PVA
Paralyzed Veterans of America

HEALTHCARE
SUMMIT + EXPO 2025

Promoting Excellence, Supporting Clinicians

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Dear Summit Attendees:

Welcome to New Orleans and the 2025 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, Program Committee Chair	Lindsay Perlman, MPH Summit Task Force Chair

Session
Abstracts

PC-251: SCI 101; ALS 101; MS 101: Nuts and Bolts of Understanding and Managing SCI&D from onset to throughout life.

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Participant has indicated the following discussion of unapproved drug or product uses:
I will discuss research regarding transmagnetic stimulation for MS progression.

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The Veterans Affairs SCI&D System of Care mission is to support, promote, and maintain the health, independence, quality of life, and productivity of individuals with Spinal Cord Injury throughout their lives. To that aim, this workshop offers a general overview of spinal cord injury and other complex diseases with a specific review of the unique approaches to the care of individuals with spinal cord injury (SCI/D), multiple sclerosis (MS) and amyotrophic lateral sclerosis (ALS). This approach aims to educate providers who are new to the field, rarely work in a multidisciplinary group, and may not have had opportunities to integrate knowledge and behaviors around SCI&D to clinical practice. An understanding of similarities and differences between these three conditions may suggest additional treatment and management strategies to impact function and quality of life. The attendee will also have an opportunity to consider the advantages of team care in all three settings.

Spinal cord injuries (SCI) typically are the result of trauma or the result of an underlying medical condition. Those with SCI have individualized health issues requiring a team approach to prevention of complications and care. Understanding spinal cord anatomy and spinal cord syndromes is important in the management of early disease. This session will review the ASIA system of classification, demonstrate the motor and sensory exam, discuss rehabilitation and management of key symptoms of bowel and bladder, autonomic dysreflexia and spasticity.

Multiple sclerosis (MS) is a chronic, progressive and unpredictable neurologic disorder that affects motor, sensory and cognitive functions. MS is characterized by neurological symptoms that relapse and remit. Medication can limit the rate of disease progression, but cure has been elusive. This section will highlight the diagnosis of MS, magnetic resonance imaging (MRI) used in diagnosis and disease management, relapse management, medications that modifying the disease course, and treatment of common symptoms.

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease of motor neurons that eventually leads to paralysis and death within approximately two to five years of diagnosis. This session explores the loss of voluntary muscle activity and its meaning in the lives of those living with ALS and their care partners. Specific management of speech, dysphagia and respiratory support are discussed. Ethical concerns arise and demand a thoughtful team approach. This session will discuss case studies around ethical issues.

Spinal cord injury and other disorders, MS and ALS, converge at the 24 SCI centers in the VA system. Each disorder has a unique set of management conditions. Providers who have better understanding of the unique similarities and differences between MS, ALS and SCI/D are best equipped to enhance quality of life for these Veterans.

Learning Objectives

- Understand best practices in 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 spinal cord injury, multiple sclerosis

PC-253: Manual Wheelchair Essentials: Adjustment and Training to Improve Independence

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Background and Issues: Independence in manual wheelchair mobility relies heavily on both proper setup and thorough user training. Unfortunately, manual wheelchair skills receive minimal attention in most clinical curriculums, with limited to no formal training provided on their assessment and instruction. As a result, many providers lack the knowledge needed to properly set up a manual wheelchair, make necessary adjustments to optimize user positioning, or deliver effective wheelchair skills training to enhance mobility and independence.

Purpose: This preconference institute will focus on hands-on practice with manual wheelchairs. For setup, we will demonstrate the adjustments that can be made, explain how to make them, and discuss their potential impact on user function. Recognizing that wheelchair setup and training are interconnected, we will pair this with practical training on how to assess and teach manual wheelchair skills effectively. Training will follow the Wheelchair Skills Program, a structured, evidence-based approach to teaching wheelchair skills rooted in motor skills learning principles.

Methods: Minimal didactic content will be combined with hands-on practice with attendees working in pairs or small groups. The course outline will include a discussion of possible adjustments that can be made and the evidence behind them, guided “how-to” hands-on practice of adjustments, application of adjustments to teaching wheelchair skills, and a discussion of case examples from clinical practice.

Results: By the end of the session participants will be able to: 1) provide a structured approach to teaching manual wheelchair mobility 2) complete hands-on manual wheelchair adjustments, 3) list two resources to use to support manual wheelchair provision

Conclusions: Research demonstrates that boot-camp-style trainings, like this workshop, can enhance clinician capacity, ultimately leading to improved clinical care.

Learning Objectives

- Complete five hands-on manual wheelchair adjustments to optimize user positioning
- Provide a structured approach to teaching 5 basic-, community-, or advanced-level wheelchair skills
- Identify two manual wheelchair skills training skills that can be used in your clinical setting
- Describe how to access two free assessment and training resources

PC-254: VA Immersive: Defining a New Reality in Care Delivery and Experience

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Background/Issues: Over the last eight years, Veterans Health Administration has been utilizing immersive technology (e.g., augmented reality, mixed reality, and virtual reality) at increasing and expansive rates. Some of the primary users and benefactors of this technology have been patients with spinal cord injuries (SCI) and patients with multiple sclerosis (MS). The ability to practice skills and/or positively distract patients in an immersive environment where they are safe and psychologically present has allowed clinical staff to better engage patients, increase access to care, and improve historically difficult to attain outcomes.

Purpose: The goal of implementing immersive technology to augment patient care was to increase engagement, increase access, and improve clinical outcomes.

Methods: Veterans were surveyed on their experiences using immersive technology in the context of their VA care. Allowing patients to use immersive technology (primarily virtual reality) enabled the evaluation of: interest of patients in utilizing this technology for their care delivery, both at home and in the medical center, and patients' perceptions of ease versus difficulty of using the technology. Results were grouped by whether or not the patient had ever utilized this technology before.

Results: Of the 372 Veterans who completed post-experience evaluations, 64% had never used virtual reality before, but 90% said it was easy or very easy to use. 90% said they'd like more virtual reality incorporated into their care delivery, both at home and at the healthcare facility. One of the greatest lessons learned through implementation of this technology was the value of "heads in headsets," or in-person demonstrations. We also identified the importance of having at least one engaged clinical champion to successful implementation. Finally, given the ease of access to this technology outside of the health care system, we often found that patients identified ways to use virtual reality on their own. One example is a patient with MS who improved her grip strength to the upper limit of normal and noted improvement in her mental and emotional health.

Conclusion: In conclusion, increasing access to immersive technology (e.g. augmented reality, mixed reality, and virtual reality) for SCI, amyotrophic lateral sclerosis (ALS), and MS patients can increase access to and engagement with care while also enabling patients to interact with virtual environments where they feel safe to practice vital skills.

Learning Objectives

- Define immersive technology and relevant key terms
- Describe the current landscape of immersive technology in healthcare
- Discuss current roles and future opportunities for health care providers, particularly in spinal cord injury (SCI) and dysfunction, multiple sclerosis (MS), and amyotrophic lateral sclerosis (ALS)
- Articulate critical next steps to implementing immersive technology in SCI, MS, and ALS care delivery and experience

P2501: MADE to RECOVER – Practical Products Developed to Enhance Engagement and Reintegration of Veterans with SCI/D

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This presentation will briefly outline the history of a collaboration between a SCI/D physician and an engineer, leading to the formation of a R&D program (MADE) that evolved into a new VA Rehabilitation Research Development and Translation Center (RECOVER). Development of several rehabilitation products will be described including some that are now commercially available. Results from clinical trials will also be shared to show potential for products to impact Veterans' engagement and participation in important life activities and events while also preventing secondary complications of SCI/D.

Learning Objectives:

- Effectiveness of skin screening technologies for visualizing at-risk areas
- Effects of supine cycling on cardiovascular fitness after surgery
- Standing time results for standing frames and standing wheelchairs
- Effects of mobility-in-standing feature for standing wheelchairs

P2502: Cracking the Spinal Cord Injury Code: 10 Principles, One Incredible Journey

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Background and Issues: Spinal cord injury (SCI) rehabilitation often relies on clinic-based interventions and advanced technologies, which can be inaccessible due to cost, location, or logistical challenges. This can leave patients feeling stuck, unsure of how to progress their recovery. Many therapists also face the challenge of guiding clients in resource-limited settings. A virtual delivery model, paired with education on evidence-based principles, provides a solution to empower both clinicians and individuals with paralysis to achieve functional recovery through accessible and effective strategies.

Purpose: This presentation demonstrates how ten evidence-based principles in SCI rehabilitation can be applied to promote functional recovery, empower clients, and enhance therapists' ability to support progress. It highlights how these principles can be delivered virtually, taught to clients for autonomous home practice, or integrated into therapists' existing care models.

Methods: The intervention focuses on improving range of motion (ROM), progressive overload, motor and neuro recruitment, high-volume repetitions, and stability before mobility. Virtual sessions utilize real-time coaching, progress tracking, and personalized feedback to guide clients in applying these principles. Therapists are shown how to translate these strategies into digital delivery models or patient education to encourage effective, goal-oriented home workouts. Functional task practice, alignment, and weight distribution strategies are emphasized to ensure exercises align with real-world activities. Case examples illustrate how these principles systematically address recovery plateaus in both clinical and at-home settings.

Results and Lessons Learned: Clients using these principles—whether through therapist guidance or independently—achieved significant improvements in mobility, stability, and functional independence. Virtual delivery proved highly effective for maintaining engagement, ensuring safety, and building confidence. Teaching clients these principles fostered greater autonomy, helping patients perform more effective, goal-driven workouts at home. Key lessons included the importance of combining education with targeted programming to create sustainable recovery pathways.

Conclusions: This principle-based approach is a powerful tool for both therapists and individuals with paralysis, offering a scalable and accessible model for SCI recovery. By learning and applying these strategies, clients can take greater ownership of their rehabilitation, while therapists can extend their impact beyond traditional clinic settings. Attendees of this talk will leave with actionable insights to empower their patients—or themselves—toward meaningful progress, regardless of available resources.

Learning Objectives
- Identify and apply ten core principles of spinal cord injury rehabilitation to design effective and accessible therapy programs for individuals post-SCI.
- Implement strengthening and mobility strategies that prioritize functional independence, enabling clients to achieve meaningful progress without reliance on advanced technologies or frequent therapy clinic visits.
- Explain how to effectively communicate the principles of SCI rehabilitation to their clients, empowering them with the knowledge and confidence to actively engage in their recovery journey.

- Design and adapt home-based exercise programs for individuals with spinal cord injuries by identifying and applying principles to ensure safety, effectiveness, and alignment with functional recovery goals.

P2503: Take Control Back Program: Implementation of an Interdisciplinary Comprehensive Neurogenic Bowel and Bladder Training Program

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Background: Neurogenic bladder/bowel are rated amongst the top priorities for people living with chronic spinal cord injury (SCI). It negatively impacts health, independence, dignity and quality of life (QOL). There is consensus that further education on neurogenic bladder/bowel is needed for patients and clinicians. Early education for patients and caregivers is critical to prevent complications and optimize management before transitioning to the community. To accommodate for shorter lengths of stay in inpatient rehabilitation, interdisciplinary programs that use multimodal education strategies for caregivers and patients are essential to foster independence with bladder/bowel management after SCI.

Purpose: With funding from the Neilsen Foundation's Creating Opportunity and Independence Grant, Burke Rehabilitation Hospital implemented the Take Control Back (TCB) Program, a comprehensive interdisciplinary education and training program for bladder/bowel management over a two-year period to improve successful management of neurogenic bladder/bowel during inpatient rehabilitation.

Method: To meet the needs of individuals admitted to an acute inpatient rehabilitation SCI Program, the TCB Program was created to target the needs of patients presenting with neurogenic bladder/bowel. Key components of the program included adding a continence nurse educator for dedicated bladder/bowel training, purchasing specialized training equipment, creation of education videos, implementation of a hotline for questions post-discharge, and administration of surveys to measure program effectiveness. Patients participating in the program received a follow-up phone call 48-72 hours post-inpatient discharge to identify and troubleshoot any concerns. A video series for patients and caregivers was created and utilized to improve success with bladder/bowel management prior to discharge and to be used as a resource after discharge. The videos included interdisciplinary training videos, adjustment to SCI, and peer mentor support. Outcomes on Bowel Management Satisfaction SCI-QOL subtest, Bladder Management Satisfaction SCI-QOL subtest, and Mentor Tool for Bowel Management were tracked at discharge, one, three, and six-months post discharge.

Results: Seventy-one individuals participated in the TCB program between January 2022 and December 2023. At discharge, >80% of patients reported feeling ready to manage their bladder/bowel program. At discharge, 25% of patients reported that bladder/bowel accidents limited their independence. At 3 months post-discharge, only 5% of patients reported that bladder/bowel accidents limited their independence. Improvement in QOL measures were noted from discharge to six months. This demonstrated that programmatic changes such as focused early education and long-term follow-up post-discharge improves neurogenic bladder/bowel outcomes.

Conclusion: The implementation of a targeted program with dedicated resources to address management of neurogenic bladder/bowel after SCI had a positive impact on patient outcomes as well as institutional culture. Multi-modal teaching tools facilitated earlier conversations in the rehabilitation hospital course, and optimized time for instruction and practice prior to discharge. Outcome information collected has been utilized to identify additional areas of training and support needed to minimize the impact of bladder/bowel on QOL after SCI. The TCB Program continues to expand the use of resources in the inpatient and outpatient setting to support individual’s independence with bowel and bladder management after SCI.

Learning Objectives

- List barriers to successful training of neurogenic bowel and bladder management due to SCI/D.
- Describe resources utilized to enhance a SCI/D neurogenic bladder/bowel training program for individuals living with spinal cord injury in an inpatient acute rehabilitation setting.
- Discuss outcomes measures utilized to track the impact of bowel and bladder management after SCI to target changes on an inpatient program.
- Discuss the impact of an interdisciplinary neurogenic bowel/bladder training program on the quality of life after SCI/D.
- Explain the benefits of focused programming to address the management of neurogenic bowel/bladder due to SCI/D from an interdisciplinary perspective.

P2504: Intravenous Medications for Veterans with Multiple Sclerosis: Practical and Logistical Issues

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Background and Issues: The treatment landscape for patients with multiple sclerosis (MS), neuromyelitis optica (NMO), anti-MOG associated disease (MOGd) and neurosarcoidosis (NS), has changed substantially over the last two decades.

In particular, the advent of intravenous (IV) medications has led to a dramatic improvement in the reduction of new and active lesions on magnetic resonance imaging (MRI) as well as new clinical exacerbations. The purpose of this clinical symposium is to review IV medications indication, ways of administration and use, as well as practical and logistical aspects related to delivery of care within the VA Healthcare System (VAHS).

Methods: We proposed 90-minute symposium targeting providers and nursing staff. We will present evidence-based medicine indication and monitoring of each IV medication for the treatment of MS, NMO, MOGd and NS. We will also discuss pre- and PRN medications along with infusion rate, expected side effects from each infusion and management of these. Last, we will present available options within the VAHS for accessing IV medications inclusive of the *Close to Me* care delivery program. Clinical cases in an interactive manner with the audience, with the goal of individualizing counselling plans for individual patients, will also be proposed.

Results: IV medications include a series of monoclonal antibodies targeting specific antigens, thought to be responsible for triggering disease activity. These medications include natalizumab, rituximab, ocrelizumab and ublituximab for MS, eculizumab, inebilizumab and satralizumab for NMO, rituximab for MOGd, and infliximab for NS

Within the VAHS, Veterans can access any of these IV medications as deemed necessary by the treating provider. Most of the VA regional canters are also equipped with an InSite infusion suite. For Veterans unable to travel to the local VA, options are available for community care referral or for referral to a different VA hospital or hub.

Conclusions: Within the VAHS Veterans affected by MS, NMO, MOGd or NS can have access to any of the available IV treatments. This applies to those Veterans who live close to a Regional Specialty Program as well as to those who live in rural areas.

Learning Objectives

- To understand the indication and ways of monitoring of each IV medication approved for neuroimmunological conditions
- To be familiar with the ways of administration of each IV medication
- To be familiar with all the pathways available at the VA to provide IV medications to Veterans
- To be familiar with the resources needed and available to set up a regional infusion center

P2505: Rehabilitation Reinvented: Tech-Driven Solutions for ALS Care

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Background and Issues: Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease that profoundly impacts motor function and quality of life. Emerging technologies—such as virtual reality (VR), wearable devices, robotic-assisted gait training (RAGT), and blood flow restriction training (BFRT)—hold promise for preserving function and enhancing quality of life in individuals with ALS. However, these interventions remain underexplored in clinical settings, limiting their adoption in standard rehabilitation practices. This presentation will review the latest evidence and clinical considerations for integrating these technologies into ALS care. Case studies and novel clinical data will illustrate the practical application and challenges of using these tools while deviating from traditional practice guidelines.

Purpose: This session aims to provide attendees with an overview of current physical rehabilitation and exercise recommendations for individuals with ALS and explore how cutting-edge technologies can expand care options. Through interactive case studies and real-world data, participants will gain practical insights into clinical decision-making and the potential benefits of innovative interventions.

Methods: A review of recent literature was conducted to evaluate the clinical application of novel rehabilitation technologies in ALS care. Additionally, preliminary clinical data are presented to assess the safety, feasibility, and acceptance of these technologies. Outcome measures—including the Six-Minute Walk Test, Patient-Reported Impact of Spasticity Measure, Five Times Sit-to-Stand Test, and Timed Up and Go—are highlighted to facilitate discussion about the preliminary safety and efficacy of these approaches, as well as the need for further research.

Results: Preliminary data suggest that incorporating these technologies on a case-by-case basis may be beneficial for individuals with ALS. Rigorous ongoing assessments remain essential to minimize risks such as overexertion and adverse events. Rehabilitation technologies may complement existing low-intensity exercise recommendations, helping to prevent deconditioning, preserve mobility, and manage pain.

Conclusions: Although robust research on rehabilitation technologies specific to ALS is limited, clinicians can consider integrating these tools into individualized care plans. The rarity of ALS poses challenges for large-scale randomized controlled trials; however, insights from research in other neurological disorders and careful monitoring of patient responses can inform future clinical trials and practice recommendations.

Learning Objectives

- Describe the proposed clinical rationale for the use of virtual reality, robotic-assisted gait training, wearable technologies, and blood flow restriction training for persons with amyotrophic lateral sclerosis.

- Identify appropriate patients for clinical application of various rehabilitation technologies.
- Compare and contrast outcome measures or test items to meaningfully measure impact over time.
- Design physical rehabilitation and exercise interventions incorporating various rehabilitation technologies.

P2506: Building a safer tomorrow: Reducing risk in patient handling and mobility for SCI/D populations.

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Background: The Veterans Health Administration (VHA) is the largest health care system in the USA, providing care to over 9 million veterans at 1,242 health care facilities through 171 medical centers in the United States Territories and employs over 98,111 nurses nationwide. Our bedside staff are one of our most valuable assets as primary caregivers and leaders who are devoted to serving this countries heroes. In 1998 it was discovered that many nurses experienced severe musculoskeletal injuries (MSI), leading to career ending injuries or working with chronic disabilities. A group of occupational health nurse leaders/researchers and health care providers determined that manual handling using body mechanics do not prevent injuries. SPHM programs are critical to reducing the risk of injury for both patients and

healthcare providers. Patients with disabilities, such as those served by the Paralyzed Veterans of America, often require assistance with mobility, positioning, and transfers, which can further increase the risk of injury when not performed correctly. SPHM programs aim to implement evidence-based practices, equipment, and education to mitigate these risks while promoting dignity and comfort for patients.

Methods: This presentation will explore the historical development and implementation of the VHA SPHM program and the resulting and significant success in the reduction of MSI. The methods will include a review of the steps for rolling out a successful SPHM program in a health care system, describing the 6 critical elements of implementation, reviewing common pitfalls and challenges that nurse leaders can anticipate and overcome, review of best practices in SPHM. We will provide an overview on how the SPHM program has had a direct impact on patient care outcomes for SCI/D, populations such as reduction in falls, Pressure Injuries (PIP), length of stay (LOS), Catheter associated urinary tract infections (CAUTI) rates, Ventilator days, and improvements in safe early and continuous mobility programs (SECM). Hands on case scenarios included will highlight the success of these programs in both inpatient and outpatient settings, with a focus on the unique needs of veterans with paralysis. Key data on injury rates, patient satisfaction, and caregiver feedback will illustrate the benefits of SPHM programs.

Results: We will discuss the research studies conducted over the years demonstrating how injuries have dropped by 50% nationwide over the past 10 years throughout VHA. We will report our partnerships with a number of regulatory agencies including Occupational Safety Health Agency (OSHA), National Institute for Occupational Safety and Health (NIOSH), Centers for Disease control (CDC), Center for Engineering, Occupational Safety and Health (CEOSH), and the Joint Commission (JC). We will present how SCI/D leaders can help prepare the health care system plan for site visits and report program outcomes in the most effective manner.

Conclusion: PVA is a critical partner to protect preventable injuries for veterans and their caregivers, through successful SPHM programs.

Learning Objectives

- Identify 6 critical elements that are the key pillars to a successful SPHM program for the SCI/D population.
- List 6 common pitfalls in patient handling programs for the SCI/D populations and how to overcome them.
- Demonstrate 3 ways to use SPHM technology to safely assist in and mobilizing patients with SCI/D.
- Compare and contrast a manual transfer with an equipment assisted transfer.

P2507: Power wheelchair footplate pressure profiles during wheelchair operations: implications for wheelchair user safety.

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Background: Veterans with Spinal Cord Injury and Disorders (SCI/D) have limb weakness and loss of sensation leading to impaired mobility. Wheelchairs (WC) are critical to independence and quality of life for persons with SCI/D. When users' feet become mispositioned or dislodged from the WC footplates, even optimally configured WCs can be dangerous during daily operation if one cannot feel, see, or easily reposition their lower limbs when inadvertent lower extremity displacements (ILEDs) occur. ILEDs are common events, particularly during power WC (PWC) use, and can be triggered by transfer activities, pressure relieving maneuvers particularly with tilt, colliding with objects, muscle spasms, and driving over rough terrain. ILED during power tilt +/- legrest extension also can cause the feet to misalign on footplates

after return to upright. When ILEDs occur, injuries may result if the foot drags under the wheelchair, lower limbs collide with obstacles, or pressure injuries develop. Such injuries have caused hospitalizations and may have led to deaths.

Purpose: Describe development and preliminary testing using FootSafe, a VA-patented prototype assistive technology (AT) for detection and alert of lower limb and foot displacements from the footplates of power wheelchairs (PWC) with the goal of preventing traumatic lower limb injuries in PWC users, including Veterans.

Design: FootSafe technology was developed to provide ILED detection using pressure and position data. The prototype is being testing by Veterans with Spinal Cord Injuries & Disorders who use PWCs for their primary mobility tool.

Methods: Device development: Algorithms have been developed to detect ILED based on mean footplate pressure profiles picked up by FootSafe. The FootSafe detection application provides an alert during testing procedures to notify the research team and user of foot displacements during PWC mobility over a set course at the Cleveland VA Medical Center. The FootSafe sensor is temporarily installed on the PWC footplates of study participants who are Veterans with SCI/D. Study participants wear each of three commonly seen foot coverings: flat footwear, soft padded heel protection boots (meant for use in bed), or hospital non-slip socks, during a 1 hour recording of supervised PWC mobility at the participants preferred speed on the set course. During each test, FootSafe collects sensor output data and runs our best performing sensing algorithm, while study staff simultaneously record speed of operation, video of foot position, visually observe the feet, and document any ILEDs that occur. Video and FootSafe data are reviewed by our clinician experts to confirm and describe ILEDs which occur.

Results: FootSafe captured pressure profiles which show differences in contact profiles and pressure between different types of footwear and successfully detects foot displacement in real-time. The soft padded heel protection boots have the least contact pressure on the footplates. Speed of PWC operation appears to be directly related to the frequency of ILED occurrence.

Conclusions: Choice of footwear and operation speed have important implications for preventing ILED occurrence during PWC use. Further study is needed to develop reliable wheelchair and adaptive equipment designs which promote safety for PWC users with SCI.

Learning Objectives

- Describe causes of inadvertent lower limb displacements that occur during wheelchair use.
- Describe patterns of ILED-related injuries identified during wheelchair use.
- Understand how footplate pressure profiles vary when using different types of footwear during power wheelchair use.
- Describe implications of PWC speed of operation on ILED occurrence and user safety.

P2508: Home-based intervention via video-teleconferencing: Advancing Spinal Cord Injury Research.

