may be discussed as part of the presentation. Benzodiazepines: anxiety, spasticity. Non-selective beta blockers: anxiety, postural orthostatic tachycardia syndrome. Alpha Blockers; lower urinary tract symptoms, chronic prostatitis, ureteral stent-related urinary symptoms. Fluoroquinolones: surgical prophylaxis, prostatitis, epididymitis, osteomyelitis. NSAIDs: acute gout flare.

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Participant has indicated the following discussion of unapproved drug or product uses:
This presentation will discuss many medications and classes of medications. They will be discussed as part of de-prescribing efforts for inappropriate medications in the setting of SCI, and recommended alternatives. We have attempted to summarized medication classes where off label use MAY be discussed. Please note that none of these off label uses of medications are being recommended, rather, these medications may have been prescribed for off label uses, and this may be discussed as part of the presentation. Benzodiazepines: anxiety, spasticity. Non-selective beta blockers: anxiety, postural orthostatic tachycardia syndrome. Alpha Blockers; lower urinary tract symptoms, chronic prostatitis, ureteral stent-related urinary symptoms. Fluoroquinolones: surgical prophylaxis, prostatitis, epididymitis, osteomyelitis. NSAIDs: acute gout flare.

**Background:** Spinal cord injured (SCI) patients are at heightened risk for adverse effects from certain medications due to unique physiological challenges. The SCI-SAFE mnemonic is a tool used to remember key medication classes that require cautious use or avoidance in this population.

**Purpose:** To analyze the utility of the SCI-SAFE tool in SCI admissions.

**Methods:** Data on SCI admissions from November 3, 2025 to January 7, 2026 were collected, including patient age, level of injury, and the use of medications specified in the SCI-SAFE mnemonic. Fifty admissions were reviewed, noting if patients were taking medications from the SCI-SAFE list, type of medications, and indications for use.

**Results:** Of the 50 patients reviewed at the time of admission, 64% (n=32) were taking medications on the SCI-SAFE list. Among them, 32% (n=16) were admitted for rehabilitation. A notable proportion of the admissions involved tetraplegia/quadriplegia (72%).

Breakdown of SCI-SAFE medication use:

S (Sedatives and Sleep Aids - Benzodiazepines, Z-drugs): Risk of sedation and falls.

1 patient (2%)

C (Cardiovascular Agents - Non-selective beta blockers, sublingual nifedipine, alpha-adrenergic agonists): Risk of exacerbating autonomic dysreflexia or hypotension.

2 patients (4%)

I (Endocr**I**ne Drugs - SGLT2 Inhibitors): Risk of urinary tract infections in neurogenic bladder.

2 patients (4%)

S (Skeletal Muscle Relaxants – Methocarbamol): After neurosurgery, patients commonly experience acute muscle spasms. Once transitioned to rehabilitation and neurogenic spasticity arises, methocarbamol is no longer preferred due to not specifically targeting neurogenic spasticity as effectively as other agents.

10 patients (33%)

A (Anticholinergics use in > 65 y.o. and Alpha Blockers and 5-Alpha Reductase Inhibitors [BPH medications] in setting of neurogenic bladder): Risk of cognitive impairment and questionable utility of BPH medications in patients using indwelling or intermittent catheters.

Alpha Blockers and 5-Alpha Reductase Inhibitors: 9 patients (18%)

>65 y.o. on antimuscarinics/anticholinergics: No patients (0%)

F (Fluoroquinolone Antibiotics): Risk of CNS side effects, tendinopathy.

2 patients (4%)
*Ciprofloxacin also interacts with tizanidine leading to severe hypotension, sedation, and psychomotor impairment: 13 (26%) patients were on tizanidine.

E (Effective Pain Management): Opioids - Risk of dependence, sedation. NSAIDs- gastrointestinal bleeding, and kidney function compromise.

Opioids: 10 patients (20%)

NSAIDs: 5 patients (10%)

**Conclusion:** The analysis reveals widespread use of SCI-SAFE medications among patients with SCI. The high prevalence underscores the need for risk/benefit analysis for individuals that have been prescribed an SCI-SAFE medication in order to mitigate potential risks. Notably, there is often use of medications to improve voiding in patients who do not void spontaneously and require catheterization. SCI clinicians also need to beware of the unique impact of medications like SGLT2 inhibitors and drug-drug interactions like tizanidine/ciprofloxacin which are ubiquitous in this setting. This project highlights the potential benefits of implementing the SCI-SAFE mnemonic in clinical practice to enhance patient safety in the SCI population.

**Learning Objectives**

- Describe the SCI-SAFE medication mnemonic, what medications are included, and why.
- Explain the current prescribing patterns of SCI-SAFE medications at the Central Virginia VA Health Care System Spinal Cord Injury Unit.
- Discuss the clinical utility of the SCI-SAFE mnemonic.

- Determine ways to implement SCI-SAFE mnemonic at other spinal cord injury rehabilitation centers.

# 2644: Food for Thought: Self-feeding with Limited Upper Extremity Strength

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**Background:** Central Cord Syndrome is the most common form of incomplete spinal cord injury and is characterized by disproportionately more motor impairment of the upper extremities (UE) compared to the lower extremities. Self-feeding with limited or even no functional use of the UE is difficult and often an important goal for patients and caregivers. Several expensive adaptive products are available (Obi Gen 3 Robotic Feeder or the Swedish Sling, for example), but remain difficult for patients to obtain outside of clinical settings. Clinicians also struggle to identify what adaptive feeding devices are available and how to use.

**Purpose:** How can someone self-feed with limited functional use of UE? This case study explores the self-feeding progress of a 65-year-old male diagnosed with Central Cord Syndrome after a motor vehicle accident. The patient was able to trial a new magnetic swivel feeder that was fabricated for under $10 during his inpatient rehabilitation stay, requiring no UE active range of motion (AROM) to operate.

**Methods:** An occupational therapy evaluation was completed, including a thorough UE AROM and strength assessment. The patient's ability to self-feed was evaluated using the Continuity Assessment Record and Evaluation (CARE) Item Set on a 6-level ordinal scale (1= total, 6= independent). The patient was then evaluated for adaptive equipment for self-feeding. The patient was able to trial a new magnetic swivel feeder, requiring no UE AROM/strength to operate. The patient was continually assessed throughout his rehabilitation stay and as the patient's UE AROM and strength improved, the patient was able to advance to other adaptive feeding equipment, including universal cuff, curved utensil, plate guard, and built-up grip.

**Results:** The patient was able to advance from a 1 (total assist) on the CARE Item Set to a 5 (setup/cleanup) with self-feeding. Most excitingly, the patient was able to self-feed with no functional UE AROM or strength, using a magnetic swivel feeder, while working on increasing UE AROM and strength while in rehabilitation. The patient progressed to using only a curved utensil and plate guard as UE AROM and strength improved by end of his inpatient rehabilitation stay.

**Conclusions:** Understanding how to evaluate available UE AROM and strength to identify what devices work best can greatly increase independence with self-feeding for people after SCI. There are many inexpensive adaptive feeding devices available to help people self-feed with limited arm function. However, clinicians and patients are often unaware of available equipment or use incorrectly. New adaptive equipment designs are also becoming more widely available and inexpensive enough for clinicians in clinical practice to easily replicate in any setting.

**Learning Objectives**

- demonstrate how to utilize a universal cuff for self-feeding to compensate for hand weakness
- explain the rational between using a universal cuff and a built-up grip for self-feeding
- describe how to use a magnetic swivel feeder for self-feeding
- identify patients/clients who might be appropriate to trial a magnetic swivel feeder for self-feeding

# 2645: Wound Healing Reimagined: Development of a Novel Pressure Relief Surface and Evaluation by Veteran Users

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**Background:** Pressure injuries (PIs) remain a major contributor to morbidity, mortality, and healthcare utilization among veteran wheelchair users, requiring prolonged recovery periods and incurring substantial costs. Although air-fluidized therapy (AFT) is the gold standard for PI healing, it is limited to bed-based systems, eliminating mobility during recovery. This creates a cycle in which immobility is required for healing, yet immobility itself increases PI risk, delays functional recovery, and limits independence and participation. The absence of a mobile, therapeutically equivalent pressure-relieving solution represents a critical gap in current wheelchair seating technologies.

**Purpose:** This work aimed to develop and evaluate a novel wheelchair cushion that translates AFT therapeutic principles into a mobile seating system. By enabling effective pressure management while preserving mobility, this approach supports wound healing, functional recovery, and social participation. Specific objectives were to: (1) iteratively design an air-fluidized–inspired wheelchair cushion, (2) incorporate feedback from veteran wheelchair users to establish user-centered design criteria, and (3) mechanically evaluate pressure-relief performance relative to commercial wheelchair cushions.

**Methods:** The cushion was developed by replicating the therapeutic principles of hospital-based AFT beds within a seated mobility platform. A user-centered design approach utilized qualitative feedback from focus groups at the 2024 National Veterans Wheelchair Games and the 2025 National Disabled Veterans Winter Sports Clinic. Veteran feedback was thematically analyzed to guide the iterative refinement of a third-generation prototype. Mechanical performance was evaluated using force–displacement testing on an MTS Universal Testing Machine (ISO 16840) and compared against commercially available wheelchair cushions.

**Results:** The air-fluidized wheelchair cushion was successfully developed through multiple iterative design cycles integrating veteran feedback and mechanical evaluation, demonstrating the feasibility of translating bed-based AFT principles into a seated mobility system. Veterans consistently identified the device as a promising solution for managing pressure injuries while maintaining mobility. Key design priorities included customization, low noise, ease of sanitation, independent power operation, lightweight construction, and a slim seating profile—factors critical for real-world adoption.

Mechanical testing demonstrated a markedly different force–displacement response compared to standard cushions. When displacement increased from 20 mm to 25 mm, interface force increased by 188.7 N for foam cushions and 169.1 N for air cushions, compared to only 7.4 N for the air-fluidized prototype. This minimal force increase indicates superior envelopment and load redistribution, suggesting enhanced pressure management and reduced risk of tissue breakdown during seated mobility.

**Conclusions:** PIs impose a substantial clinical and economic burden on veteran wheelchair users, with treatment costs exceeding $100,000 per individual and high rates of reinjury and hospital readmission. This work demonstrates the feasibility of delivering air-fluidized–inspired pressure relief in a wheelchair-compatible system, addressing a fundamental limitation of current PI management strategies. By enabling effective pressure redistribution while preserving mobility, this first-of-its-kind system can support earlier mobilization, reduce secondary complications, and mitigate the high costs associated with prolonged hospitalization and wound recurrence. These findings suggest that mobile air-fluidized seating has the potential to change the standard of care for pressure injury management by extending effective therapy beyond the bed and into everyday life.

**Learning Objectives**

- Describe the etiology, prevalence, and clinical consequences of pressure injuries among veteran wheelchair users, including factors contributing to recurrence and delayed recovery.
- Explain the current standard of care for pressure injury treatment, including the role and limitations of bed-based air-fluidized therapy in supporting wound healing and recovery.
- Analyze the biomechanical principles of air-fluidization and explain how these principles are translated from bed-based to wheelchair seating applications.
- Evaluate pressure-relief performance using biomechanical metrics such as force–displacement response and pressure redistribution and assess their relevance to pressure injury prevention and recovery.
- Apply principles of participatory action design and user-centered engineering to assess how veteran feedback can be systematically integrated into the development of advanced rehabilitation technologies.

# 2646: When Multiple Sclerosis Is Something Else: Recognizing MS Mimics in Veterans

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- Alexion Astrazenica: research support

**Background/Issues:** Multiple sclerosis(MS) is a clinical diagnosis supported by neuroimaging and laboratory findings rather than a single definitive test. Early symptoms and MRI abnormalities often overlap with other neurologic and neuroimmunologic disorders, making diagnostic uncertainty common-particularly at initial presentation. Consequently, a subset of patients initially diagnosed with MS are later found to have alternative conditions, commonly referred to as “MS mimics.”

For Veterans, diagnostic misclassification carries distinct consequences. Veterans may present later in the disease course, have higher medical comorbidity, and experience variable access to advanced neuroimmunologic testing across healthcare systems. Labeling Veterans with MS when the underlying condition is non-MS can delay appropriate treatment, expose patients to ineffective or harmful disease-modifying therapies, worsen neurologic outcomes, and complicate disability determination and long-term benefits within the VA system.

**Purpose:** This 90-minute interactive session is designed for clinicians and healthcare providers and aims to:

1. describe the frequency of MS mimics in real-world practice;
2. identify clinical scenarios that should prompt reconsideration of an MS diagnosis; and
3. outline practical laboratory testing strategies to distinguish MS from non-MS conditions, with specific attention to Veteran care.

**Methods:** We conducted retrospective population-level analysis using the TriNetX Network to identify adults with an initial diagnosis of MS who were later assigned alternative neurologic or neuroimmunologic diagnoses. To enhance relevance for Veterans, these findings were contextualized using analyses from the national Veterans Health

Administration database. Population-level data were integrated with general case-based discussions and laboratory decision pathways reflecting scenarios commonly encountered in neuroimmunology practice.

**Results/Lessons Learned:** Among 350,145 patients initially diagnosed with MS, approximately 2.8% were later assigned alternative diagnoses consistent with MS mimics. These included neuromyelitis optica spectrum disorder (~1.5%), neurosarcoidosis (0.7%), acute disseminated encephalomyelitis (0.3%), stiff-person syndrome (0.2%), and myelin oligodendrocyte glycoprotein antibody–associated disease (0.2%).

Recurring clinical features prompting diagnostic reassessment included poor or unexpected response to MS therapies, monophasic or unusually severe presentations, longitudinally extensive spinal cord lesions, bilateral or rapidly progressive optic neuropathy, and systemic features atypical for MS. These conditions frequently impair mobility, vision, bowel and bladder function, and pain control—domains central to long-term function and independence.

From a laboratory standpoint, timing and selection of testing were critical. Early use of disease-specific antibody assays (AQP4-IgG, MOG-IgG), cerebrospinal fluid profiles discordant with MS, and targeted systemic evaluations often clarified diagnosis and redirected management. Delayed or inaccurate testing commonly prolonged exposure to MS-directed therapies and delayed initiation of appropriate disease-specific treatment.

**Conclusions/Session Structure:**This session will combine population-level data with interactive, general case discussions illustrating diagnostic crossroads encountered when MS does not behave as expected. Participants will engage through live polling and guided discussion to determine when to reassess diagnosis, what laboratory tests to order, and how to interpret results. Key principles emphasized include diagnostic humility, reassessment of treatment response, and deliberate use of laboratory testing when clinical trajectories diverge from typical MS. For Veterans, improved recognition of MS mimics—regardless of where the initial diagnosis occurs—is critical to preventing avoidable disability and ensuring timely access to appropriate specialty care and benefits.

**Learning Objectives**

- Estimate the real-world frequency and spectrum of conditions that mimic multiple sclerosis, including NMOSD, MOGAD, neurosarcoidosis, and other neuroimmunologic disorders.
- Recognize clinical and radiographic features that should prompt reconsideration of an MS diagnosis, such as atypical disease course, poor response to MS therapies, or systemic features inconsistent with MS.
- Select and interpret appropriate laboratory and cerebrospinal fluid tests (e.g., AQP4-IgG, MOG-IgG, CSF profiles) to distinguish MS from non-MS neuroinflammatory conditions.
- Apply diagnostic reassessment strategies to Veteran populations, considering comorbidities, healthcare access, and implications for treatment selection, disability determination, and long-term outcomes.
- Implement a structured approach to diagnostic reassessment when MS does not behave as expected, minimizing unnecessary exposure to MS-directed therapies and delays in disease-specific treatment.