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Background: Due to mobility limitations, recruiting and retaining individuals with spinal cord injury (SCI) for research can be challenging. SCI patients experience enormous travel burdens, potentially hindering research participation that requires traveling to a research center. However, home-based interventions conducted via video teleconferencing can offer a viable alternative.

Purpose: This study aimed to determine the feasibility and the impact of a home-based electrical stimulation exercise protocol combined with vitamin D (Vit D) supplementation on bone health using video teleconferencing.

Methods: Six men with motor-complete SCI (C8 to T10) were randomized into two groups for a 9-month home-based exercise training protocol with video-teleconferencing via personal computers, smartphones, or iPads. Group 1(Vit D+ ES-Excs.; n=4) underwent 4.5 months of neuromuscular electrical stimulation resistance training (NMES-RT) with a home electrical stimulation (ES) unit (Thera Touch Ex 4 by Richmar). This was followed by another 4.5 months of functional electrical stimulation rowing (FES-rowing), using EasyRow hydraulic rower by Stamina (Springfield, MO, USA). Group 2 (Vit D+ passive movement training; n=2) underwent passive leg movement (PLM) training performed by a caregiver for 9 months. All participants received 2000 IU Vit D supplementation daily after initial two weeks graded dose for those whose serum 25(OH)D were in the deficient range... Dual x-ray absorptiometry (DXA) scans were performed to measure total and regional bone mineral density (BMD) as well as total and regional body composition. A trained technologist also captured a non-contrast magnetic resonance imaging (MRI) with a 3T Tesla magnet to measure trabecular bone microarchitectures at the distal femur and proximal tibia, and biomarkers of bone formation and resorption were

measured with ELISA. Measurements were obtained at baseline, 4.5 months, and 9 months. Data were analyzed using IBM SPSS statistical software version 26.

Results: Two participants in group 1 showed a 28% decrease in trabecular spacing and up to 49% increases in trabecular network density, which correlated with attenuation in BMD loss of 3.6-7.7% at the pelvis, 4.5-8.4% at the femoral neck, and 10.5-18.7% at the knees. Participants in Group 1 also showed a 5.3% increase in the leg to total body lean mass and decreased biomarkers of bone resorption. Group 2 did not show similar changes.

Conclusions: Over a nine-month period, the combination of Vit D supplementation and home-based electrical stimulation exercises conducted through video teleconferencing enhanced trabecular microarchitecture parameters, reduced BMD losses and increased lean mass. These findings highlight the feasibility and effectiveness of video teleconferencing for research in the spinal cord injury population.

Learning Objectives

- Describe two aspects of the video-teleconferencing platform.
- Describe one challenge of recruiting and retaining subjects in spinal cord research.
- Explain the difference between electrical stimulation resistance training and functional electrical stimulation rowing.
- Identify two benefits of home-based exercise training.

P2509: Implementation of Fire Readiness Education Program among Wheelchair and Scooter Users

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Background: Evaluation from a residence during a fire event often requires people to climb over objects, etc. which is challenging or impossible for people who use wheelchairs and scooters (WC/S).[1] Previous research has found that people with functional limitations disproportionally die in residential fires[1,2] and a gap exists between perceived evacuation capabilities and having specific evacuation plans.[3,4] A scoping review and focus group investigated fire safety for people with mobility disabilities, revealed the lack of evidenced-based fire prevention and management programs that meet the needs of people with mobility disabilities and the importance of implementing comprehensive early detection systems (e.g., smoke alarms and carbon monoxide detectors), utilizing specialized evacuation equipment, and creating detailed emergency plans that address notification protocols, establishing accessible egress routes, and post-fire education to enhance residential fire preparedness for WC/S users.[5] To address this gap in resources, an evidence-based, online, fire prevention and management program for people who use WC/S, the Fire Readiness for Wheelchair Users (FEW) program, was developed.

Objective: This prospective behavioral intervention study aims to assess the impact of the Fire Readiness for Wheelchair Users (FEW) on fire prevention and management preparedness knowledge and self-efficacy among people who use W/C.

Methods: After providing informed consent, participants completed online assessments to examine baseline fire prevention and management preparedness knowledge and self-efficacy. Next, participants participated in an online hybrid, six-week program. Weekly, participants viewed asynchronous educational materials and then met synchronously for groups discussions led by a firefighter and a therapist. After the intervention, the baseline assessments were repeated, and semi-structured interviews were conducted.

Results: Thirty-five participants living with spinal cord injury (SCI), multiple sclerosis (MS), and spinal muscular atrophy (SMA) enrolled and completed the FEW program. After engaging in the program, participants reported increased fire prevention and management knowledge, confidence in the ability to evacuate from their place of residence in the event of a fire, and adoption of specific safety measures.

Conclusions: After engaging in the FEW program, fire prevention and management preparedness knowledge and self-efficacy for people who use W/C increased. Future research and program development should continue to emphasize accessible, comprehensive, and practical fire prevention and management education tailored to the specific needs of people who use WC/S.

Learning Objectives

- Describe the unique challenges people who use WC/S face in fire evacuation.

- Identify the components of a fire management program for people who use WC/S.
- Discuss the influence of a fire prevention and management program on fire prevention and management preparedness knowledge and self-efficacy among people who use WC/S.
- Prepare strategies for implementing a fire prevention and management program into a community setting for people who use WC/S.

P2510: Preventing Neurodegeneration and Disability Progression in Multiple Sclerosis

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Participant has indicated the following discussion of unapproved drug or product uses:
I will discuss research regarding transmagnetic stimulation for MS progression

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- Pacific Northwest National Laboratories: Receives research support

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Alpha lipoic acid, clemastine

Background and Issues: Multiple sclerosis (MS) is a chronic inflammatory disease of the CNS, characterized by intermittent inflammation causing demyelination and axonal damage. Around 85% of people with MS are initially diagnosed with relapsing remitting MS (RRMS) and 15% are diagnosed with primary progressive (PPMS); most RRMS patients go on to develop secondary progressive MS (SPMS). It is now recognized that much of the MS-related disability that patients experience is caused by gradual progression independent of relapse activity (PIRA), even in RRMS patients. While disease modifying therapies (DMTs) are highly effective at preventing relapses, our current DMTs are much less effective at preventing PIRA. Therefore, preventing MS progression is a critical knowledge gap and urgent need.

Purpose: To educate patients and providers about current terminology, the pathology underlying MS progression, how to measure MS progression in research and clinical practice, and review current and emerging pharmacologic and non-pharmacologic strategies to slow MS progression.

Methods: After a brief overview of progressive MS, we will review current understanding of the histopathologic underpinnings of progressive disease including chronic axonal demyelination leading to axonal loss, mitochondrial dysfunction, failure of remyelination, and glial neurotoxicity. We will also discuss possible neuroprotective mechanisms, such as: remediating oxidative stress, neutralizing compartmentalized lymphocytes, promoting remyelination, antagonizing microglia, and exerting direct neuroprotective effects on axons and neurons. Next, we will review the current clinical and paraclinical outcomes used in progressive MS research and some of their limitations. Finally, we will review some of the current and future pharmacologic approaches for progressive MS (e.g., B-cell therapy, alpha-lipoic acid, BTK-inhibitors) as well as non-pharmacologic therapies (e.g., exercise and transcranial magnetic stimulation).

Results: Disability progression independent of relapse activity occurs in most 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 and non-pharmacologic therapies.

Conclusions: Attendees will understand our current framework of the causes of MS progression including terminology, pathophysiology, measurement, and treatment approaches. This will help attendees evaluate previous and future clinical trials of pharmacologic and non-pharmacologic therapies to treat progressive MS.

Learning Objectives

- Review the current understanding of histopathologic mechanisms underpinning multiple sclerosis (MS) progression.
- Discuss proposed approaches to slow MS progression including immunomodulation, remyelination, and neuroprotection with antioxidants and other agents.
- Explore current and emerging outcomes employed to monitor disease progression in MS.
- Discuss the role of pharmacologic non-pharmacologic interventions to slow MS progression.

P2511: Mind in motion: cognition and behavior in ALS

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Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease that significantly affects nerve cells in the brain and spinal cord and is 1.5-2 times more likely to occur in Veterans compared to the general population, with some individuals with ALS experiencing changes in cognition and/or behavior. Current literature indicates more than 50% of individuals with ALS experience some degree of frontotemporal dysfunction and up to 20% of individuals meet diagnostic criteria for frontotemporal dementia. Neuropsychologists serve as consultants or members of multidisciplinary teams to assess behavioral, emotional, and cognitive functioning in individuals with ALS. Specifically, neuropsychologists serve a distinct role in elucidating how cognitive and behavioral changes manifest in an individual with ALS and providing guidance to caregivers regarding effectively managing and adapting to these changes.

The presentation is intended for healthcare providers involved in the care of individuals with ALS, individuals with ALS, and caregivers. The proposed presentation will provide the audience with foundational knowledge regarding the role of neuropsychology and common manifestations of cognitive, behavioral, and emotional changes in individuals with ALS. Furthermore, the proposed presentation will educate the audience on how to manage such changes through compensatory strategies and behavioral or environmental modification. The presenters will provide two case studies to illustrate the different manifestations of impairment in individuals with ALS to further emphasize the utility in distinguishing the type of impairment for purposes of treatment planning and supporting caregivers.

Learning Goals:

1. The attendee will be able to describe the role of neuropsychology in the care of individuals with ALS.
2. The attendee will be able to describe the common cognitive symptoms most often observed in individuals with ALS who exhibit cognitive changes.
3. The attendee will be able to identify behavioral and emotional changes frequently associated with ALS and implement behavioral management strategies to adapt to the changes.
4. The attendee will be able to describe the two types of memory difficulties and apply compensatory strategies to work around memory changes.

Learning Objectives

- Describe the role of neuropsychology in the care of individuals with ALS
- Describe the common cognitive symptoms most often observed in individuals with ALS who exhibit cognitive changes
- Identify behavioral and emotional changes frequently associated with ALS and implement behavioral management strategies to adapt to the changes
- Describe the two types of memory difficulties observed in ALS
- Apply behavioral and compensatory strategies to work around memory changes

P2512: Navigating Complex Conversations in ALS

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Background and Issues: Conversations addressing progression and care in life limiting disease like amyotrophic lateral sclerosis (ALS) can be difficult for the professionals tasked with the conversation. Yet few resources exist to support professionals in these discussions. Moreover, roundtable discussions with Veterans found conversations with professionals must be patient-led, take the time to understand the Veterans/Caregivers prior knowledge, have definitions/explanations for terms and procedures, and follow up the conversations with a phone call and check in. 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 of a diagnosis and the initial aftermath of the diagnosis. Yet, many more difficult conversions take place well after the diagnosis, including tube feeding, tracheostomy, end of life and overall progression, which professionals are not always well prepared to engage.

Purpose: To provide resources and guidance for healthcare professionals engaging in difficult conversations, improving communication between ALS professionals and Veterans living with ALS (Veterans) and their caregiver/family.
Methods: As part of the Veteran ALS Action Committee, this multi professional presentation includes ALS professionals, Veterans, and Caregivers discussing and exploring methods and framework for having these difficult conversations. The team will present real life experiences with giving and receiving these difficult conversations as well as their insight into how to make the conversations better received and understood. These conversations will be guided by the A-L-S-PIKES protocol which provides easy-to-follow, stepwise guidelines to effectively deliver difficult news to Veterans that includes: Advance Preparation (preparing for the discussion logistically and emotionally); Location & Setting (creating a comfortable setting that fosters rapport); Patient's Perceptions (assessing PALS' understanding and perception of their condition); Invitation (seeking PALS' permission to share information); Knowledge (sharing information in a clear,

understandable manner); Emotion/Empathy (addressing emotions with empathy and providing emotional support); and Strategy & Summary (summarizing the discussion and collaboratively developing a plan of action).

Results: Participants will leave with resources, guidance and support in having difficult conversations with persons living with ALS and their caregivers. Moreover, principles and guidance from this presentation can be used and applied to conditions beyond ALS, improving communication across conditions impacting the Veteran community and improving patient and caregiver well-being.

Conclusions: 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 increased trust enables more informed and confident decision-making. Dr. Robert Buckman sums it up nicely,” If we do it badly, the patients or family members may never forgive us; if we do it well, they will never forget us.”

Learning Objectives

- Discuss challenges related to having complex conversations with Veterans and caregivers
- Describe the benefits of using the A-L-S-PIKES protocol
- 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

P2513: Issues Beyond Access: A Retrospective Look at Prescription and Utilization Barriers for Home-Use Exoskeletons.

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Background and Issues: The clinicians at the James A. Haley Medical Center (JAHVAMC) in the Robotics and Advanced Technology Center work solely with the use of robotic exoskeletons for rehabilitation and for home-use prescription. From 2022 to date, the clinicians have prescribed 8 home-use robotic exoskeleton devices to Veterans and have noticed commonalities in the barriers of many other Veterans completing exoskeleton training with the goal of device prescription. The clinicians gathered retrospective data to examine the reasons Veterans were unable to procure a device and brainstorm ideas to improve outcomes and utilization.

Purpose: Discuss trends in the utilization of exoskeletons in the home and community including: patient satisfaction with devices for home and community use, barriers in tracking exoskeleton use, reasons for underutilization, considerations prior to device purchase and possible solutions to decrease cost burden and improve outcomes.

Methods: The clinicians at James A. Haley VA Medical Center (JAHVAMC) Robotics and Advanced Technology Center collected data from 8 exoskeleton home-users and 42 Veterans who screened for exoskeleton home-use between 2022 and 2025. The data includes a retrospective chart review of device training records including training time, reason for discontinuation when applicable and/or the amount of device use during rental period and the utilization after device prescription. The data also includes insights from a survey of patient satisfaction regarding the exoskeleton training experience.

Results: Out of 50 Veterans who received a consult to the Robotics and Advanced Technology Clinic for home-use device training between the 2022 and 2025, 19 Veterans (38%) screen-failed from chart review or initial visit findings, most commonly from inappropriate referral. Of the remaining 31 Veterans that trialed a device, 8 have received a device prescription, 16 Veterans completed device trial and/or partial training and 7 Veterans are still actively participating in training. The main reason Veterans did not proceed with training after initial trial was companion availability/consistency (26%), which remains a commonly reported barrier to use after device prescription. The next most common barriers to completing device training and procurement was the practicality of utilizing the device at home (13%), health status changes (13%) and transition of care to a different facility (13%).

Conclusions: The findings from the subgroup of Veterans who were evaluated and/or trained for home-use exoskeleton device at JAHVAMC is consistent with the findings of “Exoskeletal-Assist Walking in Veterans With Paralysis A

Randomized Clinical Trial” by Spungen, et al 2024. In response to these findings, the clinicians have been working on alternatives to full device purchase, applying new screening protocols, and improving patient education and companion training techniques during clinical training and the device rental period to ensure end users are receiving the maximum benefits of home-use exoskeleton devices.

Learning Objectives

- Identify the most common barriers to exoskeleton device prescription and the utilization of home-use exoskeleton devices after procurement.
- Describe different strategies to improve the utilization of home-use devices after procurement.
- Identify the most common device characteristics causing participants to cease training due to practicality in the home environment.
- Discuss potential solutions to improve home-use exoskeleton use and decrease cost burden.

P2514: Accessing Technology: High Impact Solutions for those with Complex Injuries

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People with complex disabilities have an increasing number of options for tech access that weren't available even a year ago. Technological advancements, even at the consumer level, have made it possible provide high-level access to technology for people at any level of physical functioning.

People with high level injuries or disabilities still face unique challenges, however, in fully accessing technology in satisfactory ways. The new challenge for professionals helping those with complex disability becomes to provide access that meets the needs of younger more technologically savvy users, that are not satisfied with slow, in-efficient access methods. This is especially true when someone wants to return high-demand activities. Efficiency and ease of use becomes paramount to meet the demands, speed and agility that these activities require. This level of efficiency often requires the use combinations of devices, high-intensity training from a skilled professionals and creative utilization of available technology.

This session will cover truly hands-free, highly efficient options for technology access that allows patients to return to high demand technological activities. Coming from a clinical perspective, the technology demonstrated will be practical for patients and applicable for clinicians. Hardware and software will be available in the session, allowing for hands-on, eyes-on and interactive demonstrations of the latest in accessible technology. This session will also provide information to help prioritize available access options based on the patient's goals to increase satisfaction and optimize outcomes. The overall goal is to empower and educate those who are providing care and information to people with upper extremity dysfunction with the knowledge of what is out there, how it works, what it will cost and where to go for help.

Learning Objectives

- Identify 5 or more high impact accessibility options for individuals with disability that can be used to access technology with greater independence.
- Describe opportunities for combining assistive technology options use increased tech access efficiency
- Demonstrate ability to access and initiate the basic use of the built-in accessibility features of patient devices for various operating systems.
- Compare the pros and cons to the various assistive technology solutions and how to prioritize options based on patient goals and abilities

P2515: Promoting neurological recovery in acute and chronic traumatic spinal cord injury models with Trk agonist

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Background: Traumatic spinal cord injury (SCI) is the 2nd most leading cause of paralysis. There are up to 500,000 new SCI patients each year worldwide causing patients unfathomable emotional, social, and financial hardships. To date, there are no FDA approved treatments improving locomotor or cognitive function after SCI. The tropomyosin receptor kinase (Trk) family is of great interest for promoting neurological recovery. TrkB and its ligands, brain-derived neurotrophic factor (BDNF) and Neurotrophin(NT)-4, can reduce inflammation and promote neuron survival, synaptogenesis, learning memory, and locomotor function after SCI. TrkC and its ligand, NT-3, can enhance neuron survival, axon regeneration, and myelination promoting cognitive and locomotor function after SCI. Purpose: Endogenous activators of TrkB and TrkC have very poor pharmacokinetic profiles and issues penetrating the central nervous system (CNS). Current synthetic TrkB and TrkC agonists are not highly bioavailable or have reduced target specificity, impeding drug metabolism which may result in toxicity issues. Therefore, novel TrkB/TrkC dual agonists were developed. Our proprietary screening technology developed at Texas A&M University, using primary adult neural cells,

identified NC-0 as the most neuroprotective and pro-regenerative derivative. We demonstrated NC-0 is highly specific to TrkB and TrkC and can penetrate the blood-spinal cord barrier after intraperitoneal (IP) administration targeting spinal and hippocampal neurons. NC-0 increases axon/neurite growth and survival of primary adult cortical neurons. NC-0 reduces injury size in vitro in a scratch assay mimicking SCI implying it may help preserve tissue and increase debris clearance. NC-0 increases astrocytic Synapsin I expression, associated with increased synaptic plasticity, and decreases expression of the neuroinflammatory proteins complement component 3 (C3) and Glycogen synthase kinase-3β (GSK-3β). Adult astrocytes pretreated with NC-0 further promote axon/neurite outgrowth and survival of neurons. Methods: To demonstrate the preclinical potential of NC-0, 8-week-old male mice were injured using the clinically relevant severe thoracic-8 (T8) contusion/compression SCI model. NC-0 was administered daily for 7 weeks using IP administration, starting 4-hours post injury to represent the delay found in clinical settings. Results: NC-0 reversed paralysis and promoted long-term recognition memory in a dose-dependent manner without any signs of toxicity. In fact, NC-0 reduced SCI-induced liver fibrosis, did not alter levels of liver function enzymes (ALT, ALP, AST) or kidney function marker (blood urea nitrogen), mitigated weight loss (marker for clinical deterioration) after injury, and reduced mortality. Histological analysis of the spinal cord 7 weeks post injury illustrated NC-0 enhanced regeneration, survival, and/or sprouting of serotonergic axons and decreased IBA1 and CD68 expression (inflammatory markers). NC-0 also demonstrated potential to promote functional locomotor recovery in the chronic stages; therapeutic efficacy remained strong even when treatment in mice was delayed by 6 weeks. Conclusion: Our long-term goal is to develop novel therapeutic options that enhance neurological recovery for patients with SCI. NC-0 represents an attractive candidate to move into the clinic for SCI due to its resilience to promote recovery irrelevant of the delay between injury and start of treatment. Future aims include IND-enabling studies to move NC-0 towards the clinic.

Learning Objectives

- Determine the effects of Trk agonists on recovery of locomotor function after spinal cord injury.
- Identify the need for Trk agonists before and after spinal cord injury and analyze its effects on distal organs.
- Discuss the impact that delays in treatment has on the efficacy of therapeutics to promote functional recovery after spinal cord injury.
- Assess the clinical potential of a novel therapeutic in relation to preclinical safety testing, including influence of pharmacokinetic parameters on drug efficacy and patient safety.
- Determine the effects of Trk agonists on preservation of cognitive abilities after spinal cord injury.

P2515: PAK1 inhibition with Romidepsin attenuates H-reflex hyperexcitability after spinal cord injury

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Participant has indicated the following discussion of unapproved drug or product uses:
Romidepsin is an approved chemotherapy drug that we are exploring for the purposes of relieving spasticity after SCI. Andrew Tan holds a provisional patent filed through the VA Technology Transfer Service (VA TTS) to develop Romidepsin in a new indication for neuropathic pain (U.S. Application No. 63/222,305)

Background: A substantial population of -affected individuals living with spinal cord injury (SCI) experience severe spasticity. Spasticity is characterized by hyperexcitability of the spinal stretch reflex (H-reflex) which presents as a velocity-dependent increase in tonic stretch (Lance, 1980). While the pathophysiology of spasticity is multifactorial, hyperexcitability of spinal motoneurons is primarily involved. However, many of the current treatments for spasticity come with undesirable side effects (or are short-lived) and some impede locomotor recovery. It is therefore essential that new treatments for spasticity with limited negative side effects are explored. Previously, we have documented a common structural motif of Rac1-PAK1 regulated dendritic spine morphology associated with hyperexcitability disorders, including spasticity (Bandaru et al., 2015; Zhao et al., 2016).

Purpose: In this study, we investigated the utility of “repurposing” Romidepsin, a clinically available drug to disrupt PAK1, to relieve spasticity after SCI. Romidepsin is a potent HDAC inhibitor that reduces PAK1 activity without affecting its protein level. Importantly, we and others have previously highlighted PAK1 as a promising druggable target for chronic neurological disease. In agreement, we have shown that Romidepsin treatment has a predictable effect upon cellular and structural (dendritic spines) correlates spasticity (Kauer et al., 2024).

Methods: Thy1-YFP reporter mice were used to investigate Romidepsin's effects. Mild contusive SCI was induced using the Infinite Horizon impactor. Four weeks post-SCI, mice received either Romidepsin or vehicle via three intraperitoneal injections. Blinded observers conducted physiological and behavioral assessments of spasticity and locomotor function. Tissue analysis, including immunohistochemistry, assessed PAK1 activity and motoneuron dendritic spine morphology (Bandaru et al., 2015; Tan et al., 2012). H-reflex excitability and dendritic spine profiles were evaluated, and drug-response biomarkers were monitored for bioavailability.

Results: Our analysis showed that reduction of PAK1 activity using Romidepsin resulted in a reduction of the presentation of H-reflex hyperexcitability associated with SCI. Additionally, Romidepsin attenuated the observed motoneuron dendritic spine profile associated with SCI-induced spasticity. Additionally, no differences in locomotor functioning were seen between vehicle and Romidepsin treated SCI subjects, indicating that Romidepsin does not negatively impact locomotor recovery.

Conclusions: Our findings demonstrate that Romidepsin effectively reduces SCI-induced H-reflex hyperexcitability without impairing locomotor recovery, making it a promising therapeutic option for SCI-induced spasticity. Future investigations will focus on optimizing dosage and administration routes to maximize therapeutic efficacy.

Learning Objectives

- Highlight the effect of Romidepsin on reducing H-reflex hyperexcitability without impacting locomotor recovery.
- Explain the link between dendritic spine remodeling and hyperexcitability in the spinal reflex system.
- Describe how reducing PAK1 activity impacts dendritic spine morphology and spasticity after SCI.
- Emphasize the importance of preclinical research on Romidepsin as a therapeutic option for SCI-induced spasticity.

P2515: A Clinical Translational Study: Gene Variants as Determinants of Phantom Limb Pain Development

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Background: The incidence of limb loss is increasing and US Veterans are at increased risk of amputation and its sequelae given the higher prevalence of each of the most common causes (peripheral vascular disease, diabetes, and trauma) among Veterans compared to non-veterans.

Amputation can lead to phantom limb pain (PLP) due to abnormal changes in the peripheral and central nervous system, including the brain and spinal cord. PLP, pain originating in the “absent” limb, is poorly understood, and 42.2 to 78.8% of amputees experience PLP with no reliable treatment. PLP pain management often take the form of a trial-and-error approach, requiring a combination of medications that have limited efficacy.

Emerging evidence from clinical and preclinical genetic and functional studies suggest a direct role of rare gene variants in the presentation of neuropathic pain, either to increase the risk for neuropathic pain, or to reduce the risk for neuropathic pain (resilience). We are investigating whether this applies to PLP also. An understanding of how genetic make-up contributes to PLP, may one day be utilized in novel clinical treatments designed to neutralize these pain-related genetic factors in PLP, and other neurological diseases, including spinal cord injury pain and MS.

Purpose: The purpose of this presentation is to provide an overview of the multifactorial nature of PLP, how PLP manifests in Veterans, how genetic variants may contribute to the pre-disposition or resilience to PLP, and possible applications of this knowledge in future treatment and pain management.

Methods: We are mining the corporate data warehouse database to identify Veteran traumatic amputees who have either no PLP or severe PLP, as determined by our custom-designed pain assessment tool, and the Brief Pain Inventory Interference scale. Participants will then undergo whole exome sequencing (i.e., genetic profiling). The two cohorts will be compared to each other, as well as to a general population (a control reference) to determine whether there are gene variants associated with either PLP or No-PLP.

Results: We have found over 100,000 Veterans in the VA system who have suffered from traumatic amputation of a limb. Following our exclusion criteria, which removes individuals with diabetes, vascular disease, peripheral neuropathy or radiculopathy pain, and malignancy in the affected limb, the pool of potential participants for our study is approximately 30,000 Veterans. We have continued to recruit for the study and have recruited Veterans both with PLP and without PLP. The Veterans recruited for this study have both upper and lower limb amputations with a wide range of time since amputation, pain intensities, and frequencies of pain attacks

Conclusions: There are many Veterans amputees who are eager to contribute to improving the lives of others living with severe PLP after amputation. Understanding why some in some people develop chronic PLP after amputation while others do not will be a crucial step forward towards developing more effective treatments for PLP and other forms of neuropathic pain.

Learning Objectives

- Highlight and explain the complex nature of PLP development.
- Discuss the challenges of PLP treatment.
- Discuss the implications gene variants for PLP treatment

- Discuss the possible contributions of this line of investigation on treatment of other forms of chronic pain after injury.

P2515: Key determinants of neurological recovery following acute traumatic cervical spinal cord injury.

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Background: Several clinical factors have been studied as potential determinants of neurological recovery after acute traumatic cervical spinal cord injury (actSCI). However, most of the prior studies were characterized by relatively small sample sizes and/or lack of adjustments for major potential confounders.

Purpose: This study examined a large cohort of individuals with actSCI regarding various potential determinants of neurological recovery.

Methods: This retrospective cohort study included 655 cases of actSCI from the Second and Third National Spinal Cord Injury Studies (NASCIS 2&3). A series of multiple regression analyses evaluated various clinical factors as potential determinants of motor and sensory recovery within the first year after actSCI. Every model was adjusted for the initial motor or sensory NASCIS scores that were obtained at admission in the acute care. Potential determinants of recovery included: age at the actSCI onset; sex; racial/ethnic group; cause of injury; administration of methylprednisolone (MPSS); Glasgow coma scale, heart rate, systolic and diastolic blood pressure at the admission in the acute care; and serum albumin concentrations that were collected within 24 hours (hyperacute phase), 48-72 hours (early phase), and 7-10 days (acute phase) after actSCI.

Results: There were 567 males and 88 females with a mean age of 34.8 years, who were predominantly non-Hispanic white (n=488) or African-American individuals (n=89), and mostly had motor vehicle accident (n=306) or fall (n=137). Their initial mean NASCIS motor and sensory scores were 31.5±34.6 (range: 0-140) and 156.9±81.9 (range: 62-348), respectively. The results of the multiple regression analyses for prediction of the NASCIS motor score at 1 year after actSCI (F=55.96; R2=0.64; p<0.0001) showed that older age, higher heart rate at admission and use of MPSS had a positive impact on the motor recovery, whereas elevated serum albumin concentrations in the hyperacute phase had a negative effect on the motor recovery. Those were similar to the results from the model including serum albumin concentrations in the early phase, but serum albumin concentration in the acute phase was not correlated with motor recovery. The results of the multiple regression analysis for prediction of the NASCIS sensory score at 1 year after actSCI (F=133.17; R2=0.81; p< 0.0001) showed that female sex and use of MPSS had positive impact on the sensory recovery, and there was a trend toward positive association between older age and higher sensory recovery after adjusting for potential confounders including serum albumin concentrations in the hyperacute phase. The models for prediction of the NASCIS sensory score, which were also adjusted for serum albumin concentrations in either the early phase or acute phase, revealed that use of MPSS consistently improved sensory recovery.

Conclusions: The results of this study highlight key clinical factors associated with motor recovery after actSCI, including older age, female sex and treatment with MPSS (positive effects), and higher serum albumin concentrations in the hyperacute and early phases after actSCI (negative effects). The administration of MPSS was the only determinant that was consistently associated with better sensory recovery at 1 year after actSCI.

Learning Objectives

- Discuss the clinical factors associated with motor recovery after acute traumatic spinal cord injury.
- Discuss the clinical factors associated with sensory recovery after acute traumatic spinal cord injury.

- Compare the study results with the literature on clinical factors associated with neurological recovery after acute traumatic spinal cord injury.
- Identify knowledge gaps for future research.

P2515: Colonoscopy Complications in Persons with Chronic Spinal Cord Injury

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Background: Prevalence of anemia in persons with spinal cord injury (SCI) is higher than their able-bodied counterparts ranging from 50-80%. The etiology is multifactorial but likely related to chronic whole-body inflammation (anemia of chronic disease), or blood loss from urinary tract infections, pressure ulcers and or rectal mucosal trauma from bowel programs. Chronic anemia is often an indication of gastrointestinal (GI) blood loss and thus often triggers physicians to order a colonoscopy (CSP). However, colonoscopies in the SCI population, for diagnostic or screening purposes are not without complications given the concomitant neurogenic bowel and impaired blood pressure regulation. Current literature provides limited data on peri-procedural CSP complications in persons with SCI.

Purpose:
We tested the hypothesis that in persons with SCI, performing a CSP is more likely to result in a peri-procedural complication than diagnosis of an active GI bleed, pre-cancerous or cancerous colon pathology.

Methods:
Retrospective chart review of persons with SCI admitted to an inpatient VA SCI center for CSP from 2019-2024. Inclusion criteria: SCI >1 year, age 18-90 years. Exclusion criteria: known bleeding source, or CSP indication for surgical planning.

Anemia prevalence, percent of complications and complication types, and rate of abnormal findings were calculated. A logistic regression model was used to determine if 1.) anemia or level of injury (LOI) (tetraplegia/paraplegia), were predictors of CSP complications and 2) anemia was a reliable predictor of finding hemorrhoids, malignancies or polyps.

Results:
Of 68 screened, 44 met inclusion. Anemia prevalence was 56.8% (25/44). CSP peri-complication rate was 38.6% (17/44) and consisted of electrolyte abnormalities (n=5) autonomic dysreflexia (AD) (n=3), ileus (n=2), elevated blood pressure unrelated to AD (n=2), hypotension (n=2), and other (n=3). Abnormal findings from CSP occurred in 95.2% of cases, characterized by polyps (n=33), hemorrhoids (n=13), and diverticuli (n=12). There were *no* active bleeds or cancers found. Furthermore, of the polyps biopsied, there were no serrated polyps and no adenomatous polyps with villous features.

A significant association was found between anemia and CSP complications with an OR of 11.36(95% CI: [2.29 to 91.67], p=0.007). There was no association between LOI and CSP
complications. Patients with anemia had decreased odds of hemorrhoids, evidenced by OR 0.14 (95% CI: [0.03 to 0.55], p=0.007); and there was no statistically significant relationship between anemia and polyps, OR 0.68 (95% CI: [0.126 to 3.056], p=0.624).

Conclusions:
Given lack of finding active GI bleeds or high-risk pathology on CSP (no malignancies, villous adenomas, serrated polyps, or active bleeds), and complication rate of 38.6%, it may be prudent to weigh the risk of complication in the decision to pursue CSP in the chronic SCI patient population. The negative association between anemia and hemorrhoids and lack of association between anemia and polyps indicated that neither pathology is likely to be a contributing factor to anemia in the population studied. However, patients with anemia were 11.4 times more likely to experience a complication related to colonoscopy, which may further guide clinicians in weighing risks and benefits of CSP on a case-by-case basis.

Learning Objectives

- Compare the rate of CSP complications and the rate of finding insidious GI pathology.
- List most common types of CSP complications in persons with SCI
- List the most common type of abnormal findings from CSP in persons with SCI
- List the predictors of peri-procedural complications of CSP in persons with SCI

P2515: Tracking Choroid Plexus Volume Changes in Experimental Autoimmune Encephalomyelitis: A Longitudinal Imaging Study of Neuroinflammation

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Background: The involvement of immune cells residing in the central nervous system (CNS) in the pathogenesis of multiple sclerosis (MS) is well-established. Choroid plexus (ChP), vascularized epithelial tissues within the brain's ventricles, are thought to regulate the trafficking of immune cells into the CNS, serving as a critical entry point for circulating leukocytes. Recently, ChP enlargement has been observed across various subtypes of MS, correlating with disease severity. However, the pathophysiological relevance of these findings remains unclear, mostly due to the lack of longitudinal data.

Purpose: This study aims to longitudinally evaluate changes in ChP volume in the murine experimental autoimmune encephalomyelitis (EAE) model of MS, to identify individual ChP volume change trends, and explore its association with disease onset, clinical scores, and underlying neuroinflammatory markers. Whether alterations in ChP volume could serve as a predictive biomarker for disease diagnosis and clinical outcomes was assessed.

Methods: Active EAE among C57BL/6 mice was evaluated via magnetic resonance imaging (MRI) at four different points: (1) baseline at two days prior to immunization, (2) pre-onset at 8 days postimmunization (p.i.), (3) during the acute phase at 72 hours after clinical onset, and (4) during the chronic phase at 3 weeks post-onset (or 40 days p.i. in those without clinical onset).

Results: The mean ± SD baseline ChP volume in mice was 0.78 ± 0.13 and was not correlated to their weight (p-value: 0.80). All EAE mice exhibited ChP enlargement during the pre-onset and acute phases of immunization when compared to their baseline, independent of clinical disease. During the chronic phase, all mice with clinical symptoms exhibited a decrease in ChP volume compared to the acute phase, however volumes remained higher than baselines. The change in ChP volume (ΔV) between the pre-onset and acute phase was significantly correlated with the time of clinical onset ($r: -0.96$; p-value: 0.002). Moreover, the time of clinical onset affects the ΔV between the acute phase and chronic phase ($r: 0.87$; p-value: 0.02). ΔV between the acute and chronic phases was negatively correlated with the clinical score during the acute phase ($r: -0.96$; p-value: 0.002). We are currently assessing inflammatory biomarkers.

Conclusions: ChP volume changes could predict disease onset and clinical severity. We are currently investigating inflammatory biomarkers and MRIs to identify those linked to ChP volume changes. Associated inflammatory biomarkers, along with MRI may improve the potential prognostic yield of this emerging concept.

Learning Objectives

- Explain the longitudinal changes in choroid plexus volume in the experimental autoimmune encephalomyelitis model of multiple sclerosis
- Understand the role of the choroid plexus changes in the clinical score of experimental autoimmune encephalomyelitis model of multiple sclerosis
- Assess the correlation between choroid plexus volume changes and onset of disease in experimental autoimmune encephalomyelitis model of multiple sclerosis
- Describe the choroid plexus change trends

P2516: Summary of the International Symposium on Gait and Balance in Multiple Sclerosis: Sleep and Function

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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 20,000 Veterans. MS causes a wide range of symptoms, but most people have impaired gait and balance and these are often the most disabling consequences of their MS. The annual *International Symposium on Gait and Balance in MS* disseminates knowledge on topics related to gait and balance for people with MS, the health care professionals who serve them, and the research community who advance discoveries in this area. The 14th annual *Symposium* was supported by a PVA Education Foundation Award and will focus on “The Interaction of Sleep and Function in People with MS”.

Over 70% of people with MS have at least moderate sleep problems. Lack of sleep can contribute to problems with gait and balance, thus adversely affecting mobility and function. Recent findings also suggest that improving mobility through exercise and physical activity can help to improve sleep in people with MS. However, rehabilitation providers do not commonly ask measure sleep-related outcomes in people with MS, and neurologists often fail to consider the potential for rehabilitation to help manage sleep disorders. Therefore, providing an overview on the interaction of sleep and function in people with MS and disseminating the latest research on the topic would be helpful for patients, health care providers, and researchers alike.

Purpose: The purpose of this presentation is to disseminate content from the *14th International Symposium on Gait and Balance in MS: The Interaction of Sleep and Function in People with MS,* held on May 3rd, 2025.

Methods: The annual *International Symposium on Gait and Balance in MS* is an innovative educational project that increases knowledge of health care professionals, researchers, and people with MS. The *Symposium* invites leading MS researchers from around the world to present evidence on cutting-edge topics related to gait and balance to a professionally diverse audience of health care providers, researchers, and trainees. The *Symposium* also includes a virtual, interactive, patient-focused event that summarizes key topics from the healthcare provider event. The objectives for symposium and, by extension, the proposed presentation, are that attendees will be able to 1) define common sleep disorders in people with MS; 2) explain underlying mechanisms contributing to sleep disorders in people with MS; 3) discuss the importance of sleep for optimal gait, balance, and mobility in people with MS; 4) apply appropriate outcome measures to track sleep in a clinical setting; and 5) identify appropriate non-pharmacologic strategies to improve sleep.

Results: During this presentation, steering committee members from the *Symposium* will summarize lessons learned from the *Symposium's* expert speaker panel by providing an overview of the latest research on sleep and function in people with MS and outlining key findings and clinical practice recommendations.

Conclusions: Disseminating findings from the *Symposium* would help to increase the knowledge and effectiveness of health professionals in MS community and thereby improve quality of life among people living with MS.

Learning Objectives

- Define common sleep disorders in people with MS
- Explain underlying mechanisms contributing to sleep disorders in people with MS
- Discuss the importance of sleep for optimal gait, balance, and mobility in people with MS
- Apply appropriate outcome measures to track sleep in a clinical setting
- Identify appropriate non-pharmacologic strategies to improve sleep.

P2517: The effect of cardiovascular comorbidities on clinical outcome in multiple sclerosis

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Purpose: Multiple sclerosis (MS) is an autoimmune disease of the central nervous system sustained by a complex interplay of acute and chronic inflammation, and neurodegenerative processes. Cardiovascular comorbidities and related risk factors may converge with MS pathological changes and lower the threshold to neurodegeneration but the mechanisms leading to it remain unknown. The purpose of this symposium is to review the work of the proponents and that of others assessing the relationship between cardiovascular comorbidities or risk factors and clinical/radiological outcome in people with MS (PwMS).

Methods: In the proposed 90-minute symposium, we will present evidence-based studies showing how PwMS) and cardiovascular comorbidities or risk factors have a worse clinical and radiological outcome. We will also present clinical cases in an interactive manner with the audience, with the goal of individualizing counselling plans for PwMS and different degrees of cardiovascular comorbidities.

Results: Studies have shown that PwMS and cardiovascular comorbidities or risk factors such as diabetes, hypertension, heart disease, peripheral vascular disease and dyslipidemia, have a higher relapse rate, as well as a faster disability progression, and overall brain and grey matter atrophy accumulation. Vascular comorbidities are also associated with a diminished performance on processing speed. Smoking per se is associated with increased lesion volumes and brain atrophy in MS. At the same time, PwMS have an increased prevalence of macrovascular disease compared with those without MS.

Imaging studies show that arterial vascularization impacts brain tissue vulnerability in that lesions tend to form more frequently in watershed (WS) territories. Furthermore, WS-lesions are larger, have higher degree of tissue injury and an increased likelihood to present signs of chronic inflammation. PwMS and vascular comorbidities also show lower brain adenosine triphosphate, i.e., ATP, levels on magnetic resonance imaging spectroscopy, a factor that can lead to a decreased energy production and neurodegeneration.

Conclusions: Cardiovascular comorbidities or risk factors play a significant role in MS disease progression. Providers should be aware of this and plan appropriate counselling to PwMS to decelerate disease progression in a timely manner.

Learning Objectives

- Recognize the role of cardiovascular risk factors and diseases in affecting the clinical outcome of people with multiple sclerosis
- Recognize the role of multiple sclerosis in increasing the likelihood of cardiovascular diseases
- Recognize the importance of counseling people with multiple sclerosis on the management of these conditions
- Recognize the role of individualized care which considers the management of cardiovascular comorbidities for every person with multiple sclerosis at any stage of their disease

P2518: Amyotrophic lateral sclerosis estimated prevalence cases from 2022 to 2030, data from the national ALS Registry

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Objective: To estimate the projected number of ALS cases in the United States from 2022 to 2030. Amyotrophic lateral sclerosis (ALS) is a progressive and fatal neuromuscular disease with no known cure. Because ALS is not a notifiable disease in the United States, the accurate ascertainment of prevalent ALS cases continues to be a challenge. To overcome this, the National ALS Registry (Registry) uses novel methods to estimate newly diagnosed and existing cases in the United States. *Methods:* We estimated ALS prevalence retrospectively from 2022 to 2024 and prospectively from 2025 to 2030 using prevalence obtained through previous CRC analyses on 2018 Registry data (the most current data available) to generate projected observed, missing, and total cases. Projected prevalent cases were then stratified by age, race, and sex. *Results:* The number of estimated ALS cases in 2022 was 32,893. By 2030, projected cases increase more than 10%, to 36,308. The largest increase occurs for the population ages 66 years and older, with a 25% increase (from 16,349 cases in 2022 to 20,438 cases in 2030). The projected number of cases classified as "other race" will increase by 15% (from 2,473 cases in 2022 to 2,854 cases in 2030). *Conclusions:* These estimates of projected ALS cases reflect anticipated changes in the underlying demographics of the United States. Our projections are likely an underestimation because emerging therapeutics and improved healthcare will improve survivability in this vulnerable population. These results should inform policy to more efficiently allocate resources for ALS patients and programs.

Learning Objectives

- Learn more about the epidemiology of ALS in the United States.
- Learn more about prevalence of ALS.

- Learn more about the public health burden of ALS.
- Learn more about how ALS prevalence continues to change.
- Learn more about the National ALS Registry.

P2519: A Provider’s Guide for Acute Care Health Outcome Improvement for ALS Patients

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- Mitsubishi Pharma: Grant for research study paid to institution

Background and Issues: ALS is a progressive, neurodegenerative disease primarily affecting the motor neuron system. ALS may cause a spectrum of functional deficits from facial and oral, respiratory muscle, limb weakness, as well as secondary symptoms that require intervention and management as patients recover in an Acute Care setting. ALS patients have unique needs that require an understanding of their disease and care requirements in Acute Care settings.

Most Veteran’s Administration (VA), Community, and Private hospitals do not have dedicated ALS Acute Care Teams. Although ALS is a terminal illness, offering treatment can do more good, than harm, to improve comfort, safety, and quality of life. This presentation attempts to close the knowledge gap and discusses how providers may allow patients to continue to live with ALS at their highest functional level during and after acute illnesses.

Purpose: The goal of this presentation is to improve awareness and knowledge to Acute Care providers so they may provide safe, high-quality care; and improve hospital stays and health outcomes for patients with ALS.

Methods: An educational presentation tool is used to inform Acute and Ambulatory Care providers. This tool describes ALS, its phenotypes, assessments, common primary and secondary symptoms, potential interventions for symptom management specific to ALS patients, including, ventilation/hypoxia protocols for acute and chronic respiratory illness. The tool can be used by physicians, nurses, respiratory therapists; interventional, surgical and critical care providers; speech, occupational, and physical therapists; dietitians, pharmacists; social workers, mental health providers, and case managers. Discussion will include example case studies and recommendations for safe and high quality care improvements and plan of care recommendations for safe discharge.

Results: Lessons learned captured through surveys to providers, patients and their caregivers are used as a source for continuous care improvement initiatives and future implementation.

Conclusions: Health care professionals have changed their approach to care specific to ALS patients in the acute care setting as their knowledge increases. Implementation and recommendations will assist with development of Standard Operating Procedures/Protocols tailored to VA locations.

Learning Objectives

- Describe ALS and at least 3 phenotypes across the spectrum.
- Define the ALS Functional Rating Scale and Oral Secretion Scale and their importance in ALS assessments
- Differentiate between primary and secondary typical ALS symptoms
- Identify 3 safe interventions for symptom management for primary and secondary symptoms
- Plan for safe disposition to home or long term care facility

P2520: Moving Forward: Novel Approaches to Assessing and Improving Function in Multiple Sclerosis

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Multiple sclerosis (MS) is a chronic and disabling disease that often affects mobility and balance, leading to decreased physical activity and increased fall risk. This talk will highlight common symptoms of MS that contribute to declines in walking and balance and discuss the challenges of assessing function in the laboratory versus in the real-world. New data from Dr. Fritz's laboratory suggesting specific laboratory assessments that best predict real-world functioning will be presented. Finally, Dr. Fritz will describe how these assessments can be used to inform the development of novel rehabilitation paradigms. By translating lessons learned from laboratory assessments into clinical practice, this work aims to improve physical activity and reduce fall risk in individuals with MS, ultimately enhancing their overall quality of life.

Learning Objectives:

1. List common symptoms of MS that contribute to declines in walking and balance.
2. Discuss challenges with assessing function in the laboratory vs. in the real-world.
3. Describe laboratory assessments that best predict real-world functioning.
4. Translate lessons learned about assessments into novel rehabilitation paradigms to improve physical activity and fall risk.

P2521: Sleep apnea’s effect on electrocardiogram recordings in individuals living with spinal cord injury (SCI)

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Background: Sleep-related breathing disorders (SRBDs) and cardiovascular dysfunction are common secondary medical condition after SCI, which can cause altered sympathetic activity. We hypothesized that individuals with SCI and moderate-to-severe SRBDs are at greater risk for development of more electrocardiogram (ECG) abnormalities during sleep than those with SCI and no/mild SRBDs.

Purpose: To investigate the potential association of the degree of SRBDs with ECG abnormalities (including frequency of arrhythmias and heart rate variability [HRV] during sleep) among individuals with SCI.

Methods: This prospective cross-sectional study included adults with subacute/chronic, cervical/high-thoracic (at T6 or above) SCI of any severity, who were not previously screened for SRBDs. SRBD is defined by apnea-hypopnea index (AHI), which was quantified using a hospital-unattended sleep screening test. Additionally, participants underwent continuous ECG recording during the sleep screening test. Kubios Scientific Software was used for analysis of heart rate (HR) and frequency domain HRV, during NREM and REM stages, in each of the first three cycles. Participants were grouped into: (a) individuals with SCI and moderate-to-severe SRBDs (mod/sev); and (b) individuals with SCI and no/mild SRBDs (no/mild).

Results: Herein we report preliminary of 8 individuals with moderate-to-severe SRBDs and 8 individuals with no/mild SRBDs. Both groups were comparable regarding age at the SCI onset ($p=0.114$), sex ($p=1$), and severity of SCI ($p=1$). Mean AHI in the mod/sev group was significantly higher than in the no/mild group (30.41±8.95 vs 5.52±4.13, respectively, $p<0.001$).

Throughout the entire sleep, the mod/sev group had a significantly lower minimum HR than the no/mild group (52.75±5.12 vs 57.62±4.10bpm, $p=0.028$). There was a trend for lower mean HR in the mod/sev group (64.62±8.02 vs 71.63±5.70bpm, $p=0.064$). Both groups had comparable results regarding their frequencies of arrhythmias and maximum HR.

Mean, maximum and minimum HR were not significantly different between groups during any cycles or stages of sleep. There was a trend for lower maximum HR in the mod/sev group during Cycle-3/NREM (70.61 vs 79.50bpm, $p=0.09$). There was a trend for lower minimum HR in the mod/sev group during Cycle-3/REM (60.95 vs 67.44 bpm, $p=0.075$).

Very low frequency relative power (VLF[zJ1] %) in the mod/sev group was significantly higher than the no/mild group during Cycle-1 NREM (33.18% vs 13.55%, p=0.033) and Cycle-2/NREM (25.21% vs 11.30%, p=0.05); there was a trend for higher VLF% in the mod/sev group during Cycle-1/REM (21.35% vs 10.71%, p=0.097).