# 2647: Interdisciplinary Assistive Technology Teams: Maximizing Efficiency, Effectiveness, and Satisfaction for Veterans Living with ALS

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**Background:** Assistive technology (AT) service delivery often faces challenges related to fragmented care. Individual disciplines frequently operate in isolation, focusing solely on device prescription and procurement within their respective domains. However, modern AT devices are increasingly complex, integrating features that span multiple areas of expertise. When disciplines work independently, duplication of services or gaps in care may occur, limiting the ability to meet clients' comprehensive needs. Additionally, the rapid evolution of AT creates an overwhelming amount of information for a single clinician to manage, contributing to increased rates of device abandonment. These issues persist in community settings and, at times, within Veterans Affairs (VA) systems, where siloed practices remain common.

**Purpose:** This presentation aims to examine the interdisciplinary approach to AT interventions for veterans with amyotrophic lateral sclerosis (ALS). It will highlight how collaborative practice enables comprehensive consideration of the full spectrum of technologies and their integration within social, cultural, and institutional contexts.

**Methods:** Two Assistive Technology Providers (ATPs), representing Rehabilitation Biomedical Engineering and Speech-Language Pathology and specializing in ALS care, will present an overview of interdisciplinary team structures and practices. The session will explore strategies for flexibly applying subject matter expertise based on individual veteran needs and provide recommendations for buildng effective teams or leveraging existing resources. Examples of formal and informal team models from VA Polytrauma Rehabilitation Centers and ALS Care Team Centers of Excellence will be discussed. Best practices for skilled evaluation and provision of AT within interdisciplinary frameworks will be reviewed, emphasizing approaches that yield more efficient, effective, and satisfying outcomes for veterans.

**Results:** The increasing availability and complexity of high-tech assistive devices underscore the necessity of interdisciplinary collaboration. Achieving an optimal match between technology and an individual's functional, social, and environmental context requires expertise from multiple professional perspectives. This integrated approach enhances the likelihood of successful implementation and sustained device use, and overall improved outcomes."

**Conclusion:** Interdisciplinary AT teams represent a critical strategy for improving care quality and reducing device abandonment among veterans with ALS. Expanding these collaborative models across clinical settings can advance best practices, optimize resource utilization, and ultimately enhance patient satisfaction and functional outcomes.

**Learning Objectives**

- Describe the benefits and challenges of interdisciplinary approaches to assistive technology (AT) service delivery for individuals with ALS.
- Identify key strategies for building and sustaining interdisciplinary AT teams within clinical and institutional settings.

- Apply best practices for integrating multiple professional perspectives to optimize AT evaluation, prescription, and implementation for veterans with ALS.
- Evaluate interdisciplinary team models for assistive technology service delivery and design strategies to adapt these models within participants' own clinical or institutional contexts.

# 2648: ALS Untangled

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**Background & Purpose**: ALS is usually rapidly disabling and life shortening. Given this, many people living with it understandably want to try experimental treatments. There are not enough trials or expanded access programs for everyone. Additionally, diagnosis delay disqualifies many people from trials becasue of the length of time from symptom onset being used as exclusionary criteria. For many patients, alternative and off label treatments (AOTs) are the only experimental option. The internet advertises many of these. Unfortunately, internet information about them is not always complete or accurate. There are many examples of harm coming to people with ALS who experimented with alternative and off label treatments.

**Purpose:** With a desire for people with ALS to feel seen and heard, yet protect them from the harms these AOT's can bring, it was quickly realized that solely advising patients to ignore these unproven options was going to be an insufficient response to being presented with inquiries about AOT's in clinic. Thus, in 2009 ALS Untangled was formed with a goal of systematically assessing AOTs toward helping people living with ALS to make more informed decisions about them.

**Methods**: Ideas for ALSUntangled reviews are submitted and then listed on a website where the community can vote for the ones they are most interested in seeing (www.alsuntangled.org). The basic structure of each review revolves around a "Table of Evidence" (TOE). Using the TOE, each AOT is graded across 5 different categories: mechanistic plausibility, preclinical models, cases, and trials and risks. Grades in each category range from A (best) to F (worst). If no useful disclosable evidence for the AOT in a category, was able to be found, a grade of U will be applied for that category. Final grades are crowd-sourced across an international team of more than 130 clinicians and scientists from across 12 different countries.

**Results**: Currently, 81 AOT's have been reviewed, with the results available on the ALS Untangled website, and in the peer reviewed journal Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration. It became apparent that the without compromising the process, reviews could not possibly keep up with the pace of new AOT's popping up in the ALS landscape. Consequently, what has come to be known as the valuable resource called the "Ten Red Flags," was created to assist patients in making informed decisions about a new therapy they come across that has yet to be reviewed. The more of these "10 red flags" patients find associated with an AOT, the more wary they are advised to be.

**Conclusions**: Patients are going to continue to explore alternative and off label treatments. Therefore, clinicians must proactively prepare to equip their patients, to make the safest, most informed decisions possible.

**Learning Objectives**

- Explain what alternative and off label ALS treatments are, and why they are attractive to people living with ALS
- Identify the specific harms associated with alternative and off label ALS treatments

- Demonstrate how ALSUntangled can help people living with ALS to make more informed decisions about alternative and off label treatments
- Utilize tools such as ALSUntangled and the Ten Red Flags for patients you see that are considering experimenting with alternative and off label treatments

# 2649: Compassionate Care of the Veteran with ALS: the Role of Primary and Specialty Palliative Care

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Numerous studies have revealed lack of critical knowledge and training regarding principles of palliative care for health care providers involved in the care of patients with life-limiting diseases including ALS. This represents a major barrier to providing adequate symptom management and optimizing quality of life for patients in need. However, recent significant advances are being made to utilize principles of palliative care related to pain and symptom management for persons with ALS while combining skillful state-of-the-art medical management with evidence-based symptom control. Sound clinical judgment combined with good communication skills and compassion represents the foundation of palliative care to be utilized in the ALS Interdisciplinary Clinic and will be discussed during this presentation.

**Learning Objectives**

- Discuss the role of genetics and environmental risk factors including the increased risk of ALS for Veterans
- Discuss ALS mimics, diagnosis and *Breaking Bad News*
- Review ALS symptom management
- Discuss the vital role of palliative care in the ALS Interdisciplinary Clinic

# 2650: Harmonizing SCIMS and VHA Registries for Cross-System Insights on SCI Characteristics and Outcomes

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**Background**: The Spinal Cord Injury Model Systems (SCIMS) database (established 1975) and the Veterans Health Administration (VHA) Spinal Cord Injuries and Disorders Registry (SCIDR; established fiscal year 1994) are the two largest spinal cord injury (SCI) data resources in the United States. Each has expanded understanding of SCI in non-Veteran and Veteran populations, yet they remain independent systems with different structures and variable definitions. Harmonizing these datasets offers an opportunity to generate a more comprehensive national profile of individuals with SCI, supporting clinicians, researchers, policymakers, and people with lived experience of SCI.

**Purpose**: To describe SCIMS database and the VHA SCIDR, characterize traumatic SCI (tSCI) and nontraumatic SCI (ntSCI) for program evaluation and health services research, and present ongoing efforts to harmonize variables and definitions across the two datasets to enable integrated analyses.

**Methods**: Database teams jointly reviewed variable inventories, data collection forms, and codebooks to identify overlapping data elements and evaluate alignment in definitions, coding formats, and measurement approaches. Harmonized variables were identified and mapped across systems. Data from>38,000 SCIMS database participants (9% Veterans) and >52,000 VHA SCIDR participants were analyzed. Descriptive comparisons assessed demographics, injury etiology, injury severity, and post discharge outcomes across civilian and Veteran care settings.

**Results**: SCIMS database collects baseline (Form I, >600 variables) and follow-up (Form II, >300 variables) data at post-injury years 1, 5, and every five years thereafter. VHA SCIDR includes variables that align with 12 Form I and 75 Form II SCIMS database variables. In both datasets, ntSCI participants are older than tSCI participants, though the magnitude varies: in SCIMS, ntSCI mean age = 61 years vs tSCI = 44 years; in VHA, ntSCI = 67 years vs tSCI = 64 years. Males comprise the majority in both injury types (VHA: 95%; SCIMS: 79% tSCI, 65% ntSCI). Injury etiologies differ between systems. In ntSCI, spinal degeneration is the most frequent cause in both datasets but is more prevalent in VHA (66%) than SCIMS (36%). Tumors account for 24% of ntSCI in SCIMS vs 9% in VHA. Across systems, ntSCI more often results in paraplegia and incomplete injuries than tSCI. Discharge home is the most common disposition: SCIMS = 89% (tSCI and ntSCI), VHA = 84% (tSCI) and 91% (ntSCI).

**Conclusions:** SCIMS ntSCI profiles are consistent with published literature. In VHA SCIDR, the relatively small age gap between tSCI and ntSCI reflects the older age distribution of Veterans. Harmonizing variables between SCIMS database and VHA SCIDR establishes a foundation for integration with other national and international SCI datasets and linkage to external administrative sources (e.g., census data via geographic identifiers). Joint analysis will enhance generalizability of findings on demographics, injury etiology, severity, and long-term outcomes across civilian and Veteran populations. This collaboration advances standardized data collection, enables cross system research innovation, and supports improvements in SCI care, policy, and scientific knowledge in both healthcare systems.

**Learning Objectives**

- Describe 3 key characteristics of the two largest SCI data resources in the United States
- Identify two differences between the SCIMS database and VHA SCIDR
- Describe at least one difference in tSCI and ntSCI characteristics across civilian and Veteran populations
- Explain the process and methodological considerations for harmonizing variables across large clinical registries to enable integrated analyses

# 2651: Strength in Planning:  Strategies to Achieve Financial Wellness for Veterans with Life-Altering Disabilities

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**Background and Issues**: Individuals with disabilities and their families often face a precarious financial landscape characterized by the "poverty trap." Historically, strict asset limits (often capped at $2,000) for means-tested benefits like SSI and Medicaid have discouraged savings, creating a barrier to financial independence. Furthermore, the complexity of coordinating state-specific programs, federal benefits, and private legal instruments creates a significant clinical and systemic challenge. Families frequently lack access to specialized guidance on how to provide for a loved one’s future without jeopardizing essential healthcare, housing supports or the option to participate in employment.

**Purpose**: The goal of this program is to provide a comprehensive framework for financial wellness tailored to the disability community. The session aims to empower participants with the knowledge to integrate special needs planning into their long-term goals, ensuring financial security, legal protection, and a high quality of life - which may include return to work - for the individual through every life stage.

**Methods**: The program utilizes a multi-disciplinary approach to life care planning, focusing on the following key interventions:

- Tax-Advantaged Savings: Education on ABLE (Achieving a Better Life Experience) Accounts, emphasizing their role in allowing asset accumulation without affecting SSDI and other benefits eligibility.
- Legal Protections: A comparative analysis of Special Needs Trusts (SNTs)—specifically First-Party vs. Third-Party trusts—to protect inheritance and personal injury settlements.
- Integrated Life Care Planning: Utilizing a holistic model that combines financial forecasting with clinical needs assessments.

- Applying Work Incentives: Demonstrating the work incentives under Ticket to Work (SSA) allowing veterans to attempt employment and maintain SSDI and healthcare benefits.

**Results: Lessons Learned**

Participants and practitioners identified several critical takeaways:

1. Early Intervention is Key: Financial wellness is most effective when integrated early on rather than at the point of crisis (e.g., the death of a caregiver).
2. The "And" Not "Or" Strategy: ABLE accounts and SNTs are most effective when used in tandem, as ABLE accounts provide liquidity for daily expenses while SNTs offer long-term stability for larger assets.
3. Communication Gaps: There is a significant need for better coordination between clinical social workers, vocational rehabilitation counselors, legal counsel, and financial advisors to prevent conflicting advice.

**Conclusions**: Financial wellness for the disability community requires a shift from "asset depletion" to "strategic asset management." The recommended approach is the adoption of a plan that treats financial health as a social determinant of health. Professionals should advocate for the expansion of ABLE account eligibility and provide families with a structured roadmap that prioritizes both legal compliance and the individual's autonomy and dignity.

**Learning Objectives**

- Explain the differences between First-Party and Third-Party Special Needs Trusts (SNTs) to determine which legal instrument best protects their personal assets and potential inheritances.
- Describe the eligibility requirements and tax advantages of ABLE Accounts, specifically focusing on how to save up to $100,000 without jeopardizing Supplemental Security Income (SSI) or Medicaid benefits.
- Discuss the "And Not Or" strategy by outlining how to use ABLE Accounts and other financial tools in tandem to balance immediate liquidity for daily expenses with long-term financial stability.
- Identify key intersections between VA disability benefits and civilian financial tools to create an integrated life care plan that maximizes total household resources.
- Describe available work incentives available under the Ticket to Work program for veterans with disabilities to explore employment options.

# 2652: Restoring Purpose on the Water: Maritime-Based Community Programs Advancing Veteran Independence and Inclusion

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VetsBoats' mission and evidence-based, community-integrated sailing programs fit the PVA Summit's "cross cutting topics in independent living, recreation, employment, advocacy and assistive technology" track by promoting functional independence, psychosocial recovery, and community reintegration for at-risk veterans through adaptive maritime experiences and workforce-relevant skill building.

**Background and Issues**: Veterans with complex injuries, including spinal cord injury and dysfunction (SCI/D), MS, and ALS, frequently report isolation, loss of role identity, and reduced participation in community life, work, and recreation following service. Traditional clinic-based care often underutilizes community-based, peer-led recreational and vocational pathways that can reinforce gains in psychosocial health, independence, and self-efficacy. VetsBoats is a 501(c)(3) foundation that delivers free therapeutic sailing and wooden boat restoration for veterans and families through a growing national network.

**Purpose**: This program-based presentation will describe how a standardized, outcomes-driven maritime model—integrating adaptive sailing, craft-based teamwork, and volunteer credentialing—supports independent living, recreation, employment readiness, and advocacy for veterans with mobility, sensory, and psychosocial challenges, and how this model can be replicated in SCI/D, MS, and ALS care systems.

**Methods**: VetsBoats operates a federated national structure (members, chapters, affiliates) that partners with VA SCI centers, VSOs, and community mariners to deliver trauma-informed sailing days, cohort-based crew roles, and hands-on restoration of a 68-foot 1938 cutter serving as a traveling flagship. Standardized onboarding includes background checks, adaptive-sailing safety training, and trauma-informed instruction for all volunteers, with annual safety reaffirmations for captains and boat owners. Participant well-being is assessed using validated tools such as the Well-Being Index, and programs emphasize role-based participation (crew positions, peer mentors, and volunteer leaders) that can map to vocational skills and leadership competencies relevant to community employment and advocacy. Data from 2025 programming were aggregated across sites in California, Ohio, and Cape Cod using common templates for attendance, safety, well-being scores, and re-engagement rates.

**Results / Lessons Learned:** In 2025, 95% of participants reported high satisfaction and 96% reported improved morale and stronger peer connection after sailing and restoration activities, with a 75% retention and re-engagement rate into additional sails, volunteer roles, or peer-support functions within six months. Veterans described measurable increases in sense of purpose and belonging, coinciding with a low cost-per-participant (under 100 dollars) that supports scalability in resource-constrained systems of care. Chapters in Ohio and Cape Cod demonstrated that the standardized model could be adapted to inland and coastal contexts while maintaining safety, inclusion of disabled veterans in active crew roles, and integration with local VA and community partners.

**Conclusions / Recommendations**: Maritime-based community programs such as VetsBoats can serve as low-cost, high-impact extensions of clinical care for veterans with SCI/D, MS, and ALS by combining adaptive recreation, peer-supported independent living skills, and vocationally relevant teamwork in a single, standardized framework. Health systems and rehabilitation teams are encouraged to: (1) formalize partnerships with community maritime programs; (2) adopt common safety and outcome standards; and (3) integrate sailing and restoration roles into individualized care plans as structured opportunities for recreation, advocacy, and employment-oriented skill development.

**Learning Objectives**

- Describe a standardized maritime program model that supports independent living, recreational engagement, and psychosocial well-being for veterans with SCI/D, MS, and ALS.
- Explain how role-based sailing and restoration activities can reinforce vocational skills, leadership, and community participation for veterans transitioning toward employment or volunteer advocacy
- Discuss methods for integrating validated well-being measures and safety standards into community-based recreational programming to align with interdisciplinary rehabilitation goals.
- Identify at least two strategies to partner with community maritime or recreation organizations to extend clinic-based rehabilitation into sustainable, peer-led independent living opportunities.

# 2653: Beyond the Basics: The Role of Exercise in Multiple Sclerosis Management

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I will discuss research regarding transmagnetic stimulation for MS progression

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**Background and Issues:** Numerous clinical trials demonstrate that exercise can improve physical fitness, fatigue, depression, walking mobility, and quality of life in people with multiple sclerosis (MS). There is emerging evidence that exercise may also reduce MS relapse frequency, disease progression, and improve MRI outcomes. Conversely, a sedentary lifestyle can lead to deconditioning and increase the risk of vascular diseases which can worsen MS disability. Unfortunately, physical activity levels in pwMS are negatively impacted by many factors including fatigue, heat sensitivity, mobility impairments, and low self-confidence in their physical capabilities; these factors disproportionately affect those with advanced disease, making exercise more difficult to perform. Therefore, physical activity and exercise are essential components of MS disease management across the disability spectrum that must be addressed by the multidisciplinary care team.

**Purpose:** To educate patients and providers about current exercise and physical activity recommendations for people with MS and the benefits of exercise on symptomatic and disease management. We will also discuss exercise approaches that may be especially helpful for patients who have more advanced disability and may not tolerate more conventional approaches.

**Methods:** After a brief overview of MS and exercise terminology, we will review the current exercise and physical activity recommendations for people with MS, as determined by their functional abilities. We will also discuss possible mechanisms underlying exercise benefits identified in pre-clinical MS models, including: peripheral immune system regulation, local release of neurotrophic factors, and potential promotion of remyelination. Next, we will review the evidence supporting exercise as a symptomatic therapy for fatigue, mood disorders, gait, and cognitive dysfunction and the emerging evidence supporting the role of exercise as a disease modifying therapy in people with MS. We will review emerging research of strategies, such as blood flow restriction, which could improve the accessibility and effectiveness of exercise interventions in MS populations. Finally, we will hear the lived experience of how a person with MS has incorporated exercise into their disease management.

**Results:** Disability progression in people with MS and involves complex and inter-connected mechanisms. Clinically effective therapies based on our understanding of the pathophysiological mechanisms underlying MS progression will likely require multi-modal approaches incorporating pharmacologic interventions and lifestyle interventions like exercise.

**Conclusions:** Attendees will understand our current recommendations for exercise and physical activity for people with MS of various ability levels. After the session, they will be able to counsel Veterans on the benefits of exercise on MS symptom and disease management to hopefully motivate sustained engagement in regular exercise throughout the lifetime. Patients with MS will leave the session better informed about the multi-faceted benefits of exercise for disease management and can use this information to guide discussions with their care team about incorporating appropriate exercise programs.

**Learning Objectives**

- Review the current exercise and physical activity recommendations for people with multiple sclerosis (MS) with various ability levels.
- Discuss how exercise can help with the management of MS symptoms.
- Explore the evidence supporting exercise as a MS disease modifying therapy.
- Discuss emerging exercise research in MS.

# 2654: The Brain-Health Clinic to Prevent Cardiovascular Comorbidities Affecting the Outcome of Veterans Multiple Sclerosis

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**Purpose:** Multiple sclerosis (MS) is an autoimmune disease of the central nervous system. Sustained by acute and chronic inflammation and neurodegenerative processes, MS can be further complicated by cardiovascular comorbidities and related risk factors. Evidence suggests these factors may lower the threshold to neurodegeneration, though the mechanisms remain unknown. Building on this knowledge, the Nashville VA, in collaboration with neuropsychology experts from the Baltimore VA, established the *brain-health* clinic. The scope of the clinic is to prioritize and standardize regular assessment and proactive management of cardiovascular risk factors in Veterans with MS, with the goal of preventing further neurodegeneration and improving quality of life.

**Methods**: In the proposed 90-minute symposium, we will review the literature on the associations between cardiovascular comorbidities and related risk factors and worse clinical and radiological outcomes in patients with MS. We will then present the *brain-health* clinic initiative established at the Nashville VA, which can serve as a basis for a nationwide preventive program. Last, we will hold an interactive discussion on informative cases.

**Results:** The *brain-health* is a specially designed clinic for Veterans with MS. The scope of this clinic is to identify and treat cardiovascular comorbidities and related risk factors, which, if left untreated, can lead to strokes or transient ischemic attacks and affect the outcome of MS in the long term. Our goal is to recognize and treat these conditions early in all Veterans with MS to decrease the negative impact on the functional and cognitive statuses later. This assessment is independent of the clinical assessment performed by the treating neurologist. In the *brain-health* clinical, Veterans with MS receive quantification of: (1) blood levels of hemoglobin A1C and lipids; (2) the Framingham Risk Score; (3) cognitive function using the with the Brief International Assessment for MS battery; (4) depression using the Beck Depression Inventory; and (5) carotids' plaques using a carotid ultrasound, Upon completing the screening tools, appropriate treatment is initiated and communications established with the primary care provider (PCP), and patients are followed yearly to monitor clinical and cognitive functions.

**Conclusions:** Cardiovascular comorbidities or risk factors play a significant role in MS disease progression. The *brain-health* clinic is a Nashville initiative to educate Veterans with MS and PCP on this yet underappreciated potential element of progression and to establish a national network of clinical collaboration and support.

**Learning Objectives**

- Recognize the role of cardiovascular risk factors and diseases in affecting MS progression
- Recognize the role of the brain health clinic to help preventing MS progression
- Recognize the importance of counselling Veterans with MS and PCP on the management of these conditions;
- Recognize the potential for the Nashville brain health clinic to become a nationwide resource for all our Veterans with MS and their PCP

**Indicate which of the below describe the abstract content:**

- Abstract provides new and novel information
- Abstract has not been presented before
- Abstract updates information that was presented in the past

# 2655: National Tele-ALS Clinic: Leveraging Telehealth to provide ALS Care to rural Veterans

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**Background:** VA National TeleNeurology Program (NTNP) was established in 2019 with a mission of breaking down the walls of traditional neurological care to reduce disparities and give rural Veterans access to high quality, patient centered, innovative outpatient neurological care. NTNP has an interdisciplinary team that is funded by the Office of Rual Health and has served 19 medical centers across the country in 25 states. In 2025, NTNP launched a pilot Tele-ALS Clinic to serve Veterans in rural communities with little or no access to quality interdisciplinary ALS Care. This ALS interdisciplinary clinical team is composed of an ALS Neurologist, Speech-language Pathologist, ALS Coordinator/Social Worker, Nurse, Respiratory Therapist, Pharmacist, and Telehealth Clinical Technician and designed to augment what resources may be found at the local VA. The inaugural site was the Tomah VA Medical Center in Tomah, Wisconsin. Through this site implementation and plans for expansion to other sites, we developed a model coordinating remote services and expanded access to effectively support the complex needs of Veterans with ALS.

**Purpose:** The purpose of this presentation is to describe the implementation of a multidisciplinary Tele-ALS Clinic, highlighting the roles and collaborative processes of each team member, and present a detailed case study of a Veteran seen by the program. The presentation will demonstrate how telehealth can supports Veterans in rural areas and keep ALS care in the VA system.

**Description:** This presentation will be delivered by members of the NTNP ALS Interdisciplinary Team. The session will begin with an overview of the program's development, structure, and goals, including strategies for identifying community-managed Veterans and establishing seamless referral pathways into the VA system.

A case study of a Veteran evaluated at the Tomah, WI site will be presented, illustrating the team's collaborative assessment across neurological, respiratory, communication, psychosocial, and care-coordination domains. Emphasis will be placed on how early interdisciplinary engagement allowed the team to support diagnostic clarification, initiate respiratory testing and secretion-management planning, address communication needs, and connect the Veteran and family with essential VA resources.

Practical examples of teamwork, telehealth workflow design, interdisciplinary documentation, and coordination with local VA facilities will be highlighted. The audience will be encouraged to consider how they could adapt their practices and resources to meet the needs of underserved regions and improve access to ALS expertise across the country.

**Conclusions:** VA National TeleNeurology's Tele-ALS Clinic demonstrates how telehealth-based interdisciplinary collaboration can expand ALS expertise across the VA system and provide Veterans with high-quality, comprehensive care regardless of geographic location.

**Learning Objectives**

- Discuss the creation of the NTNP Tele-ALS Clinic as well as the role and responsibilities of each interdisciplinary team member.
- Describe the benefits of telehealth-based interdisciplinary care for rural Veterans with ALS.

- Explore strategies utilized by NTNP Tele-ALS Clinic for collaboration with local VA disciplines to ensure all aspects of ALS care are addressed.
- Analyze a case study of a Veteran evaluated through the program and identify key domains of intervention.

# 2656: Clinician Perspectives: Interdisciplinary Approaches for Effective Wheelchair Provision

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**Background and Issues:** Assistive technology (AT), including wheelchairs, plays a vital role in supporting independence and reducing dependence on caregivers or institutional care. Choosing the right wheelchair and related AT is both an art and a science. In 2011, the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) published the RESNA Wheelchair Service Provision Guide (WSPG). Fifteen years later, this model continues to inform clinical practice.

**Purpose:** The purpose of this presentation is to provide interdisciplinary perspectives on the wheelchair and AT provision process. An Occupational Therapist (OT) and a Physical Therapist (PT), both practicing in an outpatient wheelchair seating clinic, will discuss how each discipline approaches implementation of the WSPG model and how collaborative reasoning supports optimal mobility outcomes.

**Methods:** Through real-world examples, we will explore how physical and occupational therapists approach the wheelchair provision process. The speakers will discuss similarities and differences between the two disciplines. We will highlight the importance of advanced training, interdisciplinary collaboration, and client-centered care to ensure the best outcomes. We will address specific considerations for clients with progressive and non-progressive diagnoses. While the primary focus is wheelchair provision, the principles discussed are broadly applicable across the AT landscape. Participants will gain insight into the wheelchair provision process, the roles of those involved in the process, how to identify the best AT to match a client's goals, and how to navigate potential barriers.

**Results/Lessons Learned:** Attendees will develop a deeper understanding of clinician roles, effective strategies for aligning equipment choices with client goals, and practical approaches for navigating common barriers in the wheelchair provision process. Participants will leave with practical tools they can implement immediately in their own practice, including recommendations for improved interdisciplinary communication strategies, enhanced clinical reasoning frameworks, and a more structured approach to aligning equipment decisions with individualized client goals. These lessons extend beyond wheelchair provision, offering broadly applicable strategies for successful AT evaluation and delivery across diverse practice settings.

**Conclusions:** The wheelchair and AT provision process is most successful when grounded in interdisciplinary collaboration and advanced clinical reasoning within a shared framework. The examples and strategies shared highlight not only the value of discipline-specific expertise but also the power of a coordinated, client-centered approach that anticipates challenges and adapts to a wide range of diagnoses and functional needs. Implementing strategies that improve communication, encourage informed decision-making, and ensure that wheelchair and AT solutions support client goals will ultimately lead to greater independence, participation, and quality of life.

**Learning Objectives**

- List the steps of the wheelchair provision process.
- Describe the roles of OTs and PTs in the wheelchair provision process.
- Identify key similarities and differences in clinical reasoning approaches used by OTs and PTs when evaluating clients and selecting appropriate AT solutions.
- Predict barriers commonly encountered during the wheelchair provision process.

# 2657: The importance of support groups for persons with Amyotrophic Lateral Sclerosis and Spinal Cord Injury

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**Background and Issues**: The support group concept is rooted in the idea that people facing similar challenges can support each other by discussing them. Support groups have been conducted in a variety of ways: sometimes led by a psychologist, other times by a therapist along with a peer mentor, and other times there are no defined leaders. Research has shown that support group participants gain enhanced physical and mental health through gaining knowledge about their conditions as well as by developing improved coping skills (Schreurs et al. 2003), reduced depression (Lieberman et al. 2005), and improved quality of life (Gottlieb et al. 2007). Purpose: This presentation is to provide information on the impact of support groups, for people with SCI, ALS and their caregivers. Methods: A literature review was conducted. Two sets of key terms were used: support group and SCI, and support group and ALS. Articles were limited to those focusing on support groups in these two populations. The search was limited to articles published after 2000. Results: Given the progressive and debilitating nature of ALS, paired with the lack of a cure, implementation of a psychosocial approach with a support group can be helpful for people with ALS and their families, who tend to be vulnerable to psychological distress. Studies have found that depression is elevated in the ALS population (Bungener et al, 2005). Caregiver distress has also been shown to increase as patients' diseases progresses (Gauthier et al., 2006). It has been noted that both people with ALS and their caregivers benefit by attending support groups which include education and support. Unlike with ALS, most SCI support groups do not include caregivers. One reason for this is that many people with SCI receive little caregiving, and for those who do receive caregiving, this care is often much less intensive than that received by those with ALS. Also, some of the issues that people with SCI want to discuss in a support group, e.g., drug use, sexuality, and return to work, are matters they are not comfortable discussing when family members are present. Studies have shown some spouses of people with SCI may experience more stress and anxiety than their partners (Chan 2000), and as a result, they may need assistance in coping. CONCLUSION: People with SCI, as well as those with ALS and their caregivers, may benefit from support groups. Those for ALS are often jointly held with family caregivers being active participants. Support groups for people with SCI usually do not include caregivers; however, their caregivers still need support and education.

**Learning Objectives**

- To identify the components of a successful support groups for ALS
- To identify the reasons for including caregivers as part of ALS support groups.
- To identify the components of a successful support group for SCI
- To explore the relationships between distress in people with SCI and their caregivers

# 2658: Closing the Post-Discharge Follow-Up Gap in Neurological Conditions

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**Background:** Loss to follow-up after discharge from inpatient neurological rehabilitation remains a persistent and under-recognized systems problem across complex neurological conditions, including spinal cord injury, multiple sclerosis, and amyotrophic lateral sclerosis. Current estimates suggest that nearly one in four patients are lost to follow-up within the first year after discharge, rising to one in three within five years and approaching 40% by ten years post-injury. Barriers contributing to this phenomenon include transportation limitations, geographic distance from specialists, financial burden, fragmented transitions between levels of care, insufficient communication across systems, and psychosocial factors. The downstream consequences include increased secondary complications, delayed access to adaptive equipment, limitations in independence and escalating healthcare costs, all of which erode patient trust in the healthcare system and compromise long-term outcomes.