Both groups had similar low frequency, high frequency, and very low frequency absolute power, total power, and LF/HF ratio during any of the sleep cycles or stages. Both groups had similar relative frequency powers LF% and HF% during any sleep cycles or stages. There was a trend for a lower HF% in the mod/sev group during Cycle-2/NREM (26.44% vs 43.27%, p=0.075).

Conclusion: Our data suggest that individuals with SCI and moderate-to-severe SRBDs have lower HR during any sleep cycle or stage, higher VLF% in cycles-1&2/NREM than individuals with SCI and no/mild SRBDs. Those results suggest that individuals with SCI and moderate-to-severe SRBDs may be at greater risk for clinically relevant ECG abnormalities than those with SCI and no/mild SRBDs.

Learning Objectives

- Evaluate the impact of sleep apnea severity on heart rate in individuals living with spinal cord injury, during sleep.
- Discuss secondary medical conditions, such as electrocardiographic abnormalities, that are common after spinal cord injury.
- Review the importance of treating sleep apnea to mitigate cardiovascular dysfunction, in individuals living with spinal cord injury.
- Describe the differences in frequency domain HRV during sleep between individuals with mild/no or moderate/severe sleep apnea.

P2522: Diaphragm Pacing and Colostomies in SCI: Optimizing These to Improve Care and Quality of Life

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Participant discloses the following relationships:

- Synapse Biomedical: Intelectual property rights with university, Chief Medical Officer, Board Member

Participant has indicated the following discussion of unapproved drug or product uses:
Use of diaphragm pacing to help injured phrenic nerves

Background: In spinal cord injury (SCI), 75% of all patients require intubation for mechanical ventilation (MV) acutely with 20% of all cervical SCI patient requiring tracheostomy MV. Pressure ulcer(PU) incidence increases with higher level SCI and when on MV. Diaphragm pacing (DP) can replace MV, decrease wean times, and decrease hospital costs. Colostomies are utilized both for PU and quality of life. This is an observational report of delayed DP for weaning patients from MV with diverting colostomies with comparison to early DP after injury subgroup.

Methods: Retrospective analysis of an IRB approved prospective, non-randomized interventional experience at a single institution. Subgroup analysis was limited to SCI MV patients who underwent DP pacing year who had pre-existing colostomies or simultaneous DP and stoma formation. For comparison, another subgroup of SCI patients who were implanted laparoscopically with DP electrodes within 30 days of injury was included.

Results: The database of over 500 patients from 2016 to 2024 for all indications of DP was queried. There were 4 patients who had colostomies for pressure ulcers prior to DP surgery an average of 9 months (range 5-13) from injury. Average age 45 years old (range 30-60) (3 males and 1 female). Three patients never had any SCI rehabilitation. DP surgery was successful with no infections of electrodes in face of ostomies. Two had significant myopathies and neuropathies from prolonged ICU course with recurrent infections. One had tracheal fistula from over inflation of tracheostomy cuff. These factors delayed weaning from ventilators. One 52 year old female with injury from a fall had a simultaneous DP, diverting colostomy and suprapubic catheter at 5 months post injury with no surgical infections or complication and rapid complete weaning from MV in one week. In the comparison group, all weaned from MV with early DP. There were 9 (all male) patients with average age at implant 50 years (range 17-70). Average time from injury to DP surgery was 12 days (range 3-22). Average hospital stay until transfer to rehabilitation was 28 days (range 16 to 42 days). One patient 3 years after DP underwent diverting colostomy for a pressure ulcer and to improve quality of life. There was no long term complication to the DP electrodes with colostomies with no electrode infections.

Conclusions: Diverting colostomies in SCI patients has utility in managing pressure ulcers and neurogenic bowel with recent reports outlining improvement in quality of life by reducing bowel care time and increasing independence. For elective colostomies correct location placement and teaching of patients is critical. This report shows that DP can be done on patients with colostomies already present or with simultaneous DP/colostomy procedures. Colostomy placement after DP is safe. Early DP can decrease MV days allowing earlier SCI rehabilitation that could decrease pressure ulcer formation. Prolonged MV can limit facilities that provide rehabilitation leading to further complications. The American College of Surgeons and American Congress of Rehabilitation Medicine best practice guidelines in spine injury recommend early stimulation of the diaphragm to become ventilator free.

Learning Objectives

- Review the literature of colostomies in SCI patients outlining the correct placement, teaching and utilization
- Summarize the clinical results of diaphragm pacing and colostomies in patients
- Review the ways the diaphragm pacing can be utilized early after spinal cord injury

- Discuss how stoma formation can reduce adverse bowel related problems with a positive impact on quality of life and adjustment post-SCI

P2523: Effective pressure relief for clients using complex power wheelchairs: Barriers and potential solutions

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Background and issues: Clients with complex power wheelchairs (PWCs) often are not performing effective pressure relief (PR) in their PWCs and may have consequences such as pain, stiffness, pressure injuries, and others. Literature is conflicted about PR propensity for various client diagnoses; many clients have intact sensation, wheelchair control, and ability to communicate needs, so difficulties with PR and pressure management can be confusing. Some clients seem to have pressure injuries despite close management, appropriate equipment, and education/training. Why then, are some clients still so vulnerable to pressure injuries and what are the barriers for clients to timely and effective PR behaviors?

Purpose: The overall goal of this presentation is to share barriers to effective PR and/or noncompliance with PR strategies despite education/training, and then offer options for amelioration of these issues. With some disorders, the pace of change can be a challenge for clinical staff and caregivers, especially with power wheelchair PR. The session will discuss the issues and evidence from clinical experience, personal and published research, and client and caregiver testimony, as well as potential solutions which could help reduce risks of pressure injuries. Attendees will leave with new ideas to implement with clients in their own clinics and a clearer view of the issues and solutions.

Methods: The speaker's research and experience have found that clients with a variety of disorders, both progressive and stable, can be susceptible to pressure injuries. Barriers such as sensory issues, dyspnea, orthopnea, unwillingness/inability to use respiratory support when in the wheelchair, inability to swallow/manage secretions, chronic diseases, inability to self-correct to their home position once the PR position is obtained, lack of wheelchair control, tissue maceration from fluids, discomfort, lack of caregiver support, and others may limit PR effectiveness and performance. These barriers can also limit the time actually in the power wheelchair as well. Potential solutions have been discovered to manage many of the barriers noted and will be presented. A new questionnaire which is being developed to assess client risk for pressure injury based on numerous factors will be discussed; specific guidelines for education and training currently can be difficult to find.

Results/Lessons Learned: While 24-hour PR management is required, many times the issues may occur from time in the PWC. Clients may have a variety of barriers to performing timely/effective PR including those from physical, psychosocial, and resource limitations. Teams must manage these barriers as effective pressure management is a complex problem which can require creative solutions and frequent education/training. PWC control and use, cushion and seating choices, breathing, swallowing, comfort, caregiver support, pain, and bowel and bladder management, all may require team support and supervision. This may entail more often than in a single seating clinic visit and in conjunction with other community resources.

Conclusions: There can be numerous barriers to effective PR, as well as potential solutions which could help reduce risks of pressure injuries. Frequent discussion with clients as well education and training on management options and considerations for specific needs are required.

Learning Objectives

- Describe 3 common barriers to pressure relief seen in clients with SCI/D, MS, and ALS.
- Identify 1 potential solution for each barrier which may be effective in changing pressure relief behavior.
- Explain 2 education and training options for increasing compliance with pressure relief strategies.
- Plan to implement or educate on one idea for more effective pressure relief in practice

P2524: The Revised Diagnostic Criteria for Multiple Sclerosis

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The McDonald Diagnostic Criteria for Multiple Sclerosis (MS) were recently updated by the International Advisory Committee on Clinical Trials in Multiple Sclerosis. This session will focus on key improvements and refinements made to the criteria in the update as well as an overview of the consensus methodology followed. Topics to be covered include the addition of the optic nerve as a fifth anatomical location, updated dissemination in space criteria, defining radiologically isolated syndrome as MS in specific situations, confirming an MS diagnosis in those over age 50 and in those with comorbidities, and other recommendations around paraclinical tools for diagnosis. We will discuss new imaging biomarkers, their role in the diagnosis of MS, and their implications and feasibility within the VA healthcare system. As these additional paraclinical tools are not required to diagnose MS with the updated criteria, we will review case presentations and discuss how and when to use these paraclinical tools. Lastly, we will engage the audience with polling questions throughout the presentation. We will also have opportunities for voting so each learner could share tests they would order to confirm an MS diagnosis during the case presentations.

Learning Objectives

- Describe the history of the McDonald Diagnostic Criteria and the methodology used in the 2024 update.
- Identify major changes in the 2024 McDonald Diagnostic Criteria.
- Explain the new imaging and fluid biomarkers that can be used to support an MS diagnosis in the 2024 Mc Donald Diagnostic Criteria.
- Apply updates to the criteria through case-based discussion.

P2525: Managing Complex ALS: An Interdisciplinary Round Table

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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 care 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 assessment, interpretation, and handling of complex ALS case studies by a panel of interdisciplinary ALS subject matter experts.

Description: This presentation will be delivered by a panel of clinicians composed from several different interdisciplinary ALS clinics. The talk will be driven 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 VA ALS Directive, and 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.

P2526: Content Validity of a New Nutrition Knowledge Questionnaire for Individuals with Spinal Cord Injuries/Disorders

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Background: While poor diet quality in persons with spinal cord injuries and disorders (SCI/D) has been reported, little is known about the level of knowledge of SCI/D-specific nutrition and diet factors or the influence of nutrition knowledge on dietary intake patterns. Further, there is no validated tool to assess nutrition knowledge specific to persons with SCI/D, and many items on general nutrition knowledge questionnaires are not relevant or accurate for persons with SCI/D.

Purpose: As part of the development of a novel questionnaire that addresses this gap, a panel of subject matter experts in nutrition and/or the implications of nutrition on health and secondary conditions in persons with SCI/D provided input on nutrition knowledge item development.

Methods: An instrument design phase included two literature reviews that drove the development of 106 SCI/D-relevant nutrition knowledge and intake items. The next phase included the evaluation of the items through expert consensus using a content validity approach. Investigators invited 24 experts to judge the content validity of the items, of whom 17 (70.8%) agreed to participate, and 14 completed the validity ranking task. In the first draft of the questionnaire each expert panel member rated items on relevance and clarity on a 4-point scale (1 = very irrelevant, 2 = irrelevant, 3 = relevant, 4 = very relevant; 1 = very unclear, 2 = unclear, 3 = clear, and 4 = very clear). They also had the opportunity to provide open-ended feedback on each item and at the end of the questionnaire. The item-level Content Validity Index (I-CVI), or the proportion of experts that rate an item relevant (3) or very relevant (4), was calculated, and items with an I-CVI of 0.78 or higher were considered valid. The overall scale-level Content Validity Index was calculated by averaging the I-CVI of the items in the scale (S-CVI/Ave), and a S-CVI/Ave of 0.9 or higher was considered excellent content validity. In tandem with average clarity scores and free text feedback, investigators used these indices to decide which items in the questionnaire should be removed or revised.

Results: Multiple items (22) had an I-CVI of less than 0.78, and the S-CVI/Ave for the original instrument was 0.83. Four items with an I-CVI above 0.78 received a clarity score below 3. In total, 13 items were removed and 5 were modified. In addition, the wording of 14 items was modified based on expert feedback.

Conclusions: Scoring and open-ended feedback from an expert panel allowed for refinement of the novel questionnaire prior to psychometric validation with samples of persons with SCI/D. This measure may be useful in assessing dietary intake and nutrition knowledge in persons with SCI/D, representing the first measure of this information developed and validated in this population.

Learning Objectives

- Discuss questionnaire development and validation, including items on nutrition intake and behaviors
- Explain expert panel rating collection
- Demonstrate content validity calculation
- Utilize content validity calculations for instrument refinement

P2527: Penicillin Allergy Assessment and Oral Amoxicillin Challenge Protocol on an Inpatient Spinal Cord Injury Unit

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Use of amoxacillin 250 mg one-time dose for the purpose of amoxacillin oral challenge per protocol approved by local Pharmacy and Therapeutics Committee

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

Use of amoxacillin 250 mg one-time dose for the purposes of oral amoxacillin challenge to remove erroneous pencicillin allergies from the medical record as per protocol approved by local Pharmacy & Therapeutics Committee.

Background and Issues: Approximately ten percent of the United States general population reports a penicillin allergy. However, less than 10% of labeled penicillin allergies are confirmed through formal allergy testing. Inaccurate penicillin allergy labels can lead to increased antimicrobial resistance, longer hospitalizations, increased cost, and poorer patient outcomes. Those with a spinal cord injury (SCI) experience higher rates of genitourinary infections, high use of antimicrobials, and high levels of antibiotic resistance, which underscores the need for the need for assessment of true penicillin allergies in this population as part of patient centered antibiotic stewardship.

Purpose: To establish a penicillin allergy assessment policy for SCI inpatients at the Central Virginia Veterans Affairs Healthcare System (CVHCS) utilizing the Penicillin Allergy Decision Tool (PEN-FAST) and a direct oral amoxicillin challenge (OAC) protocol.

Methods: SCI inpatients with reported penicillin allergies underwent a comprehensive allergy assessment, including a detailed history and PEN-FAST risk calculation. Patients that met criteria could have the penicillin allergy removed (“de-labeled”) based on history. Patients with a PEN-FAST score ≤2 were eligible for an OAC. Patients that underwent OAC had vital signs and symptom assessments conducted pre- and post-administration. Patients with a PEN-FAST score $\geq$3 kept penicillin allergy documented in the medical record.

Results: A review of the SCI registry identified 186/1846 (~10%) patients with reported penicillin allergies in the CVHCS catchment area. Four newly injured veterans admitted since the initial review were screened and added, totaling 190/1850 patients. Of the 190 patients identified, 10 patients were excluded due to historical allergy to intravenous penicillin and 94 were excluded due to not currently being followed at CVHCS. Eighty-six veterans with SCI were called with 64 successfully contacted and screened via PEN-FAST. Nine patients (N=9/64) were de-labeled based on history. Fifty percent of patients screened had a PENFAST score of $\leq$2 (N=27/55) and were eligible for OAC. Twenty-three patients (N=23/27; 85%) agreed to undergo OAC. Five patients (N=5/23) ultimately underwent OAC, all with a negative result, prompting de-labeling of penicillin allergy in the medical record. The largest barrier to OAC completion was inability to admit due to hospital bed availability.

Conclusions: Implementing this policy has improved antibiotic stewardship and reduced unnecessary broad-spectrum antibiotic use for individual SCI inpatients at CVHCS. By utilizing a direct oral amoxicillin challenge protocol, we can safely and efficiently de-label patients with inaccurate penicillin allergies in the medical record, promoting the use of narrowed antibiotic therapy when possible.

Learning Objectives

- Describe the benefits of a penicillin allergy assessment policy in the spinal cord injury population
- List the steps to an oral amoxicillin challenge
- Discuss results of the penicillin allergy assessment policy implementation at the Central Virginia VA Healthcare system (CVHCS)
- Identify a process to create a penicillin allergy assessment policy at a spinal cord injury rehabilitation center

P2528: Loneliness Among People with Spinal Cord Injury: A Longitudinal National Survey Study

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Background: Although loneliness has been shown to have significant negative health consequences in the general population, very little is known about the relation between loneliness and health in people with spinal cord injury (SCI).

Purpose: To examine loneliness among individuals with SCI; explore its relation to demographic, disability, health-related, and social characteristics; and examine the relation between loneliness and health outcomes at **two time points.**

Design/Method: We conducted a national survey using the 20-item UCLA Loneliness Scale. In addition to assessing demographic, disability, and social characteristics, we included measures of psychological (depression, anxiety, stress, life satisfaction) and physical (general health, secondary health conditions, cardiovascular health conditions) health. Data were collected at baseline (T1 *N*=343) and 1-year follow-up (T2) and were available at both time points on a sample of 309 people with SCI. We conducted descriptive analysis of the loneliness scale and used linear regression to examine the relation between loneliness and participant characteristics using T1 data. Median regressions were used to test the association between loneliness at T1 and psychological and physical health outcomes at T1 and T2 after adjusting for demographic and disability characteristics and a measure of social isolation (number or frequency of social contacts).

Results: The sample was diverse in age, sex, time since injury, and level of injury. Slightly less than a third were of minority race/ethnicity, lived in rural settings, and were veterans. Loneliness scores were high (T1, *N*=343; *Mean*=46.2, *SD*=13.9, range 20-79), with 10% having scores indicating no/low loneliness. More than half reported that they “sometimes” or “often” feel alone, left out, isolated, and lacking in companionship. In T1 analyses relating loneliness to participant characteristics, some demographic, disability, and health-related characteristics were significantly related to loneliness in unadjusted regressions; however, only employment status, years post-injury, and severity of secondary health conditions were significant in the final regression model. The largest contributors to loneliness were measures of social characteristics (social isolation, support, and satisfaction with social roles). In univariable analyses examining the relation of loneliness to health outcomes, loneliness at T1 was significantly related to all psychological and physical health variables at T1 and T2, with correlations with psychological health outcomes generally stronger than physical health. Our measure of social isolation showed weaker relations to those same outcomes. Finally, loneliness was significantly associated with psychological and physical health at T1 and T2 above and beyond individual characteristics including social isolation.

Conclusion: Loneliness scores were high in a sample of people with SCI. A limited number of demographic and disability characteristics were related to loneliness, with social characteristics being more strongly related to loneliness. Loneliness was significantly associated with psychological and physical health and was more highly related to health than a measure of social isolation. Our findings suggest that loneliness is a significant problem for many people with SCI that may have ramifications for both psychological and physical health. There is an urgent need for increased clinical and research attention to address the loneliness epidemic in this at-risk population.

Learning Objectives

- Describe adverse effects of loneliness on health outcomes in the general population
- Describe loneliness and social isolation as distinct, but related, constructs
- Discuss loneliness as a significant problem for people with SCI
- Identify the relation of loneliness to psychological and physical health outcomes among people with SCI and its impacts beyond more objective measures of social relationships

P2529: Perceived Burdensomeness and Thwarted Belongingness Among Persons Living with a Spinal Cord Injury or Disorder

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Background: Acquiring a physical disability can result in feeling like a burden to others or that one no longer fits in. For example, people living with spinal cord injury or disorder (SCI/D) may worry about inconveniencing family or friends, have difficulty resuming social roles, or experience barriers to social connection. The Interpersonal Needs Questionnaire (INQ) measures these interpersonal constructs, specifically perceived burdensomeness (PB) and thwarted belongingness (TB). PB refers to feeling burdensome to others, possibly with beliefs that their loved ones might be better off without them. TB refers to feeling socially disconnected from others. While the INQ constructs have been used as a proxy to predict suicidal ideation in multiple populations, the constructs can independently provide valuable information. To date, there is no published research examining the INQ constructs of PB and TB in persons with SCI/D.

Purpose: To examine the magnitude of PB and TB in individuals living with a SCI/D and who is impacted most.

Methods: This sample included adults with SCI/D who used Veteran Health Administration healthcare services between 2017-2022 and had their SCI/D for at least a year. A survey was conducted with participants to collect demographic, injury, and health characteristics, as well as the 15-item INQ which assessed PB (possible scores range from 6-42) and TB (possible scores range from 9-63), with higher scores reflecting worse burdensomeness and belongingness, respectively. ANOVAs and t-tests were used for analysis.

Results: The overall sample (n=92) was predominately male (84%), white (84%), with a mean age of 58.7 (range: 27-79). The mean duration of injury was 16.8 years (range: 1-57) and 60% had paraplegia. The mean PB score was 14.5 (SD = 19.6, range = 6-42). Higher PB was significantly associated with older age (64+), older age at injury (60+), shorter duration of injury (< 5 years), fair/poor health (vs. good to excellent), frequent physical and mental health distress (≥14 days in past month), high blood pressure, sleep dysfunction, bladder complications, bowel dysfunction, and pressure injuries (all p<.05). The mean TB score was 27.6 (SD=12.0, range= 9-59). Higher TB was significantly associated with being unmarried, living alone, not being employed, older age at injury (60+), having a non-traumatic injury, fair/poor health, frequent physical and mental health distress (≥14 days), having heart conditions, sleep dysfunction, and bowel dysfunction.

Conclusions: These findings suggest that injury characteristics and SCI/D secondary health conditions are associated with increased feelings of PB and TB. Specifically, bladder and bowel complications, and pressure injuries are related to higher PB, which is reasonable since these factors often require higher levels of assistance with care. Unsurprisingly, higher TB was seen for those who were unmarried and unemployed, two common areas to achieve feelings of belongingness. Further research is needed to elaborate upon these associations between PB and TB with injury characteristics and secondary health conditions to identify subgroups at risk for PB and TB, as well as if these are related to suicidal ideation in this population.

Learning Objectives

- Define the constructs of perceived burdensomeness and thwarted belonginess and their applicability to individuals with SCI/D.
- Discuss perceived burdensomeness and thwarted belonginess scores demonstrated by a sample of individuals with SCI/D and compare/contrast scores relative to other populations without SCI/D.
- Identify demographic, injury, and health characteristics associated with higher levels of perceived burdensomeness and thwarted belongingness.

- Discuss how and why injury characteristics and SCI/D secondary complications may be associated with feelings of perceived burdensomeness and thwarted belonginess.

P2530: Improving the detection of myelin and axonal injury in multiple sclerosis

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Background: Axonal and myelin injury are an important pathological determinants of multiple sclerosis (MS) disability. Yet, magnetic resonance imaging (MRI) biomarkers of myelin and axonal integrity are lacking. The multi-b shell derived volume axonal fraction (V_{ax}) and the selective inversion recovery quantitative magnetization transfer imaging (SIR-qMT) derived macromolecular-to-free pool size ratio (PSR) are advanced MRI metrics that offer an opportunity to measure the degrees of myelin and axonal integrity with improved pathological specificity. However, how these metrics perform in vivo relative to conventional diffusion tensor imaging (DTI) and magnetization transfer imaging (MTI) remains unknown.

Purpose: To assess the performance of PSR and V_{ax} among patients with MS.

Methods: Forty-three treatment-naïve subjects with newly diagnosed MS, clinically isolated syndrome, or radiologically isolated syndrome and 18 healthy controls (HCs) underwent a 3.0 Tesla MRI inclusive of T_1-weighted (T_1-w) and T_2-w fluid-attenuated inversion recovery (FLAIR), multi-b shell diffusion-weighted imaging, DTI, MTI, and SIR-qMT. T_2-lesions, chronic black holes (cBHs) and regions of interest (ROIs) in the normal-appearing white matter (NAWM) were identified in patients and ROIs of normal white matter (NWM) ROIs in HCs. NAWM ROIs were classified as proximal (p) if situated next to a lesion and distant (d) if contralateral to a lesion. V_{ax} was compared to DTI-derive axial diffusivity (AD) while PSR was compared to radial diffusivity and MTI derived MT ratio (MTR). The metrics were compared by their ability to distinguish different tissues using effect size (ES) analysis and receiver operating characteristics.

Results: A total of 902 T_2-lesions, 398 cBHs, 446 p- and 223 d- NAWM ROIs in patients and 180 NWM ROIs in HCs were analysed. V_{ax} differed in all comparisons ($p \leq 0.048$) while PSR differed ($p < 0.009$) in most comparisons except between p- or d-NAWM and NWM. AD, RD, and MTR differed in most of the comparisons ($p < 0.001$) except between p- or d-NAWM and NWM. Relative to AD, V_{ax} had higher accuracy ($p \leq 0.029$) in differentiating T_2-lesions from NWM, dNAWM, and pNAWM; cBHs from pNAWM; and pNAWM from NWM. V_{ax} also had a larger ES ($p \leq 0.038$) in differentiating cBHs from T_2-lesions; cBHs, and T_2-lesions from dNAWM, dNAWM from pNAWM, and p- and d- NAWM from NWM. Relative to RD, PSR

had higher accuracy ($p \leq 0.049$) in differentiating T_2-lesions from p/dNAWM and NWM, and a larger ES ($p \leq 0.023$) when comparing T_2-lesions to p- or dNAWM and NWM; and cBHs to pNAWM and NWM. Similarly, PSR was more accurate ($p \leq 0.016$) than MTR in differentiating T_2-lesions from pNAWM or NWM, and cBHs from NWM. Relative to MTR, PSR also showed higher ES ($p \leq 0.005$) when comparing T_2-lesions with NWM, pNAWM, and dNAWM; as well as cBHs with pNAWM and dNAWM.

Conclusion: In conclusion, V_{ax} outperformed AD in differentiating tissues with expected larger degrees of axonal injury. Similarly, PSR was more accurate than RD and MTR in differentiating tissues with an expected higher degree of myelin damage. Our results support the use of V_{ax} and PSR as biomarkers of myelin and axonal injury, given the higher accuracy and ES, leading to lower sample sizes for clinical trials.