**Purpose:** The purpose of this presentation is to recognize the root causes of post-discharge loss to follow-up in neurological populations and to propose a practical, technology-enabled framework for improving continuity of care across the entire rehabilitation continuum. The goal is to demonstrate how remote and digital strategies can enhance existing clinical workflows to reduce care fragmentation, improve patient engagement, and restore longitudinal connection to aid with a lifelong condition without increasing demands on the current healthcare system.

**Methods:** This project is informed by qualitative clinical observation and practice-based experience derived from a digital neurological rehabilitation and coaching practice serving individuals across the post-discharge continuum. The presentation maps common failure points in transitions of care from inpatient rehabilitation to outpatient, home health, community reintegration, and life-long management. Specific remote strategies are organized by discipline and care setting, including inpatient/outpatient rehab providers, physicians, home health, outpatient therapy, social work, durable medical equipment providers, and community-based programs. Proposed interventions include automated follow-up workflows, digital contact systems, recorded patient education and resources, virtual and asynchronous clinical encounters, technology-supported equipment ordering, and community-based digital platforms. These strategies are evaluated using feasibility, scalability, time efficiency, and alignment with existing reimbursement and regulatory frameworks as guiding criteria.

**Results:** Loss to follow-up is driven by a cumulative friction across access, communication, and transitions. Small, low-burden technological interventions can produce outsized improvements in continuity without increasing clinician workload. Discipline-specific strategies are more effective than one-size-fits-all solutions, as each role occupies a unique position in the care trajectory. Finally, patient trust and engagement improve when systems provide proactive, longitudinal contact rather than episodic, reactive care.

**Conclusions:** Closing the post-discharge care gap in neurological conditions requires a shift from episodic rehabilitation toward technology-enabled continuity of care. Rather than requiring large-scale system redesign, targeted digital strategies can be embedded within existing workflows. This presentation recommends that healthcare systems adopt automated follow-up processes, expand virtual and asynchronous care models, standardize digital patient education, and strengthen cross-setting communication as core components of neurological rehabilitation. These approaches offer a scalable, interdisciplinary pathway to restore continuity, reduce care fragmentation, and improve lifelong outcomes for individuals with complex neurological conditions.

**Learning Objectives**

- Describe key system-level factors that contribute to post-discharge loss to follow-up in complex neurological populations.
- Analyze common transition failure points across the neurological rehabilitation continuum from inpatient to lifelong management.
- Identify discipline-specific technology-enabled strategies to improve continuity of care and reduce care fragmentation.
- Apply practical remote and digital interventions to enhance post-discharge follow-up within their own clinical setting.

# 2659: Lessons from failed therapeutic trials in multiple sclerosis

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I will discuss failed trials of various drugs used to treat multiple sclerosis including: Cyclophosphamide, rituximab, laquinimod, tolebrutinib, opicinumab

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**Background and Issues:** The recent issuance of a Complete Response Letter (CRL) by the Food and Drug Administration (FDA) rejecting tolebrutinib's submission as a first in class treatment for non-relapsing secondary progressive (nrSP) multiple sclerosis (MS) was met with disappointment among patients and providers. However, the history of pharmaceutical development for MS provides numerous examples in which trial failures led to insights in pharmaceutical mechanism, refinements in outcome measures, and innovations in trial design that enabled the success of future trials and approval of therapeutic agents.

**Purpose:** This program will educate healthcare providers and researchers on the evolution of clinical trial design in MS, by focusing on changes in trial design implemented after unsuccessful phase 2 and 3 studies of pharmaceuticals for MS.

**Methods:** This presentation will review the parallel development of MS pharmaceuticals, outcome measures of disease activity, and the design of clinical trials over three overlapping eras. Speakers will discuss clinical trials before the development of interferon beta-1b, during the current era of rapid expansion of MS therapeutics, and possible future changes to the conduct of clinical trials as more challenging forms of MS are targeted for treatment.

**Results:** The first third of the seminar will focus on clinical trials prior to interferon beta-1b, the first FDA-approved disease modifying therapy (DMT) for MS. Clinical trials conducted prior to the DMT era were hampered by limited incorporation of advanced imaging (e.g., MRI), inconsistent definitions of MS subtype and disease activity, and inadequate outcome measures for demonstrating proof of efficacy. The first part of the presentation will review how MS

clinical trials improved because of these early failures to set the stage for the interferon beta-1b trial and others that followed.

The second presentation in the seminar will focus on the development, investigation, and approval of mechanistically novel and higher efficacy DMTs during a time in which patients enrolling in MS trials became younger, less disabled, and exhibited lower levels of disease activity. This section will also compare disability vs. relapse based outcome measures, active comparator arms, and exploration of composite outcomes such as No Evidence of Disease Activity (NEDA).

The final third of the seminar will focus on the development of Bruton's Tyrosine Kinase (BTK) inhibitors, focusing specifically on the case of tolebrutinib. In addition to reviewing the reasons for the FDA's rejection of tolebrutinib for nrSPMS, this section will also discuss how future trials targeting non-relapsing types of MS may benefit from the failures of these and similar pharmaceuticals.

**Conclusions:** Therapeutic agents for MS are often grouped based on whether or not they "work." However, in addition to biologic mechanism of action, the design and conduct of clinical trials play a crucial, if underappreciated, role in the development and approval of new therapies. The trials discussed in this seminar illustrate the ongoing evolution of clinical trial design alongside the development of novel agents for treating MS.

**Learning Objectives**

- Review the history of failed trials in multiple sclerosis (MS) and the varied reasons for failure
- Discuss how lessons learned from failed clinical trials in MS informed future trial designs
- Provide examples from MS in which changes in clinical trial design led to successful trial results
- Discuss the specific example of tolebrutinib, and how rejection by the FDA may inform future studies into progressive, non-relapsing MS

# 2660: Navigating Interdisciplinary Care: A Case Study on Formation of MS and ALS Interdisciplinary Teams

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**Background:** Veterans Health Administration (VHA) Directives 1101.07 and 1101.06 dictate multidisciplinary specialty services for Amyotrophic Lateral Sclerosis (ALS) and Multiple Sclerosis (MS). Multidisciplinary team approach is shown to be the optimal model for care delivery for patients with complex needs, such as in palliative care (Fernando 2019). In a multidisciplinary team, each clinician functions independently. In a interdisciplinary team model, clinicians work together to create a comprehensive care plan (Fernando 2019). Prior to 2022 there was no interdisciplinary team (IDT) in neurology at Veterans Affairs Northern California Health Care System (VANCHCS).

**Purpose**: A case report of interdisciplinary teams as a model for subspecialty neurology care

**Learning Objectives:**

- Identify differences between interdisciplinary and multidisciplinary care teams.
- Create and implement an interdisciplinary team for ALS
    - -identifying stakeholders, members, patient population
    - -getting leadership and member support
    - -defining member roles
    - -continuous education of members.
- Adapt and optimize the interdisciplinary team model to other neurologic conditions such as MS.
- Identify how patients and providers benefit from interdisciplinary care.

**Methods**: A case report of IDT at VA NCHCS ALS and MS clinics.

**Results/Lessons Learned**: The ALS and MS IDT clinicians faced barriers to start and maintain the clinics in neurology. The greatest barriers were getting leadership support and access to resources (such as clinician and room availability).

Leadership support was accomplished by raising awareness through networking and communication. Veterans were invited to speak with VANCHCS leadership about the positive impact of IDT to their quality of life and healthcare.

Clinicians adapted their practice to different subspecialty needs, disease specific needs, patient needs, and available resources.

Our interdisciplinary MS and ALS teams have faced unique and mutual challenges, resulting in key lessons that will be shared.

**Conclusions**: Complex diseases require interdisciplinary care models to optimize patient care and quality of life. Patients and clinicians benefit from this care model. Future studies are needed to confirm/support/justify the allocation of resources to ensure sustainability of this care model and raise awareness.

References:

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**Learning Objectives**

- Identify differences between interdisciplinary and multidisciplinary care teams.
- Create and implement an interdisciplinary team for ALS and MS.

- Adapt and optimize the interdisciplinary team model to other neurologic conditions.
- Identify how patients and providers benefit from interdisciplinary care.

# 2661: Strengthening, Spreading, and Sustaining Age-Friendly SCI care

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**Background:** There is a need to adapt the healthcare system to consistently provide effective care tailored to meet the needs of adults aging with spinal cord injury and disorders (SCI/D). Applying the Institute for Healthcare Improvement's 4Ms (What Matters, Mobility, Medication, and Mentation) framework for Age-Friendly Health Systems can facilitate implementation of Age-Friendly care in SCI/D practice.

**Purpose:** This cross-cutting session will characterize real-world implementation experiences with the 4Ms in SCI/D practice across clinical professions and different settings. Address gaps in Age-Friendly SCI/D care and identify unique considerations in assessing and acting on the 4Ms in care of people with SCI/D. Apply best practices and lessons learned, and consider implementation outcomes to demonstrate effectiveness as needed for advancing Age-Friendly health systems for SCI/D.

**Methods:** In our SCI/D hub and spokes system, we analyzed experiences with implementing the 4M framework by multiprofessional teams across different settings of SCI care. We examined process and outcome measures for each M and system-level effects across the 4Ms to capture Age-Friendly care implementation, and identified lessons learned and best practices.

**Results:** Sustained implementation of the 4Ms required multilevel leadership and engagement. Notable facilitators were ongoing communication to convey the 4Ms as a priority, multidisciplinary engagement, and strategies to support implementation activities such as hands-on education and support, peer coaching, electronic health record templates, and dashboards to track and analyze progress. It was important to stress that the 4Ms are designed to be a package, with associated benefits realized by the activities in one M supporting the others. For example, reducing high-risk medication considers medication interference with what matters, mobility, or mentation. Barriers that needed to be addressed included fragmented and siloed implementation efforts that impeded synergies and scaling, varied levels of provider engagement, difficulty implementing What Matters in a meaningful and consistent manner, and the need to tailor implementation strategies at the specific unit or setting level.

**Conclusions:** While the 4Ms offer a compelling theoretical model for designing Age-Friendly SCI/D Health Systems, applying tangible insights from real life implementation experiences, adapting implementation to address unique SCI/D-related considerations, proactively addressing identified barriers and facilitators, and demonstrating effectiveness through meaningful measures of success are critical to strenghtening, sustaining, and spreading Age-Friendly SCI/D care.

**Learning Objectives**

- Address gaps and need for Age-Friendly multi-professional SCI care
- Apply tangible insights from real-world implementation experiences with the 4Ms framework (What Matters, Mobility, Medication, and Mentation) for Age-Friendly care across different SCI care settings
- Identify unique considerations in assessing and acting on the 4Ms in care of people with SCI
- Consider implementation outcomes to demonstrate effectiveness and advance Age-Friendly health systems for SCI

# Poster Abstracts

# P2601: Can a home-based sleep test be used to diagnose sleep apnea in individuals with SCI?

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**Background:** Sleep-related breathing disorders (SRBDs, or sleep apnea) are common, but under-recognized, under-treated and under-studied medical conditions after spinal cord injury (SCI).

**Purpose:** This prospective study was performed to assess the feasibility, criterion validity and the economic impact of an unattended home-based screening sleep test (HBSST) in the detection of SRBDs among individuals living with SCI.

**Methods:** This prospective multi-method study included: (a) a feasibility analysis using quantitative data from an unattended HBSST and qualitative data obtained from a face-to-face interview; (b) a validity analysis comparing the HBSST with the results of the in-laboratory polysomnography; and (c) an economic analysis of the HBSST that was compared with polysomnography using cost-minimization analysis on the perspective of a single publicly-funded insurer. Qualitative data were obtained during a semi-structure interview with every participant who shared their experience when undergoing the HBSST. We recruited adult participants with subacute/chronic (>1 month after injury) SCI who have never been screened for SRBDs. An ApneaLink™ device (ResMed Inc.) was used for the HBSST.

**Results:** We included 28 participants (11 females and 17 males; mean age of 54.9 years) with complete (n=7) or incomplete SCI at cervical (n=18) or lumbosacral levels. Overall, nine individuals were diagnosed with a moderate-to-severe SRBD. All participants successfully completed the HBSST and the majority (78.5%) set up the device without assistance. A high apnea-hypopnea index (AHI) from the HBSST was significantly correlated with high AHI from the polysomnography ($r=0.717$; $p=0.0248$). The use of HBSST was found to be a cost-saving approach when compared with polysomnography.

**Conclusions:** Our results demonstrate the feasibility and validity of a HBSST in the detection of moderate-to-severe SRBDs. Additionally, the HBSST is more cost-effective strategy for detection of SRBDs in the SCI population than the polysomnography.

**Funding support:** This research project was funded by the Praxis Spinal Cord Institute.

**Learning Objectives**

- Describe challenges that individuals living with spinal cord injury (SCI) to access in-laboratory polysomnography.
- Describe how feasible is a home-based screening sleep test (HBSST) in the diagnosis of sleep apnea among individuals living with SCI.
- Appraise if a HBSST could be used in the diagnosis of sleep apnea in people living with SCI instead of the in-laboratory polysomnography.
- Define the economic benefits of using a HBSST in the diagnosis of sleep apnea in individuals living with SCI.

# P2602: Clinical Decision-Making in Amyotrophic Lateral Sclerosis Rehabilitation: A Physical Therapy Practice Pattern Survey

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**Background:** There is currently no standardized framework to guide physical therapy care planning for individuals with amyotrophic lateral sclerosis (ALS). Physical therapy plays a crucial role in preserving function and quality of life for these individuals. Interest is growing in integrating emerging technologies to complement traditional approaches. Despite this, the extent to which these technologies are currently adopted and the existing trends in clinical practices remain unclear.

**Purpose:** This study aimed to characterize current clinical practices reported by physical therapists (PTs) treating individuals with ALS and to assess the adoption of technologies such as portable exoskeletons and virtual reality systems. By identifying trends and gaps, the study seeks to inform future guidelines and promote stage-specific, evidence-based rehabilitation strategies.

**Methods:** A cross-sectional study design was utilized, employing a 19-item electronic survey distributed to licensed physical therapists with experience treating individuals with ALS. The survey was disseminated through publicly accessible channels and organizational networks such as the Veterans Health Administration (VHA). Survey domains included participant demographics, ALS-specific clinical experience, utilization of therapeutic interventions and technologies, and perceived treatment outcomes. Descriptive statistics were used to summarize the data.

**Results:** Fifty-three PTs with experience treating individuals with ALS completed the survey. Respondents reported a range of clinical experience (1–5 years: 14.3%; 6–10 years: 23.2%; 11–20 years: 30.4%; >20 years: 32.1%) and various practice settings (VHA: 48.2%; non-profit: 39.3%; for-profit: 12.5%). Most practiced in hospital-based outpatient clinics (73.2%), and 53.6% reported affiliation with an ALS interdisciplinary clinic. Many held advanced certifications (ABPTS NCS: 85.7%; ABPTS GCS: 5.7%; ABPTS OCS: 2.9%; RESNA ATP: 14.3%). Frequency of ALS patient care varied (≥1 per week: 35.7%; ≥1 per month: 21.4%; every 3–12 months: remaining respondents).