Learning Objectives

- To discuss the role of myelin and axonal injury in MS
- To discuss the role of MRI in detecting these injuries in vivo
- To discuss the ability of newly developed quantitative MRI methods in measuring neurodegeneration in MS
- To discuss the role of MRI in clinical trials on neuroprotection and repair in MS.

P2531: Novel small molecules show promise in treating multiple sclerosis and amyotrophic lateral sclerosis

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Background: There is a paucity of effective treatments for progressive mulitple sclerosis (pMS) and amyotrophic lateral sclersosis (ALS). Clinically, persons with pMS and ALS develop permanent disability resulting from the death and damage to neurons; known as neurodegeneration. Pathologically, both diseases show evidence that dysfunction of the RNA binding protein heterogeneous nuclear ribonucleoprotein A1 (A1) causes neurodegeneration. Mechanistically, brains from pMS and ALS patients share the same marker of A1 dysfunction, namely its mislocalization from its normal location in nucleus to its pathologic location in cytoplasm of neurons.

Purpose: To invent and test the efficacy of novel small molecules designed to reverse A1 dysfunction in neurons (i.e., specifically returning A1 from the cytoplasm to the nucleus), thereby inhibiting neurodegeneration, reducing disability and improving the lives of persons living with pMS and ALS.

Methods: Artificial intelligence (AI) identified novel small molecules that potentially bind A1. Small molecules were put through a pre-clinical pipeline of biological tests including in vitro A1 binding assays, ex vivo testing of primary neurons, in vivo pharmacokinetics (PK) and in vivo efficacy and toxicity studies in pre-clinical animal models to determine which small molecules should be prepared for human testing.

Results: Based on the core structure of small molecules identified by AI, multiple novel small molecules were synthesized and tested in the pre-clinical pipeline. The majority of small molecules both bound A1 ($p<0.05$-0.0001) and inhibited A1 dysfunction primary neurons, including maintaining A1 in its normal nuclear location ($p<0.01$-0.001) and inhibiting neurite loss ($p<0.05$-0.001). Multiple molecules moved forward to in vivo testing, in which several were non-toxic when given orally to mice, showed an improved PK profile including increased half-life and brain penetration, and efficacy in experimental autoimmune encephalomyelitis ($p<0.01$), the most common pre-clinical model of MS.

Conclusions/Clinical Implications: There is a major gap in the treatment of pMS and ALS, leading to permanent disability. These data indicate that novel small molecules that inhibit neuronal A1 dysfunction and neurodegeneration are promising treatments to reduce disability and improve the lives of persons living with pMS and ALS.

Learning Objectives

- List the clinical features of neurodegeneration in persons living with progressive multiple sclerosis and amyotrophic lateral sclerosis.
- Identify the neuropathological features of neurodegeneration in persons living with progressive multiple sclerosis and amyotrophic lateral sclerosis.
- Describe the mechanisms of neurodegeneration in persons living with progressive multiple sclerosis and amyotrophic lateral sclerosis.
- Explain how novel small molecules designed to inhibit neurodegeneration are moved from the lab to the clinic to treat persons living with progressive multiple sclerosis and amyotrophic lateral sclerosis.

P2532: Mind and Body: A Multidisciplinary Approach to Physical Activity for Veterans with ALS

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Background: Historically, persons with ALS (PALS) were instructed to avoid physical activity (PA) for fear of worsening the disease progression. This has largely been debunked and research has demonstrated that PA is safe, well-tolerated, and physically beneficial for PALS. However, the benefits of PA across numerous other health domains are often overlooked.

Purpose: The purpose of this presentation is to synthesize and share the physical, psychological, mood, and cognitive benefits of PA for PALS and describe the reciprocal relationship of physical activity, mood, and cognition. Additionally, the presenters will provide considerations, recommendations, and strategies to promote meaningful PA across the ALS disease spectrum using case studies and audience provided scenarios.

Description: This presentation is intended for a multidisciplinary audience, including PALS and their care partners. The speakers will provide a unique blend of perspectives from rehabilitation, mental health, and neuropsychology on a topic that can be contentious amongst the clinical community and PALS themselves. The speakers will first review relevant literature on the benefits of PA for PALS. Specifically, the presenters will describe the physiological processes that occur with PA that promote physical, affective, and cognitive health. The presenters will then describe common barriers clinicians and PALS encounter when trying to begin or maintain PA during disease progression. Finally, the panel will use patient case studies that span the disease spectrum to provide practical considerations, recommendations, and strategies to promote PA.

Conclusions: Benefits of regular physical activity span across numerous health domains beyond the physical. The psychological and cognitive benefits of physical activity are often overlooked as tools to improve the quality of life of PALS and their care partners.

Learning Objectives

- Describe physiological byproducts of PA and their potential benefits to PALS' physical, affective, and cognitive health.
- Characterize the interconnections of physical, mood, and cognitive health of PALS.
- Describe common mental health and cognitive challenges veterans with ALS encounter when attempting to perform PA.
- Synthesize information from multiple health domains to individualize PA promotion for PALS.

P2533: Ready for Research: Advancing the Science of ALS in the Veterans Health Administration

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Background and Issues: ALS is a progressive, neurodegenerative disease which impacts Veterans at a rate exceeding the civilian population. Currently, there are no curative treatments and no clear understanding of why ALS impacts Veterans at a rate greater than the civilian population. One of the key factors impeding progress in advancing the science of ALS is low participation in clinical research- less than 10% of persons with ALS in the United States enroll in clinical research. The National Academies of Science, Engineering, and Medicine released a formal report to the ALS community in 2024 on accelerating therapeutics, and included were several recommendations to increase research infrastructure and participation- both within and beyond the VA.

Purpose: This presentation will provide a broad overview of the ALS research ecosystem in VA- both the history of important ALS-related research, the current state of research activities in VA, and the promise of future ALS- related research endeavors. Facilitators and barriers to ALS research participation in VA will be discussed. Perspective of Veterans with ALS and their caregivers will be included.

Methods: This 45- minute presentation will provide education on seminal works of research on ALS that have occured in VA, as well as the current ALS R&D portfolio, and resources available to advance research across multiple disciplines, including epidemiology, health services, clinical drug trials, and rehabilitation. Finally, a Veteran caregiver will provide personal insight into VA ALS research participation including their loved one and what factors weighed into that decision process.

Results: This presentation will help provide a better understanding of the past, present, and future of VA ALS research and provide insight into future research expansion in VA, including Veteran-centered awareness in engaging in discussions of research in the clinic.

Conclusions: Advancing research in ALS is critical to improve available treatments. It is critical that all ALS clinical team members have a basic understanding of the wide variety of research opportunities within and beyond VA for ALS, and provide an informed, sensitive discussion to support education provision on research during all episodes of care.

Learning Objectives

- Describe the time and setting of the original VA ALS registry, and it's impact and relation to the national CDC ALS registry.
- List two potential barriers for research participation in Veterans with ALS.
- Name two reasons Veterans with ALS may cite as reasons for the participation in research.

- List two potential areas of future ALS research in VA.

P2534: Development of a Wheelchair Seating Assessment Tool

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Background: There is no widely accepted standardized measure or battery of assessments that can be used by clinicians to evaluate a client’s need for Complex Rehabilitation Technology such as a manual or power wheelchair and facilitate payer coverage for the necessary devices. The Seating Mobility Index (SMI) was developed for clinicians to assess and quantify a person’s need for CRT based on function, participation, and environmental factors rather than a diagnosis.

Objective: The objective of this study was to conduct an investigation of the reliability of the SMI.

Purpose: The purpose of this study was to develop a standardized assessment tool for seated and wheeled mobility evaluations and assess its reliability and validity as well as utility in a clinical setting.

Methods: The development of the SMI involved a multi-phase process, including literature review, expert input, and reliability testing. A scoring system was established to evaluate multiple dimensions based on the International Classification of Function categories. Reliability testing was conducted through inter-rater assessments to ensure consistency across different ratters randomized into one of five groups. The raters were clinicians (physical and/or occupational) with at least 10 years of expertise in performing wheelchair evaluations. Each grouping had four case studies that the rater had to score.

Results: The results demonstrated strong internal consistency and inter-rater reliability indicating that the SMI is a reliable tool for measuring seating and mobility.

Conclusion: The Seating Mobility Index provides a promising new instrument for clinicians and researchers to assess the quality of seating and mobility. Future research will focus on refining the tool's application in diverse populations and its correlation with long-term seating-related health outcomes. Lastly, this session will provide an overview of the background work for this project followed by initial reliability results and next steps.

Learning Objectives

- list 2 outcome tools that were included in the initial toolbox of the development of the SMI
- describe two components of the SMI
- explain how clinicians can incorporate the SMI into their existing practice
- describe how use of objective measures in seating assessment benefit the consumer and the clinician

P2535: Enhancing Safety and Efficiency in Wheelchair Transfers Through Caregiver Training and Innovation

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Background: Wheelchair transfers are essential daily activities for hweelchair users, including individuals with spinal cord injuries (SCI), but pose significant risks. Among caregivers, 74–90% report musculoskeletal injuries related to assisting with transfers. Care recipients face discomfort, improper support, and increased injury risk. These challenges underline the need for evidence-based training and innovative assistive technologies to improve safety, efficiency, and independence for both caregivers and care recipients.

Purpose: This research employs a two-pronged approach to address transfer challenges:

1. Evaluating unsafe transfer practices to inform targeted education and training interventions.

2. Developing and assessing the Powered Personal Transfer System (PPTS), a novel robotic no-lift transfer solution designed to reduce physical strain and improve transfer efficiency.

Methods: The first approach analyzed transfer tasks involving over 50 informal caregiver-care recipient dyads through video reviews and biomechanical assessments to identify unsafe practices and their impact on musculoskeletal injuries. Individualized education and training sessions were then provided to caregivers, focusing on correct posture and techniques to mitigate injury risks.

The second approach evaluated the PPTS, an integrated bed and wheelchair system for zero-lift transfers requiring minimal caregiver assistance. Developed with input from veterans, caregivers, and clinicians, the PPTS' usability, efficiency, and biomechanical impact were assessed in four phases with 89 participants, including wheelchair users and caregivers.

Results: The first study identified common issues in manual transfers, including improper wheelchair setup, inadequate positioning of care recipients, poor handhold techniques, and unsafe caregiver body mechanics. Mechanical assist device users also exhibited errors, such as failing to lock casters or adjust bases correctly. Individualized training based on these findings improved caregiver biomechanics and scores on the Caregiver Assisted Transfer Technique Instrument.

For technological intervention, the PPTS reduced transfer time by 72% (2.4 vs. 8.7 minutes, $p<0.001$) and significantly decreased injury risk factors, including risky trunk postures ($p<0.001$) and time spent in non-neutral trunk postures ($p<0.003$). Usability testing showed significantly higher usability scores for wheelchair users (90) and caregivers (81.25) compared to current transfer methods ($p=0.009$), with the PPTS outperforming existing transfer devices across all usability metrics ($p<0.05$).

Conclusions: This research highlights the importance of addressing unsafe transfer practices through evidence-based training and advanced assistive technologies. Developed with active stakeholder engagement, the PPTS aligns with the

Paralyzed Veterans of America's mission by addressing critical challenges faced by veterans with SCI and their caregivers. These findings demonstrate the potential of promising scalable interventions to reduce caregiver burden, prevent injuries, and enhance quality of life and independence for wheelchair users and their caregivers.

Learning Objectives

- Learners will describe the biomechanical risks of unsafe wheelchair transfers and their impact on caregivers and individuals with SCI.
- Learners will identify common wheelchair transfer errors and explain how targeted training improves techniques and reduces injury risks (behavioral/psychosocial objective).
- Learners will discuss the participatory design process for assistive technologies that meet the needs of veterans with SCI and their caregivers.
- Learners will evaluate the clinical significance of robotic solutions like the PPTS in enhancing safety, efficiency, and independence for individuals with disabilities and caregivers.

P2536: Backward is the Way Forward: Preliminary Effectiveness of a Backward Walking Intervention in Multiple Sclerosis

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Background: People with Multiple Sclerosis (PwMS) experience mobility impairments, elevating fall risk, increasing the need for interventions to reduce falls. Backward walking (BW) better differentiates fallers from non-fallers in PwMS compared to forward walking (FW).

Purpose: Limited studies have examined the effectiveness of BW training in PwMS for improving walking and balance. This study provides an interim analysis investigating the effects of BW training on walking and balance in PwMS.

Methods: 42 PwMS participated in an eight-week study. Participants were randomized to receive either forward walking training (MS-FW; n=23), or backward walking training (MS-BW; n=19). Participants completed 1x/week in-person visits with a physical therapist and 2x/week at-home exercises. Baseline and post-intervention visits included FW and BW at comfortable and fast speeds and balance assessments. Change scores were calculated using post-pre comparisons, and analyses included independent sample t-tests and effect size calculations.

Results: Despite no significant differences between groups in walking or balance trials due to the limited sample size, meaningful effect sizes were identified. Small effects were noted for group differences in fast walking forward velocity (MD = 0.46, p = .46, d = 0.23) and backward walking comfortable velocity (MD = 2.7, p = .28, d = 0.34), with the MS-BW group exhibiting larger improvements. Similar effect sizes were observed for group differences in eyes closed feet together (MD = 0.26, p = .21, d = 0.39) and feet apart conditions (MD = 0.15, p = .19, d = 0.41), with MS-BW showing the greatest reduction in sway.

Conclusions: Preliminary analyses from this ongoing study (targeted completion: June, 2025) highlights the promise of the BW intervention in PwMS and suggests that BW training may provide an effective way to improve not only walking performance but may also generalize to improvements in balance and overall functional mobility for PwMS.

Learning Objectives

- Identify mobility impairments that elevate fall risk among persons with MS.
- Compare and contrast clinical rating scales used to predict fall risk among persons with MS.
- Describe benefits of using backward walking velocity to predict falls in MS.
- Discuss the preliminary effectiveness of backward walking training to improve reactive balance control and other motor outcomes in persons with MS.

P2536: Exploring Factors Affecting Respiratory Function in Multiple Sclerosis

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Background: Multiple sclerosis (MS) can cause respiratory dysfunction when demyelinating lesions in the central nervous system impair neuronal impulses to the breathing muscles. This can result in muscular weakness, impaired coughing, and respiratory failure. Early detection and management of respiratory dysfunction are crucial for beneficial intervention, which has the potential to improve long-term outcomes and reduce disease-associated morbidity and mortality, but the factors influencing respiratory function in the early stages of MS have not been adequately studied. Understanding these factors may lead to better management strategies, improved quality of life, and targeted interventions to mitigate respiratory decline. The purpose of this scoping review was to characterize non-pharmacological therapies and variables that lead to respiratory dysfunction in MS in current literature.

Methods: This scoping review was registered with the Open Science Framework and followed the PRISMA-ScR guidelines. A comprehensive search was conducted in PubMed, Embase, and Scopus for papers published in English between 2014 and 2024. Studies were included if they assessed respiratory function tests, focused on adults aged 18 years or older diagnosed with MS, and addressed non-pharmacological interventions or factors affecting respiratory. Both observational and experimental trials were included. Studies that were not peer-reviewed, protocols, reviews, conference papers, or qualitative were excluded. Two independent reviewers screened titles, abstracts, and full texts by using Covidence Review Software. Data were extracted and recorded in an Excel spreadsheet.

Results: Eleven observational studies explored factors impacting respiratory function. Factors found to significantly impact function included disease progression and disability level, motor function, thoracic kyphosis angle, trunk function, core stability, impaired physical function, urinary incontinence, fatigue, sleep impairment, cognitive deficits, and anxiety, depression, and quality of life. Nine studies examined the impact of non- pharmacological interventions on respiratory function in PwMS. Interventions included respiratory muscle training (inspiratory and expiratory muscle strength training), Pilates, deep breathing exercises, lung volume recruitment, and proprioceptive neuromuscular facilitation. The findings demonstrated that these interventions significantly enhance respiratory function.

Conclusions: This study emphasizes the significance of non-pharmacological therapies for managing respiratory dysfunction and identifies major variables impacting respiratory outcomes. These findings help to enhance multidisciplinary approaches for managing respiratory health, which can successfully reduce morbidity and mortality while increasing the overall quality of life among MS. Current studies found that respiratory function is generally normal

in the early stages of MS except for the Forced Expiratory Volume (FEV1). However, there is a critical gap in understanding what factors impact respiratory function during these early stages. While non-pharmacological treatment shows promise, important factors such as obesity, fat distribution, nutritional status, and their effects on respiratory function have yet to be investigated. Future research is needed to explore these factors and their potential impact on overall respiratory health.

Learning Objectives

- Define the role of non-pharmacological interventions in managing respiratory dysfunction among individuals with multiple sclerosis (MS).
- Identify factors that significantly influence respiratory function in people with MS, including physical, psychological, and disease-related variables.
- Discuss the current gaps in research regarding respiratory function in the early stages of MS and the implications for future studies.
- Write a summary outlining the benefits of specific non-pharmacological therapies, such as respiratory muscle training and Pilates, for improving respiratory outcomes in MS.

P2536: A systematic review on sleep disorders in individuals living with spinal cord injury.

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Background: Sleep disorders are amongst the common secondary medical conditions after spinal cord injury (SCI). Yet, sleep disorders are underdiagnosed and undertreated in individuals living with SCI.

Purpose: This systematic review was undertaken to comprehensively review the current literature on sleep disorders after SCI in order to identify discrepancies and similarities in the occurrence of sleep disorders among non-disabled people.

Methods: This systematic review was conducted in accordance with the PRISMA guidelines and registered in the PROSPERO (CRD42023380475). Six databases were searched from inception to March 2023 (i.e., APA PsycInfo (EBSCO), CINAHL Ultimate, Embase, Emcare Nursing, Medline, and Web of Science. Only two topical concepts were used to extract the full spectrum of materials discussing Spinal Cord Injuries and any aspect of Sleep. The search was limited to humans but no language limits were applied. Following the literature search and removal of duplicates, two independent authors (MA and DB) screened the remaining studies by abstract and title. Any disagreement was resolved by a the first author (JF). After the initial screening, the same two authors read the full text of the remaining studies to verify inclusion eligibility and any disagreement was resolved by the senior author. We developed a data extraction file and three authors (MA, DB, and AG) completed data extraction of the included studies.

Results: Of 3,120 publications captured using the search strategy, 111 publications met inclusion/exclusion criteria and were included in the review. They were focused on insomnia (n=3), circadian rhythm disorders (n=12), sleep-related movement disorders (n=14), and sleep-related breathing disorders (n=53) according to the American Academy of Sleep Medicine International Classification of Sleep Disorders. Further, there were 32 publications focused on sleep quality in general. Notably, 3 publications were focused on more than one topic. The frequency of insomnia varied from 15.1% to 56%. Most studies suggest a higher frequency of circadian rhythm disorders associated with abnormal levels of melatonin and cortisol in the SCI population. Most studies on sleep-related movement disorders reported a higher risk for restless leg syndrome and periodic limb movement disorder during sleep in the SCI population. Sleep-related breathing disorders are much more frequent in individuals living with tetraplegia > paraplegia than among non-disabled people. Continuous Positive Airway Pressure (CPAP) therapy can improve daytime sleepiness and, potentially, improve other secondary medical conditions after SCI. Finally, poor quality sleep was more often reported in people with SCI (up to 78.3%) when compared with non-disabled people (up to 40%).

Conclusions: Sleep disorders are more frequent among individuals living with SCI than in non-disabled people. There are several knowledge gaps in the literature regarding screening, treatment and consequences of sleep disorders in the SCI population.

Learning Objectives

- Review the literature on frequency of sleep disorders in the SCI population.
- Discuss the pathophysiology of sleep disorders after SCI based on the current literature.
- Identify differences between non-disabled people and individuals living with spinal cord injury regarding sleep disorders.
- Discuss the knowledge gaps in the literature on sleep disorders after spinal cord injury.

P2536: Oral health problems in individuals living with spinal cord injuries and disorders

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Background: Optimal oral health is essential for overall health and well-being. Studies have shown that receipt of recommended oral health care is low among individuals with spinal cord injuries and disorders (SCI/D) and that their knowledge of the importance of oral health is limited. Oral health may be related to factors affecting people with SCI/D, such as impaired mobility, medication use, spasticity, and pain.
Purpose: Examine factors associated with oral health problems in persons with SCI/D.

Methods: Cross-sectional survey conducted in 2024 with Veterans and civilians with SCI/D. We used bivariate tests to compare demographic and injury characteristics, chronic conditions, and SCI/D secondary complications of individuals with oral health problems vs. those without. We used multivariable logistic regression analysis to generate odds ratios and 95% confidence intervals to identify variables independently associated with oral health problems.

Results: The sample (n=364) was, on average, 57 years old (18-91), mostly men (71%), white (71%), who did not live alone (80%). Average years since injury was 13 (1-64) and 60% had paraplegia. Over one-quarter of individuals with SCI/D reported oral health problems during the past 6 months. Unadjusted analyses showed that of those who reported having oral health problems, a greater proportion were non-white vs. white (37% vs. 22%, p=.008); had tetraplegia vs paraplegia (28% vs. 18%, p=.04); lived alone vs. with others (35% vs. 23%, p=.04); and were not employed vs. employed part/full time (28% vs. 12%, p=.02). A greater proportion of individuals with oral health problems had (vs. did not have): high blood pressure (32% vs. 22%, p=.03); heart problems (43% vs. 24%, p=.02); sleep problems (31% vs. 21%, p=.04), respiratory problems (39% vs. 21%, p=.0004); musculoskeletal pain (30% vs. 14%, p=0.004); and bowel dysfunction (29% vs. 18%, p=.05). Similarly, a greater proportion of individuals with oral health problems experienced frequent mental distress defined as > 14 poor mental health days in the past month vs 0-13 days (36% vs. 23%, p=.01), post-traumatic stress vs none (38% vs. 21%, p=.001); loneliness vs. none (35% vs. 23%, p=.04); anxiety vs. none (35% vs. 20%, p=.002); and depression vs none (36% vs. 19%, p=.0006). Multivariable regression showed that variables independently associated with oral health problems included: non-white race (OR=1.8, p=.05), respiratory problems (OR=2.1, p=.01), and pain (OR=2.3, p=.05) and there was a trend for heart problems (OR=2.2, p=.06).

Conclusions: Oral health deficits were more common among people with tetraplegia, those who lived alone, were not employed, and were of non-white race. A greater proportion with oral health problems also had myriad health issues including high blood pressure; heart, respiratory, and sleep problems; musculoskeletal pain, bowel dysfunction, and psychosocial concerns including frequent mental distress, loneliness, depression, anxiety, and post-traumatic stress. After controlling for confounders, non-white race, respiratory problems, and pain each independently demonstrated greater odds of having oral health problems. Future studies should identify barriers to oral health in this population, including oral hygiene challenges and lack of access to preventive services. Co-designed interventions are needed to improve oral health in persons with SCI/D.

Learning Objectives

- Describe demographic and injury characteristics associated with oral health problems in persons with SCI/D.
- Describe chronic and SCI secondary conditions associated with oral health problems in persons with SCI/D.
- Describe mental health/psychosocial outcomes associated with oral health problems in persons with SCI/D.
- Discuss at risk subgroups, disparities, and implications of oral health concerns in this population.

P2536: Interpersonal Violence Against People with Spinal Cord Injury: Results of a Qualitative Study

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Background: While there is compelling evidence that people with disabilities experience disproportionately high rates of interpersonal violence (IPV), there is little research on IPV against people with spinal cord injury (SCI). The available literature is limited in the scope of abuse assessed and/or limited to lifetime abuse, without distinguishing if the abuse occurred pre or post-injury.

Purpose: The objective of this presentation is to present findings from the first known qualitative examination of IPV in the context of SCI.

Methods: In 2024, we conducted in-depth, semi-structured, open-ended interviews via ZOOM with 21 individuals with traumatic SCI recruited across the United States who reported experiencing IPV post injury. The interviews prompted participants to share their IPV experience including forms of the abuse, characteristics of abusers, coping and help-seeking strategies, and barriers to disclosing IPV. Interviews were audio recorded and transcribed verbatim. We used Atlas.ti to organize the data and facilitate the content analysis. Descriptive methods were used to calculate demographic and disability characteristics.