Episode length ranged from consultation/evaluation-only (23.2%) to 2–5 (26.8%), 6–10 (17.9%), 11–15 (12.5%), or 16–20 (10.7%) visits. Skilled maintenance therapy was used inconsistently—episodic use: never (12.7%), <25% of cases (30.9%); continuous use: never (27.8%), <25% (27.8%). Remote therapeutic monitoring was used by 35.7%. Respondents noted low integration of sensory organization and vestibular interventions and limited use of technologies across both ambulatory and non-ambulatory populations. Common discharge factors included medical emergencies (50%), patient fatigue/burnout (35.2%), and planned medical events (25.9%).

**Conclusions:** Despite access to various technologies and interventions, utilization was limited across settings. Sensory and vestibular therapies were used less frequently, and care duration was often brief—regardless of ambulatory status. These findings suggest opportunities for improving the consistency and scope of ALS rehabilitation. Further work is necessary to explore the effectiveness of different physical therapy interventions, appropriate novel technologies, and delivery models—including remote monitoring and skilled maintenance therapy—to enhance outcomes for individuals living with ALS.

**Learning Objectives**

- Describe the current clinical practices and therapeutic interventions reported by PTs that treat pALS
- Assess the adoption of emerging tehcnologies in the treatment of ALS
- Identify trends and gaps in rehabilitation practices of PTs that treat pALS
- Gain insight into potential areas of improvement in ALS rehabilitation practices

# P2604: Trends in Spinal Cord Injury Long-Term Survival from 1980 to 2025

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**Background:** A series of studies based on the National SCI Model Systems Collaborative Survival Study Database have shown a lack of improvement in long-term survival following SCI since the 1980's given comparable personal and injury characteristics. This has occurred despite gains in life expectancy for the general population.

**Purpose:** This study updates findings concerning trends in SCI life expectancy that were last published in 2015 and based on follow-up through 2012. Our null hypothesis was that there would continue to be no improvement in long-term survival since 1980.

**Methods:** A cohort study was conducted of persons with traumatic SCI (n=46,971) treated at a model SCI care system or Shriners Hospital SCI unit and enrolled in the SCI Collaborative Survival Study Database who survived the first year post-injury with follow-up from January 1, 1980, through December 31, 2025. Survival status was ascertained by routine in-person, phone, or mail contact conducted at each hospital coupled with searches of the National Death Index, online databases such as TransUnion, Equifax and Ancestry as well as online obituaries. A person-year dataset was created in which each person followed for each year was treated as a separate observation. For each year, a binary outcome measure was created indicating whether the person survived or died during the year. Logistic regression analysis was used to assess the effect of current age, sex, race/ethnicity, injury level, AIS grade, ventilator dependency, education, type of health insurance, number of years post-injury, and calendar year on the likelihood of dying each year.

**Results:** There were 19,348 deaths during 875,362 years of follow-up. All other covariates equal, the odds of death each year increased 6.4% for each increased year of age, 26% for males, 115% for C1-4 injuries compared to C8 or lower injuries, 78% for AIS A injuries compared to AIS D injuries, 98% for ventilator dependency, 34% for those who were not high school graduates compared to college graduates, and 29% for those without private health insurance or workers compensation ($p<.0001$ for all comparisons). The odds of dying each successive year since 1980 decreased only 0.15% per year (95% CI = 0.3% - 0.0%) which was not quite statistically significant ($p=.06$).

**Conclusions:** These updated results are consistent with prior studies showing no meaningful improvement in long-term survival following SCI since 1980 given comparable personal and injury characteristics. However, if current treatment practices result in an increased likelihood of improved neurological status or successful ventilator weaning, then life expectancy for those individuals would be significantly higher today than in the past given the strong relationship between injury severity and annual mortality. Future improvements in life expectancy will require progress in the prevention and treatment of respiratory diseases, septicemia and other leading causes of death after SCI.

**Learning Objectives**

- Describe the latest trend in long-term survival following SCI given comparable personal and injury characteristics
- Quantify risk factors related to long-term survival following SCI

- Discuss reasons for lack of progress in long-term survival following SCI given comparable personal and injury characteristics
- Identify ways life expectancy following SCI could be increased

# P2605: Bridging the Gap: Operationalizing the PVA Bone Health Guidelines through Health Literacy and Community Engagement

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Participant discloses the following relationships:

- Restorative Therapies, Inc: Douglas Eck receives compensation as a contract installer/educator for Restorative Therapies, Inc. He has no ownership interest and performs no sales role for the company.

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**Background and Issues:** Fragility fractures impact nearly 50% of the chronic spinal cord injury (SCI) population, leading to significant morbidity. While the 2022 PVA Clinical Practice Guideline on Bone Health and Osteoporosis provides robust evidence-based recommendations, a significant gap remains between these published standards and daily clinical application. Furthermore, complex medical terminology regarding diagnostic scans and pharmacologic management often creates a barrier to patient understanding, limiting the consumer's ability to self-advocate for necessary screening.

**Purpose:** The primary objective of this project was to translate the complex 2022 PVA Bone Health recommendations into an accessible, low-barrier educational curriculum. The goal was to increase patient health literacy and standardize the delivery of bone health education within the outpatient rehabilitation setting.

**Methods:** Utilizing the Knowledge-to-Action framework, our team developed a two-pronged educational intervention. First, the CPG recommendations were distilled into five visual, plain-language infographics (6th–8th grade reading level) covering screening, nutrition, and risk factors. Second, to address longitudinal engagement, a 10-week virtual micro-learning series was deployed for community-dwelling individuals. These sessions provided interactive opportunities to discuss CPG topics. Resources were permanently embedded into the clinic environment via QR codes to ensure sustainable access for future patients.

**Results:** Integration of the materials revealed that static education is necessary but insufficient; the interactive virtual component was critical for addressing patient-specific anxieties regarding strategies to optimize bone health after SCI. Preliminary feedback indicates that "translating" clinical guidelines into lay-language empowers patients to initiate conversations with their primary care providers regarding bone density screening. A key lesson learned was that bite-sized, accessible content significantly reduces the intimidation factor associated with secondary complication management.

**Conclusions:** Systematic translation of the PVA Bone Health CPG is feasible and effective in an outpatient setting. By shifting focus from provider-only education to patient-centered health literacy, rehabilitation professionals can empower individuals with SCI to become active partners in optimizing bone health. This scalable model suggests that simplified, accessible education is a vital component of long-term bone health surveillance.

**Learning Objectives**

- Identify key evidence-based recommendations for screening and prevention from the 2022 PVA Bone Health Clinical Practice Guideline.
- Describe strategies to translate complex clinical guidelines into accessible, plain-language educational resources for patients.
- Discuss the role of health literacy in empowering individuals with SCI to self-advocate for appropriate bone density surveillance.
- Apply the "Knowledge to Action" framework to design similar educational initiatives within their own clinical practice.

# P2606: Substance and polysubstance use in those with spinal cord injury: A descriptive analysis

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**Background:** Substance use disorders are pervasive in the general population and occur at significantly higher rates in the spinal cord injury (SCI) population (Graupensperger, et al, 2020). A majority of research on substance use disorders has focused on individual drugs in isolation of other drugs used. However, a large, national survey of the general population has shown that 20% routinely use more than one drug (Rockhill, et al, 2026). There is very limited research on polysubstance use in the SCI population, and estimates of polysubstance use are not available.

**Purpose:** We aimed to estimate the prevalence of polysubstance use in persons with SCI. We hypothesized that the prevalence would be higher than the published estimate of 20% in the general population.

**Methods:** We used the Spinal Cord Injury Model Systems National Database, a survey which asks about a variety of health outcomes, including drug use. Individuals are initially enrolled when hospitalized for SCI rehabilitation at a Model System hospital and then followed longitudinally every 5 years. For analysis, the database included individual-level survey follow-up responses collected between 2016 through 2021. We calculated summary statistics for demographics and drug use. Alcohol use was assessed using the World Health Organization Alcohol Use Disorders Identification Test (WHO-AUDIT-C) question "how often did you have a drink" in the past 3 months. Frequency of tobacco, cannabis, cocaine, amphetamine, sedative, hallucinogen, opioid, and other substance use was assessed using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), which asks about substance use on a 5-point scale (never to daily use) in the past 3 months. We applied the definition of polysubstance use, which refers to simultaneous or sequential consumption of multiple psychoactive substances; and for this study, substance use within a 3-month period. Individual responses for each substance was coded "0" for no use and "1" for use within the past 3 months; each response was summed across substances to calculate a total substance use score, inclusive of alcohol use.

**Results:** There were 10,984 unique surveys. Respondents were, on average, 48.9 years old at time of survey, mostly male (78.1%), and white race (70.3%). Few respondents (4.7%) reported Veteran status. Almost 75% of respondents had a high school education or less, 25% were employed, and almost 62% had annual family incomes less than $50,000. Seventy-four percent reported using at least one substance. Of those who reported using substances, 53.9% reported using one substance, 32.3% reported using 2 substances, 11.3% reported using 3 substances, and 2.8% reported using 4 or more substances in the past 3 months. This resulted in a polysubstance prevalence estimate of 46%. Sub analyses were performed on Veteran status and were not significantly different from reported results.

**Conclusions:** Polysubstance use in the SCI population is higher by more than twofold (46%) than use in the general population. Given the elevated use of polysubtance in individuals with SCI, ongoing clinical screening for single substance and polysubstance use is an important tool in the overall health and wellness of individuals with SCI.

**Learning Objectives**

- Describe the frequency of substance use overall within the SCI respondent sample
- Describe the proportions of polysubstance use within the SCI respondent sample
- Identify the gaps in the literature regarding polysubstance use in the SCI population
- Identify the importance of using clinical screening for polysubstance use in the SCI population in their own clinical practice

# P2607: Prototype Design and Focus Group Evaluation of a Kirigami-Inspired Hybrid Airport Transport and Aisle Wheelchair

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To board or disembark from an airplane, many passengers with disabilities must transfer to an aisle wheelchair that is frequently reported as unstable and uncomfortable. Since the chair must be narrow to fit the aisle, transferring to and from it has a high risk of injury and discomfort for wheelchair users along with the assisting staff and/or caregivers.

The objective of this study was to design and evaluate a wheelchair that converts between a transport and aisle wheelchair, with the goal of eliminating the dangerous transfer to/from the aisle wheelchair and improving the safety and comfort of the boarding process for both wheelchair users and assisting staff.

To evaluate the feasibility of this concept, a hybrid airport wheelchair was designed with priorities established by a team of experts, including a frequent-flyer caregiver and wheelchair user duo, along with several engineers. Design priorities included ease and safety of transfer, ease and speed of conversion between transport and aisle configurations, option for users to self-propel the transport configuration, and ease of manufacturing.

A prototype was designed and fabricated primarily from sheet metal instead of tubes — an approach inspired by kirigami, the Japanese art of paper cutting and folding. This approach involves fabricating wheelchair parts by cutting them from sheet metal with a laser cutter, bending them into shape using a press brake, and then assembling the parts with nuts, bolts, and rivets rather than welding. The prototype includes small rear wheels that deploy, allowing for the larger rear wheels and seat extenders to be removed with the passenger in the chair, making it narrow enough to traverse the aircraft aisle.

To gather feedback on the overall idea and design of the airport wheelchair, multiple focus groups were conducted with a total of 45 participants, including 27 wheelchair users, 3 caregivers, and 15 staff members from airport wheelchair services. Participants were given a demographic survey, shown a demonstration using the hybrid airport chair prototype along with an explanation of its intended use, and then asked about strengths, weaknesses, and ideas for improvement. The focus groups were recorded and then later transcribed, and then feedback was sorted into themes.

Common favorable reviews pointed out from groups were elimination of the dangerous aisle chair transfer, the option for the passenger to independently self-propel the transport configuration, the speed and ease of conversion between configurations, and the aesthetically pleasing design of the chair. For weaknesses, the need for a method to stow removable parts when in the aisle chair configuration, additional brakes and straps for safety, luggage storage, and more easily cleanable cushion material were commonly identified by groups.

Overall, the focus group feedback showed that the design concept is on the right track and that the features included are desirable for the passengers, caregivers, and staff. However, another iteration of the design will be necessary to incorporate several of the suggested features along with addressing some of the feasibility concerns.

**Learning Objectives**

- Discuss the shortcomings of current airport wheelchair technology
- Identify 3 advantages of applying kirigami-inspired design to wheelchairs
- Describe the functionality and features of a hybrid airport wheelchair design
- Assess the merit and feasibility of the hybrid airport wheelchair design concept

# P2608: Volitional Gait Speed Modulation After Spinal Cord Injury Using Feedforward Stimulation

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**Background**: Peripheral nerve stimulation is a powerful tool for improving ambulation after spinal cord injury (SCI). Yet, current systems to facilitate gait rely on feedforward control of stimulation that enforces one clinically optimized walking speed for each user. These systems do not account for a user's intent to vary their pace. Instead, the stimulation enforces a rigid timing sequence, limiting the user's ability to intuitively control walking speed. Understanding the biomechanical strategies employed to interact with and override these fixed patterns of muscle activity is essential for the development of next-generation adaptive technologies that can seamlessly align with human intent to vary walking speed.

**Purpose**: The primary objective of this study was to determine the extent to which individuals with SCI can volitionally modulate their speed while walking with fixed temporal patterns of feedforward neuromuscular stimulation. Characterizing the ability to voluntarily modulate speed while walking with stimulation will determine the feasibility of employing biomarkers of real-time speed as command inputs to inform the design of closed-loop systems capable of automatically adjusting stimulation to match desired walking speed.

**Methods**: Two individuals with varying injury profiles participated: a 58-year-old male (T10 AIS C, 6 years post-injury) and a 32-year-old female (T8 AIS A, 10 years post-injury). Experimental trials consisted of 10-meter timed walking tests utilizing a custom external control unit to deliver up to 8 channels of surface stimulation in an open-loop, cyclically repeating pattern targeting the bilateral hip, knee, and ankle flexors and extensors. Stimulation was individualized to produce repeatable walking at a comfortable "medium" speed and cadence. Participants were instructed to volitionally attempt to slow down and speed up while using the pattern optimized for the “medium” speed. Outcomes measured included gait steady state speed, step length, and cadence.

**Results**: Results indicated participants were capable of volitionally modulating their speed over multiple steps even when the stimulation pattern remained constant. For both individuals, the change in speed exceeded a 25% increase from medium to fast speeds and a 46% decrease from medium to slow speeds. Participants achieved speed changes exclusively by adjusting step length through voluntary upper body interactions with the walker. Cadence remained constant across all intended speeds, as it was constrained by the fixed period of the stimulation pattern. Qualitatively, both participants reported that attempting to modulate speed to deviate from the preset medium speed felt like "fighting against" the stimulation.

**Conclusions**: Individuals with SCI retain the capacity to volitionally modulate gait speed during cyclic feedforward stimulation, but the process is mechanically constrained and physically demanding. Decoupling intended speed (driven by step length) from the fixed timing (cadence) of stimulation can be inefficient and uncomfortable. These findings suggest that future neuroprosthses must adjust stimulation automatically and in real-time to effectively achieve the

desired speed, which can be indicated reliably from the voluntary speeds achieved via interactions with the walker to change step length.

**Learning Objectives**

- Describe the biomechanical limitations of current open-loop stimulation systems regarding user intent and gait speed adaptability.
- Explain the specific strategies (step length vs. cadence) that individuals with SCI use to modulate speed when stimulation timing is fixed.
- Analyze the quantitative relationship between step length adjustments and resulting gait speed when the user's cadence is constrained by the stimulation pattern.
- Assess the impact of fixed stimulation timing on user comfort and perceived exertion during ambulation.
- Identify the need for a future closed-loop control system to improve synchronization between human intent and controller output.

# P2610: Innovative approach to interdisciplinary process improvement project enhances team collaboration and Veteran-centric care in SCI/D population

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**Background/Issues:** During the Covid pandemic, many medical services were modified across the healthcare spectrum to adhere to social distancing guidelines, resulting in unintended and sustained system changes. In review of VA Boston SCI/D inpatient acute rehabilitation program in a post pandemic setting, areas of growth were identified for potential improvement, with the aim to promote Veteran-centric care and become Age Friendly in our evolving SCI/D population.

**Purpose**: Improve processes related to acute rehabilitation program with specific attention to increasing Veteran-centric care, interdisciplinary collaboration, Age-Friendly care and standardized self-sustaining methods for program development.

**Methods**: VA Boston embarked on an interdisciplinary process improvement project aimed at improving the acute rehabilitation program and providing Veteran-centric care. We used standardized methods of process improvement and system redesign principles for a collaborative and interdisciplinary approach. Our methods included qualitative interviews of multidisciplinary team members, surveys, small workgroups, standardized system redesigns exercises, presentations and group collaboration. We identified 4 main areas of focus and then created 4 smaller interdisciplinary workgroups which reported back to a larger multidisciplinary team monthly. Each group identified specific issues or barriers to intervene that would lead to enhanced Veteran-centric care. Both qualitative and quantitative data were collected to help guide progress.

**Results**: An interdisciplinary team effort using standardized systems redesign methods was successful in initiating change and enhancing an Age-Friendly, Veteran-centric and collaborative approach to acute-rehabilitation for individuals with SCI/D. The combination of qualitative and quantitative analysis can create a self-sustaining method for process improvement aimed at improving the care of Veterans with SCI/D. Specific results include improved interdisciplinary acute rehabilitation meetings that focus on Age Friendly Care and the Veterans' values. As a result of our project, >95% of Veterans who participated in acute rehabilitation met all of the standards for Age Friendly Care. We initiated a standardized Education Series for Veterans with SCI/D with >95% of Veterans participating in the Education Series. All interdisciplinary team members felt their perspective was heard during this process and all felt that they learned about process improvement. 91% of interdisciplinary team members felt positive changes in patient care resulted from this project and 91% would like to see this project continue as a self-sustaining method for ongoing improvements.

**Conclusion**: An interdisciplinary team approach that uses standardized system redesign principles can be an effective way of initiating and sustaining change in the SCI/D population. System redesign methods, including process mapping and impact/effort matrices, can be used by small workgroups to effectively solve large problems or barriers in a healthcare setting. Qualitative measures, such as surveys, interviews and group discussion can promote enhanced participation and positive feelings of change. Quantitative data to assess and analyze interventions can be used to understand effectiveness. This collective approach to process improvement can lead to productive outcomes for Veteran-centric care and promote participation and trust among interdisciplinary team members.

**Learning Objectives**

- Identify system redesign methods that support process improvement goals.
- Understand qualitative and quantitative analyses to guide process improvement projects.

- Apply system redesign principles to help solve barriers in interdisciplinary care to Veterans with SCI/D.
- Identify positive outcomes in Veteran-centric, Age Friendly care during inpatient acute rehabilitation after interdisciplinary process improvement work in the SCI/D population.

# P2611: Feasibility of Personalized VR Visualization for Home Modification Services for People With Multiple Sclerosis

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**Background**: Virtual reality (VR) technologies have potential to enhance the delivery of home modification recommendations by enabling visualization of proposed changes within realistic representations of individuals' homes. However, before evaluating clinical effectiveness, it is necessary to establish whether personalized VR environments can be reliably created using available tools and workflows. Evidence regarding the technical feasibility of developing individualized VR-based home modification visualizations in rehabilitation contexts remains limited.

**Purpose**: The purpose of this study is to examine the technical and procedural feasibility of developing personalized VR visualizations of home modification recommendations for people with Multiple Sclerosis (MS). This study focuses on the feasibility of the VR creation process itself, including image capture, model development, interdisciplinary translation of recommendations, and production burden.

**Methods**: Participants' home environments will be captured using 360-degree imaging to generate detailed 3D models of real-world spaces. Occupational therapy clinicians will develop individualized home modification recommendations based on participant-identified functional challenges. These recommendations will be translated into VR-based visualizations using architectural visualization software, with iterative collaboration between rehabilitation and design team members to ensure functional accuracy and visual clarity.

Feasibility indicators will include: (1) proportion of successfully generated usable VR environments, (2) time required for each stage of the development process (image capture, model processing, modification rendering, and VR export), (3) frequency and type of technical issues encountered, (4) extent of iteration required to achieve clinically acceptable visualizations, and (5) personnel time and resource demands. Development logs and structured process documentation will be used to track feasibility metrics. Descriptive analyses will summarize workflow characteristics, and qualitative process notes will be analyzed to identify recurring barriers and optimization opportunities.

**Anticipated Results**: It is anticipated that personalized VR environments can be successfully developed for the majority of participants using currently available consumer-level imaging and visualization tools. Variability is expected in development time and technical complexity depending on home characteristics and modification type. Anticipated challenges include image distortion, modeling limitations, and the need for repeated interdisciplinary refinement. Findings are expected to delineate practical thresholds for scalability and identify key areas for workflow refinement.

**Conclusions**: This study is expected to provide foundational evidence regarding the technical feasibility of creating personalized VR-based home modification visualizations. Results will inform future intervention studies by clarifying development requirements, resource demands, and methodological considerations for scalable implementation.

**Learning Objectives**

- Describe the end-to-end workflow for creating personalized VR-based home modification visualizations, including image capture, 3D modeling, and interdisciplinary translation of recommendations.
- Interpret feasibility indicators such as development time, technical challenges, iteration frequency, and personnel demands when implementing VR-supported home modification services.
- Use feasibility metrics to evaluate scalability and resource requirements for integrating VR visualization into occupational therapy practice.
- Illustrate how a clinical recommendation can be translated into a basic VR-based home modification.

# P2612: Relationship Between Neuropathic Pain and Central Sensitization in Chronic Spinal Cord Injury

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**Background:** Chronic neuropathic pain (NeuP) is a common and severe secondary complication of spinal cord injury (SCI). Central sensitization (CS), a pathological state within the nociceptive system that may persist long after the initiating injury has healed, causes amplification of pain signaling and is one of the primary mechanisms thought to be responsible for initiation and maintenance of chronic pain. However, relationships between evoked pain sensitivity, CS, and NeuP remain unclear in the SCI population.

**Purpose:** The purpose of this pilot study is to evaluate relationships among NeuP symptoms and two assessments of CS - a questionnaire that has been validated in other pain populations, and an evoked-pain protocol associated with CS mechanisms - in individuals with SCI.

**Methods:** Adults ages 18-70 years old with SCI $\geq$2 years, LOI C4-L2, and ASIA Impairment Scale A-D, completed: 1) the International SCI Pain Basic Data Set (ISCIPBDS), 2) the Neuropathic Pain Symptom Inventory (NPSI) for up to three chronic pain problems, 3) the Central Sensitization Inventory (CSI), and 4) quantitative sensory testing (QST) to assess somatosensory system (dys)function. QST measures included heat pain thresholds (HPT) and heat pain temporal summation (HPTS) measured above, at, and below the LOI. The HPTS protocol consisted of delivery of a 1-s stimulus set at 1.5°C above the individual's HPT, followed by rapid presentation of a train of ten 1-s stimuli. Participants rated pain intensity and unpleasantness (0-100). HPTS score was calculated as the change in the first stimulus rating to the peak rating during the train of 10 stimuli. HPTS score reflects the extent of pain amplification (i.e., CS) present within the nociceptive system. Parametric or non-parametric correlations, as appropriate, were examined (SPSSv.29). Because the analyses conducted are preliminary, both $p<.05$ and correlations >.3 were considered as important trends.

**Results:** Analyses were conducted in 18 individuals (of 38 expected) who have completed the pilot study. Intensity rating (0-10) of average pain during the past week was associated with HPT at the site *at* the LOI ($r$=-0.56, $p$=0.02), but not at sites *above* ($r$=-0.13, $p$=0.64) or *below* (ρ=-0.22, $p$=0.43) LOI. CSI scores were associated with highest NPSI score ($r$=0.72, $p$=0.012). HPTS of pain intensity above LOI was correlated with highest NPSI score ($r$=0.43, $p$=0.11) and HPTS of pain intensity below LOI was correlated with CSI score ($r$=-0.35, $p$=0.33). No other correlations between HPTS, CSI, or highest NPSI score met benchmark levels for important trends.

**Conclusions:** Preliminary analyses suggest that general, overall pain is associated with sensitivity to evoked heat pain *at* LOI, but not above or below, suggesting that mechanisms near the LOI may be important in influencing overall spontaneous pain. Results also suggest that chronic NeuP after SCI is related to CS as measured by a generalized CS questionnaire (i.e., CSI) and to experimental assessments of CS (i.e., HPTS) above LOI. We found some support for congruence between evoked-HPTS/CS measures and self-report CSI scores, but additional data are needed to fully investigate these relationships.

**Learning Objectives**

- Recognize how neuropathic pain symptoms and questionnaires relate to pain amplification mechanisms.
- Describe how pain processing differs above, at, and below the level of injury.
- Compare difference methods of evaluating neuropathic pain and central sensitization.
- Discuss the clinical relevance of identifying central sensitization and pain amplification to improve pain assessment and future treatment approaches for veterans with SCI.

- erence

# P2613: Renacidin decreases the frequency of catheter associated urinary tract infections in neurogenic bladder.

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Participant has indicated the following discussion of unapproved drug or product uses:
The authors observed that instillation of Renacidin decreased catheter associated urinary tract infection (CAUTI) frequency in neurogenic bladder of SCI subjects. Renacidin is FDA-approved to decrease catheter incrustations and there is no mention about preventing CAUTI.

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**Background:** Recurrent CAUTI is a significant problem that affects the population with SCI, and no prior strategy has proven effective in preventing it. The presence of crystalline biofilms and encrustations in urinary catheters may increase the risk of CAUTI by fostering bacterial persistence and seeding into the bladder. Renacidin is an FDA-approved solution for preventing encrustations in urinary catheters, primarily effective against urease-producing bacteria. By decreasing encrustations in catheters, Renacidin may reduce the frequency of CAUTI in neurogenic bladder.

**Purpose:** The purpose of this study is to investigate the effect of Renacidin bladder instillations (prescribed to decrease catheter obstructions due to encrustations) on the frequency of CAUTI in the neurogenic bladder of SCI subjects.

**Methods:** A chart review of patients (acute unit, outpatient, Home Care, and RCF-LTC settings) with neurogenic bladder and indwelling catheters (supra-pubic and transurethral) was performed from the placement of the indwelling catheter (maximum 5 years prior to the start of Renacidin) until the present. Renacidin was started to decrease the frequency of urinary catheter obstructions. Thirty milliliters of commercially available Renacidin were instilled into the bladder and left to soak by clamping for 30 minutes daily or twice a day for at least 6 months. Catheters were changed as often as necessary, with or without Renacidin. Data on the number of CAUTI, clinical presentation, urine culture results, and

medications received were collected before and after starting Renacidin. The frequency of CAUTI per month and the interval between CAUTI episodes were analyzed using Repeated Measures ANOVA before and after Renacidin initiation.

**Results:** Twelve SCI subjects (mean age 64 ± 16 years, including 2 with multiple sclerosis, 1 female, and 7 with supra-pubic catheters) received Renacidin instillations. One patient was also receiving antibiotic prophylaxis and methenamine hippurate. Another patient could only tolerate 10 ml of the solution for 15 minutes. The chart review spanned 45 ± 23 months before and 19 ± 10 months after starting Renacidin. The incidence of CAUTI per month decreased from 0.24 ± 0.17 to 0.07 ± 0.08 after Renacidin ($p = 0.0096$), indicating a 60 ± 38% (range 10% to 100%) reduction in CAUTI frequency. Five subjects did not experience CAUTI while on Renacidin. For those who did, the interval between CAUTI episodes increased from one every 6 months (average) to one every 11 months. All subjects had urease-producing bacteria (UPB) in their urine before and after Renacidin, with the most common UPB being Klebsiella pneumoniae, Proteus mirabilis, Morganella morganii, and Staphylococcus aureus. Patients tolerated the instillation without experiencing autonomic dysreflexia or significant bladder discomfort.

**Conclusions:** Preliminary findings demonstrate that daily Renacidin bladder instillation was well tolerated and may significantly decrease CAUTI in SCI subjects. Additional prospective clinical trials are warranted.

**Learning Objectives**

- Describe and understand the Pathophysiology and Challenges of CAUTI in SCI Patients
- Explain the Therapeutic Effectiveness of Renacidin
- Demonstrate Proper Administration of Renacidin Bladder Instillations
- Assess and monitor Clinical Outcomes of Renacidin Usage

# P2614: Implementing a Dedicated ALS Home Care RN–MD Team With Embedded Support Systems

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**Background:** Veterans with amyotrophic lateral sclerosis (ALS) experience progressive respiratory and functional decline and often require frequent interaction with the health care system. Fragmented care models and delayed access to coordinated services contribute to unmet clinical needs, caregiver strain, and crisis-driven emergency department utilization. Home-based care programs are well positioned to address these gaps but require disease-specific staffing and infrastructure to be effective.

**Quality Improvement Aim:** To implement a dedicated ALS home care team, consisting of a physician and registered nurse supported by multidisciplinary services, and evaluate its impact on timeliness of care and early identification of clinical and caregiver needs.

**Methods:** A quality improvement initiative was launched within SCI Home Care to establish a dedicated ALS RN–MD team beginning February 2026. Veterans with ALS enrolled in home care were assigned to a consistent RN–MD dyad. Core elements included scheduled in-home RN assessments, same-day physician availability, standardized respiratory and nutritional screening, expedited durable medical equipment coordination, and defined escalation pathways to respiratory therapy, social work, and palliative care. Baseline care processes and utilization metrics were reviewed retrospectively. Process measures and early utilization trends were tracked prospectively following team implementation using run charts.

**Measures:** Primary measures included time to initial home visit, time to provider intervention following symptom identification, and time to initiation of non-invasive ventilation and other critical equipment. Secondary measures included emergency department visits, hospitalizations, and caregiver-initiated crisis contacts.

Expected Results: Implementation of a dedicated ALS RN–MD home care team is expected to improve timeliness of interventions, enhance identification of unmet clinical and caregiver needs, and reduce crisis-driven acute care utilization.

**Conclusion:** Establishing a dedicated ALS home care RN–MD team with embedded support systems is a feasible quality improvement strategy that strengthens continuity, improves early need recognition, and provides a scalable model for ALS care within the VA.Can you check to make sure this meets the requirements for PVA abstract admission and put into a PDF so I can submit? Thank you.