Results: The sample included 10 females and 11 males ranging in age from 39-70 years (Mean=55.6, *SD*=8.1). Approximately half (*n*=11; 52%) reported their race/ethnicity to be non-Hispanic White, with the remainder describing themselves as Black, American Indian, Hispanic, or multi-racial. Approximately half had served in the U.S. Armed Forces (*n*=11; 52%), and more than a third (*n*=8, 38%) lived in a rural setting. Participants had lived with their injury for over 25 years on average (*Mean*=25.2, *SD*=14.9, range 4-47 years). Twelve [57%] lived with paraplegia and nine [43%] with tetraplegia. All but one used a wheelchair for mobility. The majority (n=18; [86%] experienced multiple forms of IPV, including actual or threats of physical, sexual, emotional, disability-related, systemic, societal, and/or financial abuse. Perpetrators included intimate partners, family members, friends, strangers, and care providers. Of note, nearly half (48%) of study participants experienced IPV by nursing staff or other healthcare providers. Barriers to reporting IPV included fear of repercussions, social isolation, abuser manipulation, and perceived futility of reporting.

Conclusions: People with traumatic SCI who had survived IPV following their injury shared sensitive information about the nature and dynamics of their victimization. Our findings underscore the gravity of the problem of IPV against people with SCI and barriers individuals with SCI face in addressing it. There is a critical need for additional research on IPV against people with SCI. Furthermore, there is a pressing need for collaboration among people with SCI, disability-service providers, health care providers, researchers, policy makers, and violence prevention specialists to address the problem of IPV in this at-risk population.

Learning Objectives

- Define and provide examples of interpersonal violence (IPV)
- Describe the research on IPV in the context of disability including research on IPV against people with SCI
- Describe the IPV experiences, perpetrator types, and barriers to reporting shared by participants with traumatic SCI in a qualitative interview study (Study 1 of this mixed methods project)
- Discuss the need for additional research and the national survey study planned as Study 2 of this mixed methods project

P2536: The Role Environmental Factors in Explaining Pain Interference Among People with Spinal Cord Injuries

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Background: Pain and pain interference are frequent significant issues for people with people with spinal cord injuries and disease (SCI/D). While it is intuitive that environmental factors may have a significant impact on the experience of pain interference, little research has been conducted to quantify this. Rather, research has tended to focus on issues such as neurological status, demographics, social support, other health conditions and resources available for medical care.

Purpose: The purpose of this research was to assess the impact of environmental factors on pain interference after controlling for the factors listed above.

Methods: This research was conducted using data from a study on aging in SCI/D. All participants were at least 45 years old, had continued locomotor dysfunction, had incurred their SCI/D at least five years prior to study participation and were community dwelling. Data was collected via surveys, which asked about numerous factors including demographics, neurological status, aging issues, health issues including pain and pain interference, resources, and environmental issues. Data was entered into a REDCap database and analyses was conducted with SPSS v27. First descriptive statistics were calculated for key variables. The final analysis was conducted using a generalized linear model, in which variables were entered in three clusters: demographics and neurological status; aging and health status; and environmental factors.

Results: There were 177 participants. Most participants were male (77.4%) and white (88.7%) and their mean age was 59.7 years ±8.3 while their time since injury was 23.6 years (±11.1). Medicare or Medicaid were the primary source of health insurance. In terms of neurological status, 45.2% had paraplegia with an AIS Grade of A, B or C, 31.1% had tetraplegia and an AIS grade A, B or C, while 23.7% were classified as AIS grade D. The mean SCI-QOL Pain Interference Scale score was 55.55 ± 8.5, indicating that pain interference was somewhat higher in this sample than in the adult SCI population at large. In the multivariate model, model fit, as measured by chi-square, improved with the addition of each cluster, from 43.720 to 64.423 and finally to 108.331 in the final model. Environmental variables included in the model were the MOS Emotional/Informational Support Scale and the Facilitators and Barriers Survey Community Factors score. Both were significant in explaining pain interference (p=.008 and p=.001).

Conclusion: While other factors were significant predictors of pain interference in our final model, including race, employment status, and secondary medical conditions, environmental factors played a significant, major role. Thus, clinical staff who are helping people with SCI/D to prepare for community re-entry need to address issues of limitations in Emotional and Informational Support as well as the physical barriers that they will face in their communities. Such assistance is likely to be needed in preparation for rehabilitation discharge and subsequently, as their situations will change over time.

Learning Objectives

- To discuss the importance of pain interference as an outcome of SCI/D rather focusing wholly on pain severity.
- To recognize the importance that environmental barriers can play in enhancing pain's impact.
- To recognize the importance of conducting multivariate analyses by entering variables in clusters, thereby allowing for explaining the additive impact of each cluster in explaining the study outcome.
- To discuss the implications of this research for clinical care in preparation for and after community re-entry.

P2537: Choose VA: The Choice for Comprehensive Lifelong Excellence in MS Care

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Background and Issues: The Multiple Sclerosis Centers of Excellence (MSCoE) national network was initiated in 2003 to provide multidisciplinary care, education, and innovative research for Veterans with multiple sclerosis (MS). Despite over 20 years of existence, many Veterans are not aware of our clinical specialty program, or the benefits it can offer.

Purpose: To highlight the clinical, educational, research, and social support benefits of the MSCoE.

Methods: Through a series of didactic sessions on clinical care, research and social/occupational benefits, the primary features of the MSCoE will be presented by the speakers. Partnerships with our non-profit and industry partners will be discussed. Some case examples will be used to show relevance to individual Veteran that are making decisions about their care.

Results: The following MSCoE topics will be reviewed by the speakers:

Clinical Care: a) Comprehensive cost-effective interdisciplinary care; b) Access to FDA-approved MS Disease Modifying Therapy with approaches for sustainment over the lifespan; c) Standardized MRI acquisition and interpretation; d) Standardized neuropsychological testing.

Research: a) VA-funded research projects on imaging and rehabilitation; b) multi-site clinical trials; c) Comprehensive databases to discover risk factors and outcomes unique to military population

Education: a) Veteran related MS lectures and podcasts; b) MS Veteran Newsletter; c) Compreshensive website;

Psychosocial Resources and Veteran Benefits: a) VA Service Connection and other financial benefits; b) Travel and home care resources: c) Occupational and educational programs; d) Special population benefits (e.g., PACT Act)

Collaboration with non-profit organizations and industry: Paralyzed Veterans of America, National MS Society, MS Association of America, and pharmacy, rehabilitation and mobility companies.

Conclusion: The MSCoE offers guideline concordant inter-disciplinary clinical care to sustain Veterans with MS throughout the lifespan. Veterans are given the opportunities to participate in research, and educational activities specific to the military population. Importantly, through the MSCoE national network, Veterans can access the benefits they've earned.

Learning Objectives

- List the clinical benefits of utilizing the VA healthcare system for life-long integrated MS care.
- Identify how participation in educational and research activities related to MS can enhance one's own healthcare experience and lead to new opportunities to change behavior and practice in the MS community.
- Describe the benefits of VA care to address the unique psychosocial challenges faced by the Veteran population and how to assess for eligibility and refer patient to appropriate VA services to address these needs.
- Describe how VA partners with military and community non-profit groups and industry to educate and support Veterans with MS, along with their families and caregivers

P2538: Thinking Outside the Clinic Box

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Background: The Washington DC VA Medical Center/Multiple Sclerosis Center of Excellence-East (DC VAMC) has utilized the multidisciplinary care team approach in the management of veterans with chronic conditions such as, multiple sclerosis (MS) and spinal cord injuries (SCI). The multi-disciplinary team continues to be a well-studied approach in the management of the care of these complex individuals. The care team, including neurology/MS-specialists, social work, pharmacy, physical and occupational therapies, nutrition, neuropsychology, wound care, and speech language pathology, unite to place the veteran at the center of the care team.

Purpose: The multi-disciplinary team's goal remains steadfast: to increase the veteran's quality of life given their chronic condition. Doing so, allows the veteran to function with optimal comfort, safety, and participation in daily life. Developing a "live" multidisciplinary care team clinic requires significant coordination of care providers to optimize veteran outcomes. Providers have time allotted to attend the clinic; however, opportunities for follow-up discussion with the clinic team and patients remains elusive. At the DC VAMC, we also have received veteran feedback that attending our MS/SCI multi-disciplinary clinic remains difficult. Travel and time remain significant barriers. Veterans also report a lack of benefit from the full clinic experience; others find clinic services duplicative in nature. Lastly, our clinic still suffers from a high no-show rate impacting the opportunity cost of the missed appointment. This presentation introduces a new bi-level MS/SCI Multidisciplinary team described below.

Methods: Level 1 Clinic: Virtual Once a month clinic which includes PT, SW, Neuropsychologist and neurology NP. Act as a triage clinic for specific symptoms and needs

Level 2: Full multi-disciplinary clinic experience which his ideal for new consults/referrals and includes a comprehensive assessment from each discipline

Results and Conclusions: This presentation features the roles of neuropsychology, social work, physical therapy and the neurology NP within a MS Clinic. Information presented will provide the audience with insight on how to implement a virtual triage clinic in their setting . Doing so, will increase access to specialized care for veterans with Multiple Sclerosis and decrease the opportunity costs of missed appointments.

Disclosures: None

Commercial Interests: None

Learning Objectives

- The learner will identify steps for developing, implementing and managing a triage style virtual MS Multi-Disciplinary clinic.
- The learner will describe the key components of the roles and functions of a MS Nurse Practitioner, Social Worker, Physical Therapist and Neuropsychologist in this triage virtual clinic setting.
- The learner will list the benefits of implementing a virtual triage style clinic in respective VA settings to increase access to care, decrease duplication of services and minimize no-shows.
- The learner will recognize which patients should be referred to a Level 1 virtual triage MS appointment as opposed to a Level 2 full Multi-Disciplinary clinic.
- The learner will identify psychosocial barriers that can be addressed with implementation of a virtual triage clinic and how access to care and health outcomes are improved for veterans with psychosocial limitations.

P2539: ExciFlex: effective mobile health technology to accelerate healing of pressure injuries and decrease wound infection

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Background: Many Veterans experience chronic wounds which don't heal for extended periods, causing significant pain and reducing the quality of life. Current approaches to electroceutical wound therapy require frequent clinical sessions, incurring significant cost and inconvenience to patients. Repeated dressing changes disrupt and inhibit healing. The current study objective was to evaluate these paradigms in a translational study using exciflex, a VA-developed mobile health electroceutical bandage that can be worn for up to 7 days, thereby delivering consistent therapy and minimizing wound bed disruption. VA research funding has provided support for development and systematic testing of exciflex, a wearable electroceutical bandage enabling therapy to be delivered safely outside the clinic. exciflex is a disposable occlusive bandage incorporating flexible nonmetallic electrodes and an absorbent, flexible, and transparent substrate to manage wound exudate, together with a reusable stimulation/control module. The exciflex bandage can be worn for up to one week, delivering electroceutical therapy around the clock, which promotes healing.

Purpose: Describe development and clinical translation of a novel wearable electroceutical bandage for treatment of chronic pressure injuries

Methods: Extensive translational development and testing of exciflex was carried out prior to starting a first-in-human clinical pilot study funded by the VA BRAVE program. Physiological markers of wound healing showed improvement for wounds treated with exciflex compared to a non-active wound dressing. Participant inclusion for the pilot clinical study included being a Veteran with SCI who are inpatients or residents of the on-site Long Term Care Unit, over 18 years old and not pregnant. Electroceutical therapy was applied at a 10% duty cycle for 24hrs/day, i.e. for 6 minutes every hour applied for 10 weeks or until the wound is healed for 3 days. Bandage changes and wound monitoring, including non-invasive assessments of wound geometry, wound temperature, perfusion and biofilm, were carried out until the wounds were healed.

Results: Physiological markers of wound healing showed improvement for wounds treated with exciflex compared to a non-active wound dressing. Wounds that had stalled in healing months of expert care showed significant healing within 4 weeks of starting use of exciflex treatment. Wounds decreased in overall size by as much as 97%. Daily wound status monitoring showed progressive healing without infection, needing the bandage changed only every 6 days. In one wound with significant tunneling the tunneling decreased markedly and the opening in the skin shrank.

Conclusions:

The exciflex bandage delivers reliable electroceutical therapy, minimizing unnecessary dressing changes and wound bed disruption, improving healing outcomes and increasing patient safety. exciflex is transparent over the wound bed, allowing the clinician to monitor wound status visually without removing the bandage. Electroceutical therapy delivered using the exciflex system improves healing rates compared to standard of care and reduces wound bioburden, providing an alternative to topical antibiotics. The BRAVE study provides an essential translational step toward the use of the exciflex electroceutical bandage by a broad population of Veterans with wounds in the clinic and at home use.

Learning Objectives

- Discuss the advantages to Veterans and clinicians of an effective lightweight electroceutical bandage for chronic wounds.
- Describe the benefits of minimizing unnecessary dressing changes
- Describe the clinical impact of sustained electroceutical wound therapy.
- Describe the impact of sustained electrotherapy on infection in chronic wounds.

P2540: Enhancing Remote Home Assessments: Integrating 3D Modeling Technology for Advanced Practice

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Background: Aging-in-place is a priority for many older adults, including those living with disabilities. However, residential environments are often static and may not effectively adapt to the evolving needs associated with aging. As individuals experience physical and cognitive decline and the structural conditions of their homes deteriorate over time, the resulting misalignment can present significant challenges to safety and accessibility. This disparity underscores the need for adaptable housing solutions to support aging in place successfully. Healthcare professionals, such as occupational therapists, address these issues by conducting home assessments and recommending modifications, proven to enhance functional independence, reduce fall risks, and alleviate care partner burden. In the Veterans Health Administration (VHA), home assessments shifted from in-person visits to videoconferencing during the pandemic, improving access for Veterans in remote and rural areas. While videoconferencing has emerged as a valuable substitute for in-person visits, offering convenience and accessibility, it still presents notable limitations. These include a restricted field of view and potential issues with video quality, which may compromise the comprehensive and accurate identification of home hazards. To address these challenges, alternative technologies need to be explored.

Purpose: This study evaluates the benefits and limitations of three-dimensional (3D) modeling as a novel technology to enhance remote home assessments.

Methods: Using a 360-degree camera and mobile app, 3D models of home environments were created. Five VHA occupational therapists participated in virtual training and practice sessions to familiarize themselves with the 3D modeling process. Each occupational therapist then conducted a remote home assessment using the 3D model, followed by completion of the System Usability Scale (SUS) and semi-structured interviews.

Results: Occupational therapists (M_{age} = 47.8, age range 32-57 years) required an average of 10 minutes for training and practice, reporting increased or maintained confidence in using the 3D models. Remote assessments were successfully completed in an average of 17 minutes. The 3D models were rated as highly usable, with an average SUS score of 78.5. Participants preferred 3D models over videoconferencing, citing improved visual field and accuracy in detail perception. All participants expressed willingness to incorporate 3D modeling into clinical practice, highlighting its potential to address and mitigate the inherent limitations associated with videoconferencing methods.

Conclusions: This study shows that 3D modeling technology offers a practical and effective solution for remote home assessments. This innovative approach suggests that 3D modeling may offer significant advantages in remote assessment scenarios, potentially enhancing the accuracy and comprehensiveness of virtual patient evaluations. With minimal training, occupational therapists can perform assessments more efficiently and comprehensively. Integrating 3D models into clinical workflows, particularly as a preparatory step to videoconferencing, could significantly enhance the quality of remote assessments for individuals aging-in-place, including Veterans with disabilities.

Learning Objectives

- Identify technological challenges in remote home assessments and their impact on hazard identification.
- Prepare to utilize 360-degree cameras and mobile apps to create 3D models of home environments for remote home assessments.
- Evaluate how 3D models improve accuracy and confidence for occupational therapists and other clinicians.
- Discuss how 3D models address the limitations of traditional methods and enhance clinical outcomes for individuals living with SCI, MS, and ALS.

P2541: Tenacity and Resilience: What ALS taught us

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ALS is a devastating progressive neurodegenerative disease which impacts the Veteran population at a rate disproportionately to their civilian counterparts. In response to increasing populations of Veterans seeking care for ALS since 2008, the ALS System of Care emerged organically across the VA. Building upon the strength of established models of comprehensive rehabilitative management, and after engaging and incorporating the perspective of Veterans and their caregivers, the VA was lauded as “a bright spot in the landscape of ALS care” in the 2024 National Academies of Science, Engineering, and Medicine “Living with ALS” report. Much work remains to elucidate and address the increased risk of ALS in military Veterans and to ensure consistent access to the highest quality care for all, but promising work is underway that may support future breakthroughs in diagnosis and care.

Learning Objectives:

- List at two reasons the National Academies of Science, Engineering, and Medicine referred to the VA ALS System of Care as the model upon which community clinics should be based
- Provide two examples of how input from persons served can be systematically incorporated into continuous quality improvement in ALS care
- List two environmental exposures associated with ALS.
- Describe the Millenium Cohort and how this project may help better understand military exposures related to the development of ALS in the Veteran population.

P2542: What can multi-omics tell us? Integrated approaches to provide a deeper understanding of secondary health conditions after SCI.

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Background: Despite the best standards of care, secondary health conditions (SHC) continue to have a major negative impact on health and quality of life for many persons with spinal cord injury (SCI) and their providers. Individuals with SCI are, in general, at increased risk for development of SHC. It has been found that Veterans with traumatic SCI are more likely to have multiple chronic conditions and experience poorer health status, thus accounting for a disproportionate share of VHA expenditures. There is great potential to improve health-related quality of life and decrease compounding medical health complications through focused investigation of SHC in this population. Current studies are identifying multivariate biomarkers, including genetic and epigenetic indicators, that may facilitate earlier identification of individuals at the highest risk for SHC.

Purpose: To demonstrate the advantage of applying multi-omic approaches to enhance early risk assessment of secondary health complications following traumatic spinal cord injury thus reducing healthcare costs and enhancing the well-being of Veterans with traumatic SCI.

Design:

Setting: VA Medical Centers (multi-site recruitment)

Study design: Repeated measures observational study

Follow-up: Blood draw

Methods: Sequencing whole blood samples was conducted to examine repeated measures of transcriptome profiles of a diverse cohort of 102 Veterans with complete or incomplete SCI (AIS A-D) and known history. Whole genome sequencing (WGS) using the Illumina Next Generation Sequencing (NGS) platform was applied to blood samples from the study cohort. Samples were collected at 6-12 month intervals for up to four years. Quality control was carried out using the Qubit™ RNA broad range kit and normalized to 50ng/uL prior to sequencing using the NovaSeq 6000 (Illumina) system. Methylation levels were measured using EPICv2 Methylation array (Illumina) and quality control was performed using R/Bioconductor packages *minfi* and *wateRmelon*. Sequence data was analyzed using iPathwayGuide (Advaita Bioinformatics).

Results: Preliminary findings demonstrate concurrent associations among neuropathic pain, recurrent pressure injury and disturbed sleep. Genomic and transcriptomic biomarkers identified appear to differentiate increased risk for SHC of interest. The dopaminergic pathway was also found to hold promise as a shared pathway between several SHC of interest, given dopamine's involvement with movement, memory, attention, sleep regulation, and multiple addiction pathways.

Conclusions: The huge impact of chronic SHC on quality of life remains challenging. 21st century approaches to an age-old problem are providing greater understanding of the role of multi-omic biomarkers on increased risk for recurrent or severe SHC. The use of disease models in the context of the larger biological systems and environmental risk factors, offer a key opportunity to recognize and predict risk and outcomes, while improving therapeutic interventions. Our ongoing multisite repeated measures study is providing further insights into multi-omic risk.

Learning Objectives

- Describe the impact of secondary health conditions on persons with SCI.
- Identifying the difference between multi-omic approaches.
- Summarize advances in the development of novel approaches to identify persons at increased risk for recurrent secondary health conditions.

- Describe concurrent associations among secondary health conditions following SCI.

P2543: The Effect of Design on Long-Term Care Outcomes

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According to the WHO (World Health Organization), the *physical environment* is one of six factors that influence how we will age (the other five being *social*, *economic*, *behavioral*, *personal*, and *available social and health services*). Evidence-Based Design (EBD) is the process of basing strategies about the design of a physical environment on credible research in order to maximize outcomes.

Since the 1980's when the architecture of assisted living facilities first started to evolve, there has been extensive research on the powerful effect that building design has on the physical and emotional health of extended care and rehabilitation facility residents. However, large institutions such as the Department of Veterans Affairs (VA), have only recently caught up to the research. It has now become commonplace for healthcare project decision-makers to set "enhancing outcomes" as one of the design goals. The benefits of "de-institutionalizing" environments have definitively been shown to increase the healing powers of medical centers. And nowhere is this more important than extended care facilities, including Spinal Cord Injury and Disorders (SCI/D) LTC centers.

Healthcare providers of all disciplines would benefit by learning about the research-driven guidelines which informed the design decisions of the new Dallas VA LTC Center. The new Dallas Center is the most recent, and best, example of a healing environment design for SCI/D LTC residents and will be used as a primary case study in this discussion. Providers may incorporate the strategies discussed into their current patient and resident care, such as intentionally finding daylight-filled spaces to work with LTC residents or being cognizant of other spaces which can foster detrimental feelings of isolation or danger. They might even find themselves with the opportunity to contribute these ideas on a future clinical facility project on their own medical center campus.

Although outcomes-based design strategies are ever-evolving, with a basic knowledge of these principles and how they can have a positive physical and emotional effect, healthcare providers will have an additional tool assisting in the treatment of SCI/D residents and patients.

Learning Objectives

- Identify how the design of clinical spaces affects patient outcomes.
- Explain the positive influence of Evidence-Based Design (EBD).
- Describe how the new Dallas Long-Term Care (LTC) Center employs innovative resident-centric design strategies.
- Identify the differences between the outcome-based design strategies of acute care vs. long-term care medical center facilities.

P2544: Spirituality is everybody's business

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Background: In 2018, we presented a study that described the association between spiritual well-being, demographic characteristics, quality of life (QOL), and depressive symptoms following Spinal Cord Injury (SCI). In this study spirituality, as measured by the FACIT-Sp, was strongly associated with QOL and the likelihood of Major Depressive Disorder. Thus, the importance of spirituality is to better inform treatment and support the patient's mental health. Recently, more studies have identified the importance of spirituality in clinical settings to improve the patient's QOL (Ghezelseflou, M.,2023; Maciej Klimasiński et al, 2022; J Van de Geer, *et al.2017;* K Jones, et al.2016*).* Brito Sena et al. (2021) concluded that understanding spirituality is important in healthcare research and clinical practice. A study on spirituality with 136 physical therapists (PT) from 250 clinics indicated that most (96%) of PTs felt that spiritual well-being is important to health. However, only 30% were comfortable addressing it, due to their lack of experience asking about spiritual history, doubt about how to manage spiritual issues, and lack of time. Jones, et al. (2023) identified that spirituality is associated with increased comfort, QOL, resilience, and physical and mental health, with lower levels of depression and anxiety. It has been a common recomendation between people with lived experience (PWLE), if possible, to use an incremental approach when addressing spirituality (Lee, Abeska, & Winters, 2025). Many studies report that healthcare teams often feel poorly prepared to talk about the spiritual needs of their patients. Thus, emphasizing the importance and the need for this training in spirituality.

Goals: 1) improve the care for patients with chronic illness such as SCI and ALS and their families by setting health care goals which include addressing the concept of spirituality (three case studies discuss the issues); 2) increase awareness of FOF and addressing one's position on spirituality and 3) Identify that it is a responsibility of the whole team to learn to address spirituality in the care of the patient.

Methods: The most common teaching method found in the literature review among the spiritual care programs was educational teaching (n=36), Group (n=26) or personal reflection (n=14) often accompanied by didactic teaching often based on case studies. Therefore, this presentation has incorporated research on the importance of teaching how to address spirituality in health care by incorporating aspects of the Jones' training program, case examples from treating ALS, and SCI patients, and audience participation of their own spiritual beliefs with case examples of patient encounters.

Results: 1) Participants will understand the concept of spirituality; 2) will be able to recognize the importance of the spiritual dimension in patient care; 3) will gain awareness of the importance of understanding one's spirituality before addressing the spiritual needs of others; 4) and understand the importance of self-care, with an increasing ability to self-reflect.

Conclusion: This program will broaden participants' existing understanding of spirituality and will incorporate an understanding that spiritual care encompasses compassion, kindness, respect, and finding out what matters most to an individual patient.

Learning Objectives

- Identify the different spiritual care training programs and how they have been delivered to health care teams
- Recognize the key outcomes of spiritual care training
- Discuss the reasons healthcare professionals need to utilize self-care and self-reflection to incorporate and address spirituality in the care of patients.
- List the Barriers and Facilitators concerning Spiritual Care in Healthcare

P2545: Addressing Adverse Childhood Events (ACEs): Underlying Patient Care Experiences

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Background and Issues: Working with individuals in the midst of life-altering diagnoses like Spinal Cord Injury/Disorders (SCI/D) is complex; when patients engage in challenging behaviors, that work is even more demanding and care can be compromised. A clinical scenario sets the stage for a unique perspective for appreciating and responding to an irritable, resistant patient, across health care disciplines. This presentation will raise awareness of Adverse Childhood Experiences (ACEs) their prevalence, their effects, and how-as care providers-we can address. The Centers for Disease Control reports 64% of adults endorse at least one ACE before age 18. ACEs may have profound, negative impact on our notions of self and others, affecting our emotional and interpersonal patterns.

Purpose: The purpose of this talk is to teach participants about ACEs and their associated physical and mental health-related sequelae. Participants will learn about attachment theory, raising awareness of how the invisible effects of ACEs alter how we think about our selves and others, what we expect, and how we protect ourselves. From this integrated perspective, providers will be offered key concepts and resources from Trauma-Informed Care. The anticipated result should be increased understanding, empathy, and flexibility in responding in difficult interaction…moving from "what's wrong with them?" to "what happened to them?"

Methods: First, ACEs and their pervasive presence will be explained; a recent study found 42.3% respondents growing up outside the military endorsed no ACEs, compared to 26.6% of respondents who were raised in a military family (Blosnich et al, 2014). Then, we will explore how childhood trauma impacts our underlying neurobiological systems, particularly the limbic-hypothalamic-pituitary-adrenal axis and the locus coeruleus-norepinephrine/sympathetic nervous system. Next, attachment theory provides a useful frame understand how ACEs may manifest as diverse patterns of emotional and interpersonal interactions. Finally, guiding principles and practical strategies are shared from the field of Trauma-Informed Care, to improve patient care and provider stress.

Results: As a result of participation in this session, participants will be able to :

1. Explain the nature and scope of ACEs in the Veteran population;
2. Describe at least two ways research suggests ACEs may impact adult health and underlying neurobiological systems;
3. Discuss how attachment theory relates to ACEs and patient care;
4. Formulate at least two strategies for enhanced professional practice, grounded in Trauma-Informed Care.

Conclusions: Adverse early life experiences impact our neurobiological systems as well as our affective and interpersonal experiences in concrete, long-lasting ways. These unfortunately common events impact our complex concept of self--including race, ethnicity, sexual and gender identities, ability, social roles—intersectionality at its core. Appreciating these phenomena and understanding the essential physiological and experiential changes through an attachment theory lens, generates increased empathy, resilience, and an expanded trauma-informed repertoire for responding in difficult patient encounters.

Blosnich, J. R., Dichter, M. E., Cerulli, C., Batten, S. V., & Bossarte, R. M. (2014). Disparities in adverse childhood experiences among individuals with a history of military service. JAMA psychiatry, 71(9), 1041–1048.
https://doi.org/10.1001/jamapsychiatry.2014.724

Learning Objectives

- Explain the nature and scope of ACEs in the Veteran population;
- Describe at least two ways research suggests ACEs may impact adult health and underlying neurobiological systems;
- Discuss how attachment theory relates to ACEs and patient care;
- Formulate at least two strategies for enhanced professional practice, grounded in Trauma-Informed Care

P2546: Complex Seating and Multiple Sclerosis: Interface Pressure Mapping to Optimize Access to Assistive Technology

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Background and Issues: Wheelchair users with Multiple Sclerosis (MS) often have complex seating and assistive technology (AT) needs. Interfacing Pressure Mapping (IPM) is a clinical tool used to address seating and positioning, known to decrease exposure to damaging high pressures (Teleten et al., 2019). Use of this underutilized, cutting-edge technology, in conjunction with interdisciplinary collaboration tactics, can maximize the wheelchair user's seating for optimal access to their environment and various means of AT.

Purpose: In this talk, an Occupational Therapist and Speech-Language Pathologist will explore interdisciplinary ways to maximize AT access by integrating IPM to optimize positioning for wheelchair users with MS.

Methods: Accessing AT is a collaborative process, at the least conducted between the wheelchair user, OT, and SLP. This requires ongoing communication, clinical rounding, role delineation, cotreating, and creative problem solving. This collaboration is vital to determining types of AT for the wheelchair user; positioning for organ function, feeding, and swallowing; as well as access to AT, such as augmentative and alternative communication (AAC) devices, eye-tracking systems, smart home technology, and environmental controls. This interdisciplinary presentation will dissect the effectiveness of IPM with subsequent hands-on demonstration, considering positional needs guiding the clinician towards optimizing the user's access to AT.

Results: Clinicians utilizing IPM as a tool in conjunction with interdisciplinary collaboration tactics can increase function, pressure ulcer safety, engagement with AT, and overall quality of life for wheelchair users with MS.

Conclusion: Pressure mapping is a noninvasive, objective, and '3-D' graphical representation to measure surface interface pressure and pressure redistribution. However, seating interventions for pressure ulcer prevention do not always align with the wheelchair user's access to AT. Integrating IPM innovative technology, in conjunction with interdisciplinary collaboration tactics, is the catalyst to maximizing seating for optimal access to various means of AT for wheelchair users with MS.

Here are links to supporting photos of IPM for complex seating needs.

VA Access: PVA Presentation Photo Documents of IPM.docx

Google Drive Access: PVA Presentation Photo Documents of IPM.docx

Learning Objectives

- Demonstrate best practices and hands-on use of Interface Pressure Mapping for complex seating.
- Identify interdisciplinary collaboration tactics as it relates to seating and Assistive Technology (AT) access needs.
- Examine case studies employing interdisciplinary collaboration tactics and make recommendations to optimize both seating needs and access to AT.
- Ascertain strategies to maximize participation in AT evaluations and use of positioning recommendations for wheelchair users with MS-related cognitive changes.

P2547: Diet and MS: What we know and what we're learning

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Background: People living with MS (pMS) and their caregivers often ask if they should follow a specific diet for MS, and nutrition is currently a hot topic in MS research. Despite the prevalence of myths and unsubstantiated claims about following a specific diet for MS, there is a growing body of literature to support the idea that what we eat could impact MS outcomes.

Purpose: The purpose of this presentation is: 1. Review the current evidence on diet in MS, including common diet myths related to MS, 2. Present results of two pilot dietary trials in MS, 3. Discuss on-going studies that may fill in critical gaps in knowledge related to how diet may influence MS, and 4. Offer practical recommendations for diet change for clinicians, pMS, and caregivers.

Methods: We will begin with a comprehensive review of the current literature on diet in MS, including epidemiological and clinical trials related to dietary patterns and potential mechanisms of action. We will then discuss two single-arm pilot trials that we conducted. In the first trial, DIET MS, n= 20 adults with relapsing remitting MS (RRMS) followed a low glycemic load (GL) diet for 12 weeks. In the second trial, TREO MS, n = 12 adults with RRMS followed a time restricted eating (TRE) pattern, in which all food was consumed during an 8-hour period each day, for 8 weeks. Both studies measured dietary adherence, adverse events, and change in cognition, pain, and mood.

Results: Eighteen participants (85% female, 45% white) completed the DIET MS study. Participants had good adherence to the diet, evidenced by exceeding the recommended GL reduction (prescribed GL: 96.66 [12.97] points, reported GL: 90.32 [39.36]). Paired samples t-tests and Cohen's d for effect size indicated a moderate improvement in mood, measured by Patient Health Questionnaire-9 (paired difference: 1.53 [2.87] p= .04, d= .36). Eleven participants (82% female, 58% white) completed the TREO MS study. Participants reported following the TRE schedule a mean of 6.8 (1.6) days/week at 4 weeks, and 6.5 (1.4) days/week at 8 weeks. Paired samples t-tests and Cohen's d indicated large improvements in symbol digit modalities test (paired difference: 5.8 [8.3] p= .06, d= .70), and moderate changes in pain, measured by the McGill Pain Scale (paired difference: -1.9 [5.4] p= .30, d=.35). There were no serious adverse events reported in either study.

Conclusions: Epidemiological evidence supports the hypothesis that unhealthy diet patterns are associated with MS symptoms and outcomes including increased pain, fatigue, disability, and hospitalization, but dietary intervention research in MS is still in early phases. Our research suggests that low GL diets and TRE may improve cognition, pain, and mood, and we are currently conducting randomized follow-up studies to further test the impact of these diets on MS clinical outcomes. There is currently no evidence to support one specific "MS diet," and pMS should focus on adopting healthy habits including eating a variety of fruits, vegetables, whole grains, and lean protein, and limiting processed/refined sugars.

Learning Objectives

- Describe the current level of evidence related to diet in MS
- Identify common diet myths in MS
- Explain components of a healthy diet
- List top dietary recommendations for people living with MS

P2548: Bringing specialized care closer to SCI/D Veterans: A Hub/Spoke collaboration for annual exams using Telehealth

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Learning Objectives

- Educate SCI/D Veterans about the importance of annual comprehensive evaluations and the resources available to complete the exam utilizing Telehealth.
- Recognize how to effectively integrate Telehealth technology in the annual evaluation process for SCI/D Veterans who are unable to travel to the SCI/D Center.
- Illustrate how to structure a coordinated Telehealth annual comprehensive preventive evaluation between the SCI/D Center and Spoke Teams.
- Understand how to incorporate standardized templates at Hub and Spoke sites to streamline the process.

P2549: Osteomyelitis CDC Surveillance Definition in SCI, National Survey results and understanding what is needed

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Background: The CDC/NHSN (National Healthcare Safety Network) Surveillance Definitions for osteomyelitis, particularly Criteria 3, present challenges for accurately diagnosing hospital-acquired infections in spinal cord injury (SCI) patients. This criterion requires at least two of the following localized signs or symptoms: fever (>38.0°C), swelling, pain or tenderness, heat, or drainage. However, these symptoms are often absent in the SCI population due to the nature of their condition. Chronic pelvic wounds and limited access to timely bone biopsies further complicate the distinction between community-acquired and hospital-acquired osteomyelitis. These issues increase the risk of misclassification, which can affect hospital-acquired infection (HAI) rates and overall patient management.

The purpose of this study is to identify the limitations of the current CDC surveillance criteria for osteomyelitis in SCI patients and propose adjustments to ensure accurate infection classification. The study seeks to develop an algorithm that accommodates the unique clinical presentation in SCI patients, thereby improving compliance with CDC definitions and enhancing patient outcomes.

Methods: To address these challenges, the CDC guidelines were thoroughly reviewed and discussed with the NHSN. An algorithm was created to guide clinicians in diagnosing osteomyelitis within the constraints of the CDC definitions. This algorithm was reviewed by infection control providers, infectious disease (ID) services, and SCI attendings to ensure its practicality and effectiveness.

In addition to the algorithm, a survey was conducted using RedCAP to gather data from SCI and wound care providers across the VA system and the broader community through the Academy of Spinal Cord Injury Professionals (ASCIP). The survey aimed to evaluate the clinical applicability of Criteria 3 and to understand the diagnostic practices and challenges faced by providers managing osteomyelitis in SCI patients.

Algorithm Details: The algorithm emphasizes the importance of early imaging, recommending that imaging be obtained within 72 hours of admission to identify potential osteomyelitis. Although bone scans, gallium scans, and MRIs are preferred for their diagnostic accuracy, the algorithm suggests using CT scans when faster results are needed due to logistical constraints. The algorithm also considers the limited availability of bone biopsies, advocating for the use of imaging evidence as a supporting diagnostic tool when timely biopsies are not feasible.

Survey Questions Included:

- Frequency of localized signs or symptoms (fever, swelling, pain, heat, drainage) in SCI patients with osteomyelitis.
- Association of fever with osteomyelitis in chronic wound cases.
- Incidence of swelling in osteomyelitis transferred from pelvic wounds.
- Presence of pain or tenderness and relevance of drainage in diagnosis.
- Preferred imaging modalities and timelines for obtaining bone biopsies.

Results: The survey was completed by 60 respondents, with 80% managing 1-5 osteomyelitis cases per month. Two-thirds reported difficulty meeting Criteria 3 due to the absence of localized symptoms in SCI patients. Only 7% observed fever associated with osteomyelitis, and 60% noted fever only in the presence of a concurrent wound infection. Swelling was reported as absent in 75% of cases, highlighting confusion between clinical and radiological findings such as bone marrow edema. Pain was notably absent in 90% of cases, and drainage was rarely attributed solely to osteomyelitis.

Imaging challenges were also significant, with MRI and nuclear scans difficult to obtain within 72 hours, and only 14% achieving timely bone biopsies.

Conclusion: This study highlights the limitations of the current CDC surveillance definitions for osteomyelitis in SCI patients, particularly the challenges in meeting Criteria 3. The proposed algorithm offers a practical approach to diagnosing osteomyelitis, taking into account the unique clinical presentations and diagnostic constraints of the SCI population. The survey results and the algorithm have been submitted to the NHSN for review in their July 2025 cycle, with the aim of refining the surveillance definitions to improve diagnostic accuracy and patient outcomes.

Learning Objectives

- Review current CDC Surveillance Definition for Osteomyelitis
- Discuss limitations of the CDC Surveillance Definitions for Osteomyelitis
- Assess what changes are needed in clinical practice to avoid erroneous label of Hospital Acquired Infection.
- Analyze the response of the survey

P2550: A healthcare provider educational curriculum to manage loneliness in persons with spinal cord injuries/disorders

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Background: Loneliness is common among people with spinal cord injuries and disorders (SCI/D) but is often underrecognized and undertreated. Loneliness is associated with increased health consequences, and individuals with SCI/D may have a greater risk of experiencing loneliness due to changes in social roles which may impact their social relationship. The US Surgeon General issued a call to action that includes providing health professionals with training on the relevance and risks of loneliness. This highlights the need for educational training/materials focused on how healthcare providers can help individuals with SCI/D manage loneliness.

Purpose: To describe the development, refinement, and content of an educational curriculum intended for use by SCI/D healthcare providers to help individuals with SCI/D manage loneliness.

Methods: The Six-Step Approach to Curriculum Development framework guided curriculum design, data collection, and development. Educational curriculum topics were developed based on literature, interviews with SCI/D healthcare providers (novel data), and surveys and interviews with individuals with SCI/D (previously published). An advanced prototype of the curriculum was evaluated by SCI/D healthcare providers to assess content, organization, layout/design, relevance, and actionability. Items were rated on a 5-point Likert rating scale (strongly agree, somewhat agree, neutral, somewhat disagree, and strongly disagree), along with an open-ended question on how to improve the curriculum. A brief survey was conducted to collect demographic and employment characteristics before the interviews and evaluation. Descriptive statistics were used to summarize quantitative data. Interviews were audio-recorded and transcribed verbatim. Transcripts were coded and analyzed using thematic analysis methodology. The evaluation's open-ended text response was summarized.

Results: Healthcare provider interview participants (n=14) were female (86%) between 26-49 years of age. Participants included 21% psychologists, social workers, or therapists (e.g., recreational, occupational, physical), 14% nurses/physicians, and one chaplain (7%). Participants on average had 13 years of providing SCI/D care (range: 3-36). Five main curriculum modules were developed: 1) defining loneliness/social isolation, 2) scope and consequences/risks associated with loneliness/social isolation, 3) loneliness cues exhibited by persons with SCI/D, 4) measuring loneliness/perceived social isolation, and 5) facilitators to alleviate loneliness in persons with SCI/D. Each topic-specific module included learning objectives, learning activities, and learning materials. Curriculum evaluation participants (n=16) were female (69%) between 26-49 years of age (56%). Participants were social workers (50%), psychologists (31%), and SCI/D clinician research scientists (19%). Participants on average had 8 years of providing SCI/D care (range: 1-37). Above 80% agreement on the evaluation assessment was achieved for content, layout/design, relevance, and actionability. Identified modifications to the curriculum included word choice/style, organization, and visual aids. Providers described the curriculum as organized, approachable writing, relevant, a needed topic, and versatile across different disseminations methods and healthcare disciplines.

Conclusions: The development of the educational curriculum was a dynamic and iterative process that allowed for edits from end users. Our curriculum provides relevant content, tangible and actionable learning resources, and assignments for self-knowledge checks for SCI/D providers.

Learning Objectives

- Describe utilization of the Six-Step Approach to Curriculum Development framework, including data sources used to identify the educational curriculum content from perspectives of individuals with SCI/D, SCI/D healthcare providers, and relevant literature.
- Describe priority topics and content of 5 modules (defining, risks/consequences, cues, measuring, and facilitators to alleviate loneliness and social isolation) included in the educational curriculum.
- Describe post-development evaluation of the educational curriculum and iterative modifications made based on stakeholder feedback.
- Discuss how self-directed learning behaviors can be used by healthcare providers for knowledge acquisition of learning objectives, materials, self-assessment assignments.

P2551: Transcranial Magnetic Stimulation (TMS) treatment for Depression and Pain in SCI/D, MS and ALS

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

This presentation will clearly delineate between current FDA treatment protocols and those that have not yet gone through the FDA approval process but have clear, abundant, level A research to support their clinical safety and efficacy. The VA currently supports treatment protocols for neuropathic pain in their clinical guidelines that are not yet FDA approved. No protocols are treatments will be discussed that have been DENIED by the FDA.

Transcranial Magnetic Stimulation (TMS) is a non-invasive, clinical treatment for depression, pain and other neuropsychiatric disorders that is safe, effective, and well-tolerated. It was FDA-approved for depression in 2008 and later expanded to include obsessive-compulsive disorder (OCD) and smoking cessation. It is currently approved for use in the Veterans Administrative (VA) system for Mood Disorders and Pain Syndromes. There are close to 60 TMS sites in the VA National TMS Program across the country, including a Mobile TMS Van in Montana that is accessible for wheelchair users. Despite the plethora of research, clinical data, and excellent therapeutic outcomes, TMS is still largely unknown to many clinicians.

TMS is a focused, non-invasive, neuromodulation therapy that is well tolerated and does not produce systemic side effects or interfere with medication regimens. It is an office procedure that does not require anesthesia, has no cognitive side effects and can usually be administered while the Veteran is in their own wheelchair without the need for transfers. TMS directly stimulates neurons in the brain by using pulsed magnetic fields that pass unimpeded through the scalp and skull to induce small, focal electrical currents. Different TMS protocols are used to either increase or decrease neuronal activity, producing change in brain networks to affect clinical outcomes. The benefits of TMS treatment in the Spinal Cord Injury/Disorder (SCI/D), Multiple Sclerosis (MS) and Amyotrophic Lateral Sclerosis (ALS) population are many. Research has shown that more than 60% of people will have a positive response to TMS therapy when used to treat major depression. For neuropathic pain, TMS has 1A-High level research evidence to support its clinical use.

This presentation will describe the pathophysiology and mechanism of action of TMS so that participants can make informed clinical decisions about this technology. It will also outline clinical guidelines on current TMS protocols and how providers can access referrals for treatment. TMS is a beneficial treatment option for many Veterans who suffer from Depression or Neuropathic Pain. The goal of this presentation is to expand understanding and access to this valuable, but underutilized, treatment modality.

Learning Objectives

- Demonstrate how Transcranial Magnetic Stimulation (TMS) can be utilized in the treatment of depression, pain, and other neuropsychiatric conditions in those who have SCI/D, MS and ALS.
- Describe the science and mechanism of action of TMS and how it differs from traditional medicinal treatment.
- Compare differences between types of TMS machines/coils and clinical treatment protocols.
- Identify clinical populations that could benefit from TMS and how to access treatment in the VA system and the community.

P2552: Veterans Health Administration (VHA) Spinal Cord Injury & Disorder (SCI/D) Updated Inpatient Nurse Staffing Methodology Calculator

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Background and issues: In 2016, an inpatient SCI/D staffing calculator (SCI/D-SC) was implemented at VHA SCI/D Centers to determine nursing hours per patient day (NHPPD) staffing levels. To improve staffing efficiency and accuracy, SCI/D-SC considered Functional Independence Measures (FIM) categories, medical conditions (good, fair, serious and critical), and unit turbulence (admits, discharges, transfers,) on SCI/D units. Historically, VHA SCI/D Centers NHPPD have been higher than other acute care areas. The SCI/D National Program Office (NPO) data evaluation determined NHPPD benchmark of 11.7, which is mandated in VHA Directive 1176. A field review in 2024 revealed ranges below the benchmark and up to 16 NHPPD, which is above expected NHPPD. A review panel was created to explore the inconsistencies.

Purpose: The VHA Office of Nursing Services (ONS), SCI/D NPO and SCI/D inpatient subject matter expert (SME) panel reviewed and updated the 2016 SCI/D-SC. The panel tested the updated SCI/D-SC for consistency across users and assessed the need for new education materials.

Methods: The review panel included three registered nurses (RNs) from ONS, two representatives from NPO and three inpatient SCI/D RN SME. The panel reviewed the development documents from the 2016 SCI/D-SC. They tested the SCI/D-SC for mathematical accuracy and compared the definitions for FIM to those for the Inpatient Rehab Facility-Patient Assessment Instrument (IRF-PAI). Common SCI/D conditions and co-morbidities were evaluated for understanding workload implications that may affect NHPPD. They appraised current education materials for ease of use and understanding.

Results: After the SCI/D-SC was updated to (IRF-PAI), the data evaluation identified unit turbulence numbers were being added into the totals twice. To address this issue, unit turbulence events (UTE) were removed from the main calculator and given a separate section. To improve accuracy, UTE were weighted by applying the NHPPD to each unique occurrence. This enables each SCI/D Center to address the NHPPD anticipated to meet the needs of their populations served. SCI/D-SC kept 11.7 NHPPD as the lowest value accepted for staffing SCI/D inpatient units, aligning with the 2016 benchmark requirement.

The panel created education materials and case studies to practice using the tool. Content of the education materials included the history and purpose of SCI/D-SC. The case studies were to demonstrate each level of function, changes in conditions, common complications, and UTE. This allows for more consistent training. When presented to novice or nurses new to SCI/D patient care, the learners demonstrated increased accuracy using the SCI/D-SC, understanding nursing resources required, and rationale for staffing at the level of NHPPD from the calculator.

Conclusions: The SCI/D-SC should be tested at one or more pilot sites. The pilot site(s) would receive the updated education and use the newer version of SCI/D-SC. Members of the panel will be assigned as a resource for each pilot site(s) with the goal of increased NHPPD consistency between sites and a narrower range. Members of the panel will review the NHPPD data for inter-rater reliability. If the NHPPD numbers are more consistent across the pilot sites, the updated education and SCI/D-SC should be implemented for inpatient all SCI/D units.

Learning Objectives

- Explain the concept of Nursing Hours Per Patient Day (NHPPD) and its importance in staffing methodology for Spinal Cord Injury/Disorder (SCI/D) units.
- Describe the NHPPD ranges for SCI/D patients based on their level of function, complications, comorbidities, and patient condition.
- Demonstrate how to use the SCI/D NHPPD calculator to determine appropriate staffing levels for different patient acuity levels.
- Discuss the potential impact of implementing a daily NHPPD calculator on patient outcomes

P2553: IMPACT-MS: A Novel Cognitive Remediation Program to Enhance Functional Outcomes in Veterans with Multiple Sclerosis

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Rituximab off-label use in MS treatment.

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Background: Cognitive changes arecommon in multiple sclerosis (MS) patients, with estimates reaching 34-65% and occurring across phenotypes. Despite the heterogenous nature of the disease, neurocognitive profile patterns suggest a preferential decline in mental processing speed, complex attention, memory, and executive functions. Cognitive change has been associated with diminished functional status, community engagement, and quality of life. Although targeted cognitive remediation offers a minimal-risk solution to mitigate the negative effects of cognitive change in MS patients, few programs offer a standardized protocol that may be scaled for widespread use.

Objectives: The IMPACT-MS study is an integrated MS prospective and retrospective assessment of a novel, standardized cognitive therapy protocol and the associated outcomes in persons with MS. This study examines the patient-reported functional outcomes following a six-module (7weeks) cognitive remediation intervention in Veterans with MS.

Methods: Veterans with both relapsing and progressive phenotypes of MS complete comprehensive cognitive assessment, followed by participation in cognitive remediation with a rehabilitation neuropsychologist using our novel, standardized protocol. Within this frame, treatment was tailored to address patients' objectively identified cognitive deficiencies and subjectively reported functional concerns. Patients' values and goals, determined at the outset of therapy, were utilized to drive treatment and promote optimal engagement. This brief, comprehensive treatment protocol also addressed the complex relations among mood, fatigue, and cognition. Patient-reported outcomes, quality

of life, and fatigue impact were assessed at the following intervals: before treatment initiation, immediately following treatment, and 6 months after treatment.