**Learning Objectives**

- Identify key gaps in early ALS care delivery that contribute to delayed intervention and crisis-driven acute care utilization among veterans
- Describe the structure and core components of a dedicated ALS home care RN–MD team, including embedded clinical and operational support systems
- Explain how RN–MD in-home assessments improve identification of respiratory, equipment, and caregiver needs compared with clinic-based evaluation alone.
- Apply quality improvement strategies demonstrated in this program to develop or enhance ALS home care services within VA or community-based settings

# P2615: Transcutaneous Spinal Stimulation Combined With Treadmill Training in Multiple Sclerosis: A Case Study

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Participant has indicated the following discussion of unapproved drug or product uses:
The use of Arc-ex by Onward for Transcutaneous Spinal Cord Stimulation outside of the their accepted FDA approval for cervical level incomplete spinal cord injuries for individuals with MS and spinal cord lesions.

**Background:** People with Multiple Sclerosis (MS) frequently experience progressive decline in motor control, strength, balance, and endurance, leading to impaired ambulation, reduced transfer ability, and loss of independence in activities of daily living (ADLs). Individuals with spinal cord lesions associated with MS often demonstrate limited recovery with conventional rehabilitation alone. Recent research in spinal cord injury populations has demonstrated that transcutaneous spinal cord stimulation (TSS) can enhance spinal excitability and improve voluntary motor output. However, the application of TSS in individuals with MS and spinal cord involvement remains underexplored, particularly when combined with task-specific gait training.

**Purpose:** To examine whether eight weeks of twice-weekly TSS combined with body weight supported treadmill training improves walking endurance, functional mobility, lower extremity strength, and patient-reported functional performance in an individual with MS.

**Methods:** This prospective single-subject case study involved a veteran with MS and documented spinal cord lesions who completed 16 intervention sessions over eight weeks. Treatment consisted of TSS delivered concurrently with body weight supported treadmill training. Stimulation intensity was progressed to patient tolerance while treadmill speed, duration, and distance were increased and body weight support was systematically reduced. Outcome measures were collected at baseline and post-intervention and included the Patient-Specific Functional Scale (PSFS), Timed Up and Go (TUG), 30-Second Chair Stand Test (30CST), and Six-Minute Walk Test (6MWT). The TUG and 6MWT were performed using a platform walker to ensure safety and consistency.

**Results:** At baseline, the participant achieved 240 feet on the 6MWT, completed 4 repetitions on the 30CST, demonstrated a TUG time of 43.39 seconds, and reported a PSFS score of 14. Following the eight-week intervention, outcomes improved to 700 feet on the 6MWT, 7 repetitions on the 30CST, a TUG time of 30.05 seconds, and a PSFS score of 30. Improvements exceeded established minimally important difference values for the 6MWT and PSFS and minimum detectable change values for the TUG, indicating clinically meaningful improvements in endurance, mobility, and perceived functional capacity. Although normative data for the 30CST in MS populations are limited, the observed improvement suggests enhanced lower extremity strength and functional sit-to-stand performance.

**Conclusions:** This case study demonstrates that TSS combined with body weight supported treadmill training may promote meaningful gains in walking endurance, mobility, and functional independence in individuals with MS and spinal cord involvement. Improvements in both objective and patient-reported outcomes suggest potential neuromodulatory and task-specific training synergy. These findings support further investigation through controlled trials to determine efficacy, durability of outcomes, optimal dosing parameters, and broader psychosocial impacts, including confidence, participation, and quality of life. While preliminary, this case provides early clinical evidence supporting the feasibility and therapeutic potential of incorporating TSS into neurorehabilitation for the MS population.

**Learning Objectives**

- Describe the rationale for using transcutaneous spinal cord stimulation in individuals with Multiple Sclerosis and spinal cord involvement.

- Explain the effects of combined neuromodulation and body weight supported treadmill training on gait and functional mobility outcomes.
- Interpret clinically meaningful change using standardized outcome measures in individuals with MS.
- Discuss the psychosocial and behavioral implications of improved mobility on confidence, independence, and participation in daily activities for individuals with MS.
- clinical practices.

# P2616: Utility of the Columbia Suicide Severity Rating Scale (C-SSRS) in ALS

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**Background:** Individuals with amyotrophic lateral sclerosis (ALS) have been shown to be at increased risk for suicide (Lund et al., 2021). The Columbia Suicide Severity Rating Scale (C-SSRS) has sought to improve ease of classification (Interian et al., 2017; Posner et al., 2011). Its utilization is standard practice in Veterans Administration (VA) medical centers. A more nuanced examination of this may be useful in understanding monitoring for risk.

**Purpose:** The purpose was to examine frequency of C-SSRS positive findings and to characterize its relationship to other variables or outcomes. In addition to overall positive findings, this study aimed to assess frequency of endorsements to individual C-SSRS questions (Q1) or a wish to die, Q2 (suicidal ideation), and Q3 (method). Insight into behavioral changes in ALS can be reduced (Temp et al, 2021). Relationship to caregiver endorsement of depression was considered in order to better understand this perspective.

**Methods:** The C-SSRS was examined across 20 Veterans in a VA ALS multidisciplinary clinic. Frequency of responses Q1, Q2, Q3, and overall positive findings of the C-SSRS were examined. Relationship of C-SSRS responses to endorsement of depression on the ALS-CBS caregiver questionnaire (Woolley, 2011) was also explored.

**Results:** The average age of Veterans was computed (M = 69.3 years, SD = 12.1), and all were male. Besides one borderline positive finding in terms of most recent suicidal ideation about method, there were no other overall positive C-SSRS findings. In this instance, it was in line with literature observing that risk is higher early in the course of the disease or after diagnosis (Palmieri et al, 2010 and Silva-Moraes et al., 2020). So there was only one endorsement of Q2 and Q3 (thus only administered in this case), similarly borderline positive. However, there was a positive ("yes") response to Q1 regarding a wish to die in four of the 20 individuals (20%). In addition, caregivers' response to the ALS-CBS questionnaire item about seeming depressed was positive ("yes") for two (50%) of those individuals. In other words, caregivers were able to identify feelings of depression half the time in those with a wish to die detected by the C-SSRS. There were no suicide attempts by the Veterans in this sample in this time under the care of the ALS multidisciplinary clinic.

**Conclusions:** The C-SSRS has been lauded for its ease of use. The vast majority of these Veterans with ALS did not have an overall positive screen. In one exception, observations were in line with others suggesting intervention should occur early in the disease or after diagnosis to prevent suicide (e.g. Lund et al., 2021). Finally, half of caregivers recognized depression in those with a wish to die endorsed on the C-SSRS. In the future, it could be worthwhile to explore mitigating factors such as social support, mental health history, and the ALS multidisciplinary team model of care.

**Learning Objectives**

- Describe the utility of the Columbia Suicide Severity Rating Scale (C-SSRS) in ALS.
- Identify a critical period to intervene in the ALS diagnostic process.
- Recognize how caregiver report of depression relates to self-report of suicidal risk.
- Incorporate assessment of wish to die in evaluating suicidal risk.

# P2617: Shifting Gears: Exploring Electrically Stimulated Cycling Training and Feasibility for Overground Transition after Paralysis

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**Purpose:** To explore a varied emphasis ES cycling exercise training protocol on a non-motorized trike.

**Background:** Electrical stimulation (ES) cycling modalities for paralyzed lower extremities are available and report positive benefits for overall health, however, many are motor driven, lack a gold standard training protocol, and are not able to be used in the community. Training is often long-duration without interval or strength emphasis rides. Our current work explores performance outcomes following varied strength and endurance emphasis ES cycling training protocol with a non-motorized custom recumbent trike. Additionally, we assessed the potential to transition from the stationary trainer to going overground. Our adapted trike features a pedal position sensing encoder that communicates with a multi-channel surface stimulator to produce a cycling pattern that can be optimized for each individual using a tablet application. Additionally, training protocols can be set on the application to include long duration or shorter interval training sessions.

**Content:** Four individuals with paralysis completed 36 sessions of ES cycling exercise on an adapted recumbent trike. Participants visited the lab 2-3 times per week to complete a variety of endurance and interval strength training rides lasting 30min-1.5hr in duration. An endurance cycle to fatigue and ES knee extension strength were assessed at baseline and post-training. Baseline rides to fatigue ranged 1-60 minutes with distances ranging 0.13-2.02 miles and following training ranging 26-60 minutes covering distances of .5-2.7 miles. Peak cycling power increased 55% and knee extension strength increased 54% following training.

**Conclusion:** Participants were able to complete ES cycling on a non-motorized recumbent trike and additionally achieved overground cycling by the end of training. Based on these preliminary results it is possible for varied emphasis ES cycling training to result in increased ES muscle performance.

**Learning Objectives**

- Identify the common uses of stimulation following SCI.
- Be able to identify common exercise training goals and how application may differ.
- Be familiar with electrical stimulation adapted cycling and rowing and how it could translate to further community opportunities.
- Describe the potential benefits of overground cycling for individuals with SCI.

# P2618: The Effect of Glove Material on Handrim Propulsion in Wheelchair Racers: An Exploratory Study

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**Background and Issues:** Participation in adaptive sports provides physical and psychosocial benefits for individuals with disabilities, and wheelchair racing is one of the most widely recognized adaptive sports worldwide. Equipment design and selection, such as racing chairs or gloves, play a critical role in performance and upper limb safety; however, research on racing gloves remains limited. Use of 3D-printed racing gloves has increased the opportunity for athletes to customize fit and build, however, there is a dearth of quantitative data demonstrating glove optimization.

**Purpose:** To investigate the influence of glove material on wheelchair racing performance metrics like hand rim propulsion kinetics, spatial-temporal metrics, and intra-individual variability during steady-state and acceleration conditions, to improve performance, minimize injury, and inform glove selection decisions among athletes and coaches.

**Methods:** Data collection occurred indoors using a roller-based dynamometer with a Wahoo Kickr flywheel system providing standardized resistance. Eight elite wheelchair racers participated in two test conditions: Maximum Speed Test (maximal-effort acceleration from a stationary start) and Submaximum Speed Test (steady-state propulsion at 60%, 70%, and 80% of the maximal speed achieved during the Maximum Speed Test). Because wheelchair racers compete from 100m to marathons, they require competence across all the conditions examined. Each condition used two popular but distinct 3D-printed glove types. The gloves compared were a full polylactic acid (PLA) glove and a hybrid (HYB) glove, arelatively new type, with a PLA handle and a thermoplastic polyurethane contact surface. Kinetic and spatial-temporal variables were measured by the Push Power Measurement Wheel System. Additionally, at the Submaximum Speed Test, outcome measures were computed as the intra-individual Standard Deviation, and Coefficient of Variation. Results were presented as mean ± SD, with two-tailed p-values and $\alpha = 0.05$. Paired-sample t-tests were performed for variables that

satisfied the normality assumption, while Wilcoxon signed-rank tests were used for variables that violated the assumption to assess consistency.

**Results:** During the acceleration phase from a stationary start, no significant differences in peak speed and kinetic outcomes were observed between the different glove materials. However, the average Contact Ratio (handrim contact time relative to the time of one stroke) duration was significantly lower with the HYB glove compared to the PLA glove. Meanwhile, during steady-state propulsion at low-speed conditions, the HYB glove showed a higher negative torque, a known braking factor during propulsion. During high-speed conditions, the HYB glove showed a potential increase in tangential force. Across all speed conditions during steady-state propulsion, the HYB glove showed lower inter-cycle kinetic variability in several variables then the PLA glove.

**Conclusions:** This study indicates that the effects of glove material differ between acceleration from a stationary start and steady-state propulsion, with distinct characteristics also observed between high- and low-speed steady-state conditions. This suggests that glove selection could be optimized for the specific demands of events such as sprints or marathons. This study may assist athletes and coaches select glove type appropriately. Future studies expanding participant characteristics and incorporating qualitative investigations of user comfort and preferences may provide more practical and applicable insights.

**Learning Objectives**

- Interpret the need for evidence-based glove selection tailored to athletes' disability, experience, and competitive events.
- Describe how differences in glove material affect wheelchair racers performance during acceleration and steady-state propulsion.
- Predict the relationship between glove material and injury risk.
- Recognize how recent advances in 3D printing and performance measurement devices contribute to athletes, coaches, and researchers in wheelchair racing.

# P2619: Identifying the role of physician practice focus and practice location on access to SCI care

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**Background:** Access to spinal cord injury (SCI) specialty care is an area of significant importance. While numbers and trends for physicians with subspecialty certification in SCI Medicine (SCIM) have been reported, information on practice patterns and areas of practice focus of these physicians is lacking, as is data on SCI care provided by physicians without SCI sub-specialty certification. Furthermore, there is little information on the rural-urban practice location distribution for physicians with SCIM subspecialty certification.

**Purpose:** The objectives of this study were to 1) identify practice patterns and areas of practice focus for physicians with SCIM certification; 2) examine the prevalence of SCI as a self-reported practice focus area for physical medicine and rehabilitation (PM&R) physicians without SCI subspecialty certification; 3) compare rural-urban practice location for physicians with SCIM certification.

**Methods:** We conducted a retrospective analysis of deidentified data on responses to practice profile questions obtained through physician annual enrollment in the American Board of Physical Medicine and Rehabilitation (ABPMR) continuing certification program. Data for 9,543 ABPMR board certified physicians, including 423 with SCIM subspecialty certification, was available for analysis. A separate analysis was conducted on practice location data for 472 physicians with SCIM certification. Practice site zip codes were matched with zip codes in a zip-code database. Rural-Urban Continuum Codes were then stratified based on population size: rural (<100,000), urban (100,000–250,000), and metropolitan (>250,000).

**Results:** While SCI was reported as a practice focus area by most (96%) of the 423 physicians with SCIM certification, only 30% of those reported SCI as their only area of practice. A diverse range of additional practice focus areas was reported by the remaining 70% with SCIM certification, with brain injury medicine being the most common. Conversely, about 23% of PM&R physicians without SCI subspecialty certification reported SCI as one of their practice focus areas. Analysis of practice location data for 472 physicians with SCI subspecialty certification, revealed that the majority, 398 (84%), practiced in metropolitan areas, 55 (12%) in smaller urban locations, and only 19 (4%) practiced in rural locations.

**Conclusions:** Our study suggests that information on number of physicians with SCIM subspecialty certification alone, while valuable, is insufficient by itself for making determinations about access to SCI care, since 70% of those physicians don't report SCI as their only area of practice. Our finding that a relatively high percent of PM&R physicians without SCI subspecialty training or certification provide SCI care as part of their practice highlights the importance of addressing the consistency and quality of SCI exposure and training in PM&R residency and in continuing education of PM&R physicians, in addition to efforts to increase the number of physicians with SCI subspecialty fellowship and certification. The high concentration of SCI subspecialty certified physicians in large metropolitan areas raises particular concerns about access to SCI care in rural and smaller urban locations. Practice patterns and practice location are important areas of further in depth research to better understand implications for strategic planning to promote optimal access to high quality SCI care.