Results: As of December 2024, five patients have completed the protocol. Preliminary data shows that all patients reported meeting their identified short-term goals and progressing toward their long-term goals. While patients continued to acknowledge cognitive difficulty and MS-related fatigue, they reported improved ability to manage these symptoms. Patients also reported improved task efficiency and increased participation in values-driven behavior.

Conclusions: This novel, standardized yet adaptable cognitive remediation protocol shows promise as a minimal-risk, low-cost intervention. Patients reported a diminished impact of MS-related symptoms and an increased ability to engage in personally meaningful activities and meet self-identified goals. Patients are being actively recruited and followed longitudinally for re-assessment at successive 6-month intervals following treatment.

Keywords: Cognition and MS, Rehabilitation, Symptom management and MS, Fatigue, Psychological Issues and MS, Comprehensive care and MS

Learning Objectives

- Identify the cognitive changes commonly observed in multiple sclerosis (MS) patients, focusing on declines in mental processing speed, complex attention, memory, and executive functions.
- Explain the association between cognitive decline in MS and its impact on functional status, community engagement, and quality of life.
- Implement a standardized cognitive remediation protocol tailored to address cognitive deficiencies and functional concerns in Veterans with MS.
- Assess patient-reported outcomes related to quality of life and fatigue impact before, immediately after, and six months following cognitive remediation intervention.
- Evaluate the effectiveness of cognitive remediation by analyzing improvements in symptom management, task efficiency, and engagement in values-driven behaviors reported by patients.

P2554: Overview of Diagnosis and Treatment of Eye Movement Disorders in Multiple Sclerosis

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gabapentin, memantine, baclofen, 4-amynopiridine can be used outside their FDA label to treat nystagmus and other ocular oscillations

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Background and Issues: Multiple sclerosis (MS) is a primary cause of non-traumatic disability in young adults. Disability in MS is quantified using standardized scales that might not fully capture the impact of eye movement dysfunction in daily life. The presence of eye movement abnormalities correlates with greater levels of disability in affected patients and generally predicts a worse prognosis.

Purpose: Review bedside presentation of common eye movement syndromes encountered in MS and describe their pathophysiology. Provide an update on current treatments available for eye movement disorders in MS.

Methods: This presentation provides a systematic classification of eye movement disorders in MS based on anatomical structures involved, including the brainstem, cerebellum, and higher order control cortical networks. The pathophysiology of each syndrome is examined and highlighted with potential and available therapeutic interventions discussed.

Results: All classes of eye movements can be affected by MS. Pathological strabismus can manifest as exotropia, especially in association with internuclear ophthalmoparesis (INO), or esotropia, commonly due to sixth nerve palsy, or vertical strabismus, usually due to a skew deviation. Fixation can be disrupted by nystagmus, including gaze-evoked nystagmus, acquired pendular nystagmus, upbeat and downbeat nystagmus, or by saccadic intrusions and oscillations. Disorders of saccades are common in MS, manifesting as saccadic dysmetria, adduction slowing in INO, horizontal gaze palsy. Vestibular dysfunction in MS can present with vertigo, both spontaneous and positionally induced, impaired vestibulo-ocular responses. Patients with MS may have impaired ocular smooth pursuit, optokinetic reflexes, and impaired eye-head tracking. Evidence-based treatments for acquired pendular nystagmus include memantine and gabapentin, while 4-Aminopyridine is effective for downbeat nystagmus and baclofen should be considered for periodic alternating nystagmus. Patients with saccadic intrusions and oscillations may benefit from memantine.

Conclusions: Identifying eye movement disorders in MS can aid in diagnosing the condition, offer insights into the location of demyelinating lesions, track disease progression, and assess the level of disability. Understanding the treatment options for eye movement disorders can significantly enhance the quality of life for MS patients. Since the physiology and anatomical network responsible for eye movement control are well understood and eye movements can be accurately measured in laboratory environments, they have the potential to function as biomarkers, monitoring tools, and outcome measures for evaluating new treatments in MS.

Learning Objectives

- Recognize common eye movement syndromes encountered in multiple sclerosis (MS)
- Explain the pathophysiology of most eye movement disorders and their localizing value
- Discuss three cerebellar syndromes caused by lesions of flocculus and paraflocculus, nodulus and uvula, dorsal vermis and fastigial nucleus
- List pharmacological treatments available for eye movements abnormalities in MS

P2555: Zero Harm: Using simulation to identify needs in treating and preventing pressure injuries

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Background: Pressure injuries (PI) remain a worldwide public health problem related to patient safety. Development of a pressure injury during the hospital course is considered to be patient harm and reported as a quality indicator. Pressure injuries are preventable with interventions and evidence-based practices (Gaspar et al., 2019). The South Texas Health Care System at the end of FY23 has a pressure injury risk adjusted rate of 2.13 and currently has a rate of 1.46. Simulation has been proven to increase safety and quality in healthcare by allowing clinicians to engage in real situations in a protected environment allowing for increased resilience in teams (Lame & Dixon-Woods, 2020). Developing a reproducible simulation toolkit using High Reliability Organization (HRO) principles with scenario-based simulations provides experiential learning.

Methods: The Simulation Toolkit was developed by Certified Wound Care Nurses, HRO Coordinators, and nurses specializing in simulation education. The toolkit contained a self-assessment using the Benner Model, case studies in the application of the Braden Scale, pre- and post-evaluations, directions on how to use the Joint Patient Safety Reporting System (JPSR), a review of HRO principles, and a simulation scenario with embedded injuries, allowing opportunities to provide hands-on interventions. The toolkit was designed for easy use and replicability by other healthcare facilities. It serves as a blueprint to guide facilities in consistency and standardization with pressure injury management and interventions. The training experience included resilience-building opportunities regarding common and not-so-common scenarios around pressure injury assessment and documentation.

Results: A total of 218 individuals participated in the simulation. The individuals represented all different disciplines throughout the hospital, including nurses, CNAs, physicians, and residents. Participants were asked about the Braden Scale. During the post-evaluations, learners were 23% more likely to file a JPSR with a new pressure injury. Simulation was identified by 98% of learners as their preferred method to learn, and 95% will apply what they learned in the simulation to their everyday practice within the next 3 months.

Conclusion: Providing simulations with new evidence-based practices for pressure injury prevention is important to implement on a regular and frequent basis. A toolkit is a helpful resource to have to collaborate and provide standardization and consistency across healthcare organizations. The majority of the learners participating in the simulation were aware of interventions, but needed reinforcement and further guidance in the use of certain equipment and products. Incorporation of high reliability organization principles as a guiding framework allowed for better design and focus on the safety aspects of pressure injury prevent. Use of in situ simulation has been shown to increase reliability for surfacing latent safety threats. The team will continue to track safety reporting around pressure injuries. Using simulation for clinical situations where staff can practice teamwork and communication skills are needed to test what could go wrong such as a pressure injury and use this information to strengthen best practices. ensured Pressure injury prevention simulations highlighted the need for effective teamwork and communication in the prevention and management of injury prevention.

Learning Objectives

- Learners explained appropriate Braden Scale
- Learners identified interventions to be implemented
- Learners recognized products that were needed on their Units
- Learners discussed differences in pressure injury vs moisture associated skin damage

- Learners able to report findings in JPSR format

P2556: Online Training Course for Clinicians in Adaptive Cycling

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Background: Adaptive Sports and Recreation (ASR) provides Veterans with SCI/D opportunities to exercise as well as participate in activities with others in the community. While many Physical, Occupational, and Recreational Therapists are eager and interested to provide exposure to Veterans for adaptive sports, many lack the training or exposure to the variety of adapted cycles and all of the options and accessories available to make educated recommendations and assist in procuring such equipment for Veterans. This can potentially lead to PwD utilizing equipment that does not meet their functional needs, does not provide adequate pressure relief, and could pose threats to their health. Having therapists skilled in referral, evaluation, fitting, and training of equipment either professionally or through volunteer with community organizations is critical to ensuring that Veterans with SCI/D have access to safe and appropriate devices during cycling for exercise, recreation, or competition.

Purpose: An online training course for therapists will provide crucial education needed for evaluation, ordering, fitting, training, and injury prevention for adaptive cycling for individuals with SCI/D. This training will expand therapists' knowledge of this popular adaptive sport by focusing on applications for individuals with SCI/D to provide inclusive and safe opportunities for exercise, recreation, and competition.

Methods: An online training course was developed and evaluated through interviews with an advisory council including individuals with SCI/D and community groups who provide adaptive cycling equipment, survey of stakeholders to identify the content, scope, and design of the course, review of existing literature and trainings available for adaptive cycling, content and course creation through an accessible online platform and with multi-media offerings for content, pilot testing of course by subject matter experts, and dissemination of the course.

Results: The online training course received positive feedback from pilot testers and subject matter experts, including individuals with SCI/D and will be moved to a public-facing online course platform for free access to clinicians to better support individuals with SCI/D in pursuit of adapted exercise and recreation.

Conclusions: The online training course for adapted cycling is a useful resource for clinicians working with individuals with SCI/D to select appropriate cycle types, trial equipment, take specifications for ordering equipment, and complete fitting and training with equipment to ensure safe and successful use of adapted cycles.

Learning Objectives

- Identify 3 styles of adaptive cycles and physical function and recreation/exercise goals most compatible with each
- Describe evidence-based process by which clinician training course for adaptive training was developed
- Identify measurement and adjustments to consider when trialing and ordering adaptive cycles to ensure safety of individual with SCI/D
- Describe process to enroll in and complete online training

Poster
Abstracts

PO2501: Reducing Compassion Fatigue using Unit-Based Intervention

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Problem Identification: Clinicians in the Amyotrophic Lateral Sclerosis (ALS) Interdisciplinary Team (IDT) at the Department of Veterans Affairs Northern California Health Care System (VANCHCS) have reported compassion fatigue due to the demanding nature of their work. This has led to needing an intervention to help reduce compassion fatigue and increase compassion satisfaction.

Statement of the Problem: ALS is an incurable, progressive neurodegenerative disease with a mean survival time of 3 years from symptom onset. Since ALS does not have a cure, patient care consists of symptom management and quality of life. This can take a toll on the clinicians that are providing care for these patients. The intense, prolonged exposure to patient suffering puts these clinicians at a high risk for compassion fatigue.

Purpose of the Project: The primary goal of this project was to implement a 13 week unit-based self-care intervention that would reduce compassion fatigue and improve professional quality of life during work hours among the ALS IDT clinicians.

Methods and Implementation

Measures: The Professional Quality of Life Scale 5, Brief COPE and CD-RISC-2 were used to assess compassion satisfaction, compassion fatigue, coping strategies, and resilience.

Processes and Procedures: The intervention consisted of bi-weekly meetings over 13 weeks with surveys given pre, mid, and post-intervention. Clinicians received educational binders with tools such as mindfulness, Code Lavender, self-care, and stress management. Grief and bereavement support was offered by chaplains and team rituals during the ALS IDT meetings.

Outcomes and Findings: An intervention aimed at reducing compassion fatigue was implemented at a federal healthcare facility among the ALS IDT clinicians during work hours. This intervention was inspired by Sullivan et al. (2019) who reported success in reducing compassion fatigue among pediatric oncology nurses. The outcomes were measured using ProQOL 5, Brief COPE and CD-RISC-2. (For abstract word requirements, only ProQOL 5 results are listed below.)

ProQOL 5

Professional quality of life was measured using the ProQOL 5 survey. The scores for compassion satisfaction either remained the same or improved over the 13-week intervention. The mean scores increased from the pre survey score of 39.99 to the post survey score of 41.44 indicating clinical significance in improving compassion satisfaction.

The scores for burnout also improved as evidenced by the mean scores decreasing from the pre survey score of 23.67 to the post survey score of 21.33. This indicates clinical significance in reducing burnout among the clinicians.

The scores for secondary traumatic stress (STS) also improved during the intervention. The mean scores decreased from the pre survey score of 23 to the post survey score of 20.33 indicating clinical significance in improving STS.

Conclusion: The unit-based self-care intervention met its goal to reduce compassion fatigue among the ALS IDT clinicians. The intervention will be sustained and potentially expanded to other clinics, ensuring continued support for clinicians at risk for compassion fatigue.

Learning Objectives

- Signs and symptoms of compassion fatigue
- Compassion fatigue definition
- Tools to assess compassion fatigue
- Tools to use that help reduce compassion fatigue

PO2502: Tim Lowrey ALS Panels: Bringing Lived Experience into Undergraduate and Graduate Health Science Classrooms

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Background and Issues: People living with amyotrophic lateral sclerosis (ALS) can face a delayed diagnosis due to practitioners' unfamiliarity with the rare, 100% fatal neuromuscular disease and its heterogeneous presentations. 1 That delay can have a devastating impact on people with ALS and their families. Tim Lowrey, a retired pharmacist and volunteer with I AM ALS, was diagnosed with ALS in 2018.
He is the impetus behind a virtual panel series.

I AM ALS is a patient-led community which mobilizes and empowers advocates to raise awareness and resources for the ALS community. The I AM ALS Community Outreach Team organizes the panels.

Purpose: The objective of panels is to educate medical professionals and all disciplines of undergraduate and graduate healthcare students who may come into contact with a patient with ALS either before or after diagnosis. The goal is to help current and future medical professionals recognize signs and symptoms of ALS so that they refer patients promptly to neurologists, hopefully reducing delays in diagnosis.

Methods: Universities and organizations that request a panel will host a virtual hour-long session staffed with people living with or impacted by ALS. After a presentation detailing basic knowledge about ALS, panelists share lived experience. Participants are presented with the tools to help them identify signs and symptoms, communicate with people living with ALS and their caregivers, and manage the disease from the participants' chosen healthcare profession. R

Results: Now in its fifth year, the program was well received in 2024: the number of panel presentations (45) was a 60 percent increase over the previous year, and the number of audience members (1778) was a 115% increase over 2023. The panels reached students, professors, and medical experts including first responders. Further, post-panel survey results consistently showed that 100% of participants learned something new about ALS and the experience of living with the terminal disease.

Conclusions: Given the successes in 2024, and continuing delays in diagnosis, I AM ALS has set a goal of 55 panels in 2025 with expanded outreach. I AM ALS is also assessing the possibility of offering continuing education credit for Tim Lowrey ALS Panels presented to medical practitioners.

1. Gwathmey KG, Corcia P, McDermott CJ, Genge A, Sennfält S, de Carvalho M, et al. Diagnostic delay in amyotrophic lateral sclerosis. Eur J. Neurol. 2023;30(9):2595-2601.

Learning Objectives

- Familiarize the medical and supportive services professions with an educational tool.
- Understand the importance of hearing from people with lived experience with a disease
- Replicate the educational model established by I AM ALS
- Identify ALS quicker by familiarizing people with ALS symptoms and common misdiagnoses

PO2503: Early Detection of Kidney Dysfunction using Cystatin-C in Spinal Cord Injury Patients

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Background: Neurogenic bladder is a common complication of spinal cord injury and disease (SCI/D) frequently leading to urinary tract infections, obstructive uropathy, and renal impairment, with prevalence of chronic kidney disease (CKD) up to three times that of the general population. Traditionally, the estimation of the glomerular filtration rate (eGFR) was derived from serum creatinine levels. The accuracy of the eGFR using serum creatinine may be impacted by reduced muscle mass, medications, prolonged immobilization, and muscular atrophy in SCI/D patients, in addition to variations for age, sex, and body weight. The lower serum creatinine levels associated with reduced muscle mass result in overestimated eGFR, which can result in improper pharmacological choices and late detection of CKD. Cystatin C is produced in all nucleated cells, removed from the bloodstream by glomerular filtration, and is an alternative biomarker to creatinine for estimating GFR since Cystatin C is not affected by muscle mass and other variables.

Project purpose: Early detection and more accurate classification of CKD in in the SCI population through standard use of Cystatin C among providers.

To raise awareness among clinical staff on the utility of cystatin C and add it to SCI admission orders for quality improvement.

Methods: Quality-improvement project among Veterans 21 years and older with spinal cord injury admitted to the Miami VA SCI unit between October 2023-Jan 2024.

1. Chart review of patients admitted to the SCI unit at the Miami VAMC with normal results of serum creatinine and that simultaneously had a cystatin C obtained. Then we compared the results of eGFR using the National Kidney Foundation CKD-EPI creatinine equation (2021), The CKD-EPI cystatin C (2012) equation and the CKD-EPI creatinine-cystatin equation (2021). Based on the obtained eGFR, risk stratification will be assessed by using the KDOQI CKD classification.

2. Training to SCI providers emphasizing the relevance of using cystatin C to early diagnose and / or classify stages of chronic kidney disease.

Results and Discussion: 68 charts were reviewed, of those, 43 met criteria for inclusion. (N=43). All 43 were considered to have normal renal function when eGFR was estimated using CKD-EPI creatinine equation (2021). After using the CKD-EPI creatinine-cystatin equation (2021), 28 (65.11%) met criteria for a diagnosis of CKD. Of those, 13 (46.42%) were classified as having CKD stage 2, 11 (39.28) as CKD stage 3A, and 4 (14.28%) as having CKD stage 3B. No one was classified as CKD stages 4 or 5.

Creatinine alone is inaccurate for estimating GFR in SCI/D patients leading to underdiagnosis of CKD. Accurate renal function assessment is crucial for managing medication doses, treatment length, and preventing complications. Early detection allows for better care, improved outcomes, and optimized resources.

Conclusion: Cystatin C is a more accurate biomarker for estimation of GFR in the SCI population compared to creatinine alone. The standard use of cystatin C in SCI patients is beneficial in early detection and classification of CKD and facilitates proactive and timely interventions.

Learning Objectives

- Discuss the importance of using cystatin C as a biomarker for estimating renal function in the SCI/D population.
- Identify teaching strategies for SCI providers to standardize use of cystatin C for early detection of CKD in this special population.
- Describe importance of timely interventions, including nephrology consultation, in SCI patients with kidney dysfunction based on cystatin C eGFR despite normal creatinine values.
- Identify potential changes in clinical management in SCI patients after using cystatin C as a biomarker of kidney function.

PO2504: Increased independence in persons with impaired hand function by using power-enhancing glove assistive technology

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Background: Individuals with inclusion body myositis (IBM) have reduced hand function leading to limitation in daily activities. There is an urgent need to develop therapies and assistive technology to improve every-day function and quality of life for individuals with IBM. This also true for several health conditions with impaired hand function, such as Multiple sclerosis and amyotrophic lateral sclerosis (ALS) and an array of orthopedic related impairments.

Purpose: We aimed to investigate if a power enhancing glove is feasible to use in persons with IBM.

Methods: Data were collected during The Myositis Association's (TMA) patient conference in September 2023. The study was open to interested people with IBM who perceived hand weakness.

The glove's assistive force in grip and pincer strength is triggered by an 'intention-detection' logic that reacts to and supports the follow-through of a hand movement initiation by the user.

Activity performance (Patient Reported Outcome Upper Extremity Function Scale for IBM (PRO-UEFS), IBM-Functional Rating Scale (IBM-FRS)), pain (numeric rating scale) and grip strength (Jamar) were measured to assess degree of impairment.

Subsequently three activities listed in the modified PRO-UEFS that participants perceived as difficult were selected. The participants performed the activities rating their perceived limitation on a 5-point scale (0 = "unable to do", 4= "without any difficulty") first without the glove and then upon using the glove.

The glove was fitted individually to the left or right hand. After testing the glove, the participants answered a series of open-ended questions regarding their perception of the glove.

Results: The study included 40 persons with IBM. Median age 69 years, 52% male. The participants had reduced grip strength (kg) (median, range) (3.75,1.3-10.7) and physical function (IBM-FRS 20, 2-38, PRO-UEFS 23, 1-44).

The most selected PRO-UEFS activities were "Lift a heavy bag from the floor", "Open previously open jars", "Lift free weights", "Lift and hold a frying pan", "Pick up a coin from a table". All activities were perceived easier to perform with the glove ($p<0.001$ to $p=0.039$).

In the open-ended questions, participants documented that the glove would be beneficial for use in everyday tasks, lifting objects, grocery shopping, stabilizing the hand and would increase independence. Most of the participants did not foresee activities in their daily routine where it might not work, however, some persons conveyed foreseeing some difficulty of glove use during personal hygiene and social activities. A few showed an interest to use the glove on both hands.

Conclusion: Based on this analysis the glove appears to increase hand function and might improve activity performance in persons with IBM who experience impaired hand-function. These findings indicate such technology device may increase independence in IBM as well as other health conditions with hand function impairment.

Learning Objectives

- To recognize that people with significant hand function impairment have options to maximize the force and coordination of hand use in everyday activities.
- To recall such devices to optimize hand function are available through the Veterans Administration.
- Discuss how increased independence could affect over all wellbeing for a person with hand function by using an assistive device.
- device such as this can be used in many health condition that affect hand function, be able to identify other health conditions were patients would benefit from using assistive technology for the hands.

PO2505: Impact of vascular risk on cognitive functioning in Veterans with multiple sclerosis.

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Background: Multiple sclerosis (MS) is a chronic and degenerative disease of the central nervous system. Cognitive impairment is common in MS, including in processing speed and memory. Vascular risk factors are also known to similarly impact cognitive functioning. It is established that MS disease burden (i.e., lesion load, atrophy) and vascular risk factors affect cognitive functioning uniquely, but less is known about this effect when these conditions are comorbid.

Purpose: This study aimed to address gaps in the literature regarding the influence of vascular disease on cognitive functioning in patients with MS. We investigated the following hypotheses: (1) MS patients with vascular risk factors will perform worse on cognitive tests than patients without vascular risk factors and (2) greater vascular health burden will predict worse cognitive performance.

Method: Archival data came from the MS multidisciplinary clinic and the outpatient neuropsychology clinic within the Washington DC VA Medical Center from 08/04/2021 to 12/04/2024 as part of routine examination, including cognitive evaluation ($N = 41$; M Age = 54.1 [SD = 9.0]; 21% Female). An a priori power analysis was performed to determine ideal sample size. Vascular risk factors included hypertension, hyperlipidemia, diabetes, and several others (Absent = 11, Present = 30; Range = 0-4, $M = 1.5$). The following raw cognitive test scores were analyzed: Symbol Digits Modalities Test – Oral (SDMT), California Verbal Learning Test (CVLT-2, Total Learning), and Brief Visuospatial Memory Test – Revised (BVMT-R, Total Learning). These measures are consistent with the Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS). Group differences (i.e., absence v. presence of vascular risk factors) in cognitive performance and prediction of cognitive performance by vascular risk burden were analyzed.

Results: There were no significant differences in any cognitive performance between Veterans with and without vascular risk factors, and number of vascular risk factors did not significantly predict any cognitive scores. However, greater vascular risk burden was modestly correlated with worse SDMT ($r = .132$) and CVLT ($r = -.057$) performances, although not to significance.

Conclusion: Cognitive test performance did not significantly differ based on presence or number of vascular risk factors among Veterans with MS; however, increased vascular risk was marginally associated with worse processing speed and verbal learning. These results have implication for clinical practice with MS patients, particularly in a Veteran population in which vascular disease is pervasive. Providers are encouraged to consider the impact on cognition of both MS and vascular disease and how it may impact patient care and treatment planning.

Learning Objectives

- The learner will identify common vascular risk factors comorbid with MS.
- The learner will analyze the role of neuropsychological assessment in evaluating cognitive functioning and identify the impact of vascular burden on cognitive decline.
- The learner will identify domains of cognitive functioning that are impacted by MS and vascular disease.
- The learner will apply knowledge of cognitive burden of comorbid MS and vascular disease in clinical practice, particularly in a multidisciplinary VA hospital setting.

PO2506: Exploring the use of MRI and DXA as measures of adiposity in multiple sclerosis research

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Background: Over half of adults living with multiple sclerosis (MS) also have overweight/obesity, which is a significant risk factor for decreased physical function and increased disability and hospitalizations in adults with MS. Although the relationship between obesity and MS is not well understood, a leading theory is that the pro-inflammatory state of obesity and co-occurring cardiometabolic conditions may compound the inflammatory state of MS, increasing neuroinflammation and speeding progression of the disease. Despite the known association between obesity and MS, research is currently limited to weight and/or body mass index (BMI). Few studies have included the rigorous measures of body composition needed to fully explore how the amount and location of adipose tissue may lead to increased disease activity. By accurately measuring total adiposity and distinguishing between types, such as visceral, subcutaneous, and intramuscular, researchers may better assess risk for increased disease progression and potential comorbidities.

Purpose: The purpose of this review is to investigate the body composition techniques currently used in research of adults with MS and how they are applied to those with obesity.

Methods: The literature search was conducted using Medlars Online