**Learning Objectives**

- Describe areas of self-reported areas of practice focus for physicians certified in Spinal Cord Injury (SCI) Medicine.
- Identify non-SCI board certified physicians who provide SCI care as part of their practice
- Compare the rural-urban distribution of SCI Medicine board certified physicians

- Consider the implications of findings on access to SCI care and recommended actions
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# P2620: Advancing Care Pathways for Veterans Living with Amyotrophic Lateral Sclerosis (ALS)

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Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease that leads to profound functional decline, respiratory compromise, and increasing dependence on caregivers. Veterans diagnosed with ALS face unique challenges due to the rapid progression of symptoms and the need for timely, coordinated, multidisciplinary care. Within veteran healthcare systems, variability in access to specialized services, inconsistent communication across clinical teams, and delays in obtaining essential equipment or interventions can significantly affect quality of life. These systemic gaps highlight the need for structured, proactive care pathways that ensure continuity, efficiency, and patient-centered support throughout the disease course.

The purpose of this project was twofold: first, to investigate whether an interdisciplinary care coordination model could improve timeliness of care and patient satisfaction among veterans with ALS; and second, to evaluate the implementation of a clinical program designed to streamline communication, enhance proactive planning, and reduce care fragmentation. The primary research question guiding the study was: *Does structured interdisciplinary coordination improve access to services and patient-reported outcomes for veterans living with ALS?*

A mixed-methods approach was used. The research component included a retrospective chart review and a prospective pilot implementation involving veterans receiving care through a regional VA ALS clinic. Participants underwent standardized functional assessments, respiratory and nutritional monitoring, and coordinated referrals to rehabilitation and assistive technology services. Measures included ALS Functional Rating Scale-Revised (ALSFRS-R) scores, time-to-service metrics, and patient satisfaction surveys. Quantitative data were analyzed using descriptive statistics and paired comparisons, while qualitative feedback from veterans and caregivers was coded for thematic patterns.

The clinical program component introduced structured interdisciplinary case reviews, automated referral triggers based on disease milestones, and early integration of assistive technology consultations. Analysis criteria focused on timeliness of care delivery, adherence to evidence-based guidelines, and patient-reported satisfaction.

Results demonstrated that the interdisciplinary model reduced average time-to-service delivery by 22% and improved patient satisfaction scores by 18%. Earlier identification of functional decline through routine assessments enabled more timely interventions, including respiratory support and mobility equipment. Qualitative feedback emphasized improved communication, clearer expectations, and increased caregiver confidence. Program implementation also revealed that early interdisciplinary engagement significantly reduced delays in obtaining equipment and specialty services. Veterans and caregivers reported feeling more prepared for disease progression and better supported by the care team. Lessons learned underscored the importance of proactive planning, streamlined referral processes, and enhanced caregiver education.

In conclusion, both the research findings and program outcomes support the adoption of a standardized, multidisciplinary ALS care pathway across veteran healthcare systems. Structured interdisciplinary coordination improves care efficiency, enhances patient experience, and reduces fragmentation. Implementing automated referral triggers, expanding interdisciplinary team training, and strengthening caregiver support resources are recommended strategies to sustain improvements. These findings have meaningful implications for clinical practice, suggesting that proactive, coordinated care models can significantly improve quality of life and long-term outcomes for veterans living with ALS.

**Learning Objectives**

- Describe the key challenges veterans with ALS face within current care pathway
- Explain the components and rationale of an interdisciplinary ALS care coordination model
- Evaluate the impact of structured interdisciplinary coordination on clinical outcomes
- Identify actionable strategies to improve ALS care delivery in veteran healthcare settings
- Analyze the impact of an interdisciplinary ALS care coordination model and determine how its components can be applied to improve continuity of care for veterans

# P2621: Improving Air Travel for Mobility Device Users: Modifiable Human Factors as Barriers to Flying

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**Background**: Traveling by air allows people to move quickly and cheaply; however, it is difficult, if not impossible, for people who use assistive technologies, including manual and power wheelchairs and mobility scooters to regularly access air travel. Prior research has evaluated barriers in the built environment and assessed policies and regulations designed to make flying more accessible to people who use accessibility devices, yet very little research has examined how modifiable human factors among airport and airline employees affect air travel for people who rely on mobility devices. Unlike the built environments or implementing new regulations, changes to how people who are employed by airports and airlines can be changed with updated training and support that is often significantly cheaper and faster to implement than systemic changes.

**Purpose**: This secondary analysis assessed patterns of airport and airline employee behaviors that directly or indirectly impede air travel among mobility device users.

**Methods**: A secondary thematic analysis was conducted of free-text feedback collected from a travel survey administered by the Human Engineering Laboratories (HERL) at the University of Pittsburgh. 418 users of mobility devices responded to the survey, of whom 197 provided additional comments in at least one of 15 questions that allowed participants to provide additional context to their responses to an air travel survey. Participants' written responses were analyzed using Braun and Clark's six-step approach to Thematic analysis

Results: of the 197 respondents who provided additional feedback, 97 mentioned facilitators or barriers linked to airport or airline staff; 65 only mentioned barriers caused by employees, 6 only mentioned employees as facilitators during air travel, and 26 mentioned both barriers and facilitators associated with airport or airline employees. Themes included Staff members' ability to address flyers' needs (n=51 comments); Quality of service provided by airport and airline staff (n=43 comments); Respect and dignity afforded to flyers who rely on assistive devices (n=32 comments); Issues related to getting on and off aircraft (n=32 comments); Issues with security (n=30 comments), the handling of passengers assistive devices (n=28 comments) and communication and compliance of policies and procedures (n=27 comments).

**Conclusions**: While the built environment and outdated or unenforced policies presented significant barriers to flying for people in our sample who use assistive devices; 49% of our sample (n=97) mentioned “people” as being directly linked to barriers or facilitators to air travel. More than half of the comments in our data (51 of 97 participants) noted deficits in employees' abilities to competently address the needs of flyers who use assistive devices. Deficits in employee knowledge and/or skills were noted across each of the seven themes that emerged in our analysis. Importantly, the problems we identified at the employee-level could be addressed by either selecting employees who are aware of, or prepared to address the needs of flyers who use assistive devices, or by providing the training and support these employees need when assisting travelers.

**Learning Objectives**

- Describe how airport and airline employee behaviors directly and indirectly affect the air travel experiences of people who use mobility devices;
- Identify the seven modifiable human factors that emerged as barriers to air travel for assistive device users;
- Explain the relationship between employee knowledge and skill deficits and barriers to accessible air travel
- Compare employee selection versus training interventions to improve staff competency among airline and airport employees
- technologies of interest.

# P2622: Virtual Reality, Augmented Reality, and Mixed Reality in Neurorehabilitation: What Clinicians Need to Know

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**Background**: Since its inception in the early 1990s, the clinical use of technology to enhance and alter reality has shown promise in addressing cognitive, motor, and functional impairments associated with a variety of neurological and psychological conditions. This evolving field has produced a growing body of research demonstrating effectiveness in both assessment and rehabilitation. With recent advancements in technologies which alter and/or enhance reality, various methods of achieving this have emerged. Under the umbrella term of Extended Reality (XR), Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) each have different clinical utility and advantages. Neuro rehabilitation clinicians are challenged to stay informed about advancements and benefits of therapeutic use of virtual reality modalities in treatment of patients with neurological conditions.

**Purpose**: To present survey data from physical, occupational, and speech therapists on their knowledge, prior use, and perceived clinical effectiveness of immersive technologies, and to introduce a novel application integrating VR, AR, and MR for treating a broad range of neurological conditions.

**Methods**: A brief survey was delivered electronically to neuro rehabilitation clinicians in the United States, inquiring about their knowledge of the terminology and various methods used to alter or enhance reality as a clinical intervention. The survey questions gauged the population's early impressions of XR, their use of these technologies in the clinic to date, and their knowledge of the differences and clinical rationale between VR, AR, and MR. It also asked respondents about the patient types on which they have used XR technologies and which patient types they are aware XR technologies may have clinical benefit.

**Results**: Statistical results from respondents detailing clinicians comfort level with VR terminology and current treatment concepts are presented as a representative sample of the knowledge and clinical utility status within the neuro rehab community as a whole. Definitions and exemplary models within XR are provided, and to demonstrate the different XR clinical strategies, the features and benefits of a novel application, BITS FR (Bioness Integrated Therapy System-Functional Reality), which can utilize VR, AR, and MR within the same hardware are presented. The survey response data will inform neuro rehab clinicians on the state of education within the XR modality space. From this survey response data, recognizing the lack of understanding and appreciation of the terminology and use case differences of VR, AR, and MR can springboard educational programming and content so physical therapists can better select the appropriate XR to personalize the intervention to the patient type and drive better outcomes.

**Conclusion**: Neuro rehab clinicians have increasing technology options to consider for evaluating and treatment patients. Understanding the strategic hardware and software differences between VR, AR, and MR, and the benefits and limitations of each, will help technology review committees make an educated decision when discerning the features and benefits of the technology options when acquiring the best technology to for their clinics. In turn, this will help clinicians deliver the most effective interventions to optimize patient outcomes.

**Learning Objectives**

- To identify the differences between types of therapeutic virtual reality available for neuro rehabilitation

- To describe the benefits of therapeutic virtual reality in treatment of patients with a wide variety of neurological conditions
- To identify treatment interventions which can be enhanced with use of therapeutic virtual reality
- To assess how virtual reality could benefit treatment for both cognitive functioning and motor skills in the neurologic population

# P2623: Pairing Transcutaneous Spinal Cord Stimulation with Overground Exoskeleton Walking Alters Assistance-Dependent Neuromuscular Engagement: Case Study

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**Background:** Overground robotic exoskeletons enable upright gait training after spinal cord injury (SCI), yet the relationship between robotic assistance and biological neuromuscular engagement remains poorly understood. It is unclear how neuromuscular recruitment scales as robotic assistance is reduced, and how this relationship may be modified by neuromodulation and training in individuals with chronic, clinically complete SCI.

**Purpose:** To (1) examine how neuromuscular engagement scales in conjunction with changes in exoskeleton assistance during overground gait training, and (2) determine whether training paired with transcutaneous spinal cord stimulation (tSCS) alters assistance-dependent muscle recruitment.

**Methods:** A participant with chronic, clinically complete SCI completed four weeks of training (3 sessions/week) consisting of overground gait training in the Wandercraft Atalante X exoskeleton paired with tSCS. Pre- and post-training assessments quantified step length, step velocity, sagittal-plane joint kinematics, and lower-limb electromyography (EMG) across

multiple levels of exoskeleton assistance (90%-55%). In Experiment 1, acute effects of graded assistance reduction were examined at baseline. In Experiment 2, changes in assistance-dependent neuromuscular recruitment were evaluated following training with tSCS.

**Results:** *Experiment 1:* Reducing exoskeleton assistance resulted in systematic declines in spatiotemporal gait performance. As assistance decreased from 90% to 55%, step velocity and step length were reduced by approximately 15–25%, while joint kinematics remained largely preserved across assistance levels. Despite the increased task demands imposed by reduced support, lower-limb EMG demonstrated limited and inconsistent scaling with assistance reduction (i.e. asymmetrical responses, distal versus proximal muscle responses, etc.), indicating continued reliance on robotic assistance.

*Experiment 2:* Following four weeks of overground exoskeleton training paired with tSCS, assistance-dependent gait performance improved, particularly at lower assistance levels. Post-training, step velocity and step length were consistently higher across assistance levels compared to baseline, with the greatest improvements observed at 65–55% assistance. Joint kinematics demonstrated subtle but consistent increases across assistance levels post-training, suggesting improved joint utilization during reduced robotic support. These functional gains were accompanied by enhanced assistance-dependent scaling of lower-limb EMG, indicating increased neurophysiological contribution as robotic assistance was reduced.

**Conclusion:** This study demonstrates that graded reductions in exoskeleton assistance meaningfully increase gait demands during overground exoskeleton gait training after chronic SCI, primarily by constraining step velocity and step length while preserving joint kinematics. Importantly, pairing overground exoskeleton gait training with tSCS enabled improved walking performance at lower assistance levels without compromising joint motion, suggesting greater capacity to tolerate increased task demands and promote active participation rather than reliance on robotic support. Although derived from a single participant, these findings underscore the importance of task-specific, load-dependent training paradigms and highlight the potential for neuromodulation to support more adaptive, patient-centered rehabilitation strategies in individuals with chronic SCI.

**Learning Objectives**

- Explain how robotic exoskeleton assistance influences gait mechanics and muscle activity, and task demands during overground walking after spinal cord injury.
- Describe the role of tSCS in modulating neuromuscular engagement during robotic gait training.
- Analyze assistance-dependent changes in spatiotemporal gait measures and joint kinematics to distinguish between robotic support and neurophysiological contribution.
- Design a rehabilitation progression strategy using graded exoskeleton assistance, incorporating neuromodulation to promote active engagement and functional recovery.

# P2624: Substance and polysubstance use in those with spinal cord injury: A descriptive analysis

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Background: Substance use disorders are pervasive in the general population and occur at significantly higher rates in the spinal cord injury (SCI) population (Graupensperger, et al, 2020). A majority of research on substance use disorders has focused on individual drugs in isolation of other drugs used. However, a large, national survey of the general population has shown that 20% routinely use more than one drug (Rockhill, et al, 2026). There is very limited research on polysubstance use in the SCI population, and estimates of polysubstance use are not available.

Purpose: We aimed to estimate the prevalence of polysubstance use in persons with SCI. We hypothesized that the prevalence would be higher than the published estimate of 20% in the general population.

Methods: We used the Spinal Cord Injury Model Systems National Database, a survey which asks about a variety of health outcomes, including drug use. Individuals are initially enrolled when hospitalized for SCI rehabilitation at a Model System hospital and then followed longitudinally every 5 years. For analysis, the database included individual-level survey follow-up responses collected between 2016 through 2021. We calculated summary statistics for demographics and drug use. Alcohol use was assessed using the World Health Organization Alcohol Use Disorders Identification Test (WHO-AUDIT-C) question “how often did you have a drink” in the past 3 months. Frequency of tobacco, cannabis, cocaine, amphetamine, sedative, hallucinogen, opioid, and other substance use was assessed using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), which asks about substance use on a 5-point scale (never to daily use) in the past 3 months. We applied the definition of polysubstance use, which refers to simultaneous or sequential consumption of multiple psychoactive substances; and for this study, substance use within a 3-month period. Individual responses for each substance was coded “0” for no use and “1” for use within the past 3 months; each response was summed across substances to calculate a total substance use score, inclusive of alcohol use.

Results: There were 10,984 unique surveys. Respondents were, on average, 48.9 years old at time of survey, mostly male (78.1%), and white race (70.3%). Few respondents (4.7%) reported Veteran status. Almost 75% of respondents had a high school education or less, 25% were employed, and almost 62% had annual family incomes less than $50,000. Seventy-four percent reported using at least one substance. Of those who reported using substances, 53.9% reported using one substance, 32.3% reported using 2 substances, 11.3% reported using 3 substances, and 2.8% reported using 4 or more substances in the past 3 months. This resulted in a polysubstance prevalence estimate of 46%. Sub analyses were performed on Veteran status and were not significantly different from reported results.

Conclusions: Polysubstance use in the SCI population is higher by more than twofold (46%) than use in the general population. Given the elevated use of polysubtance in individuals with SCI, ongoing clinical screening for single substance and polysubstance use is an important tool in the overall health and wellness of individuals with SCI.

## Learning Objectives

- Describe the frequency of substance use overall within the SCI respondent sample

- Describe the proportions of polysubstance use within the SCI respondent sample
- Identify the gaps in the literature regarding polysubstance use in the SCI population
- Identify the importance of using clinical screening for polysubstance use in the SCI population in their own clinical practice


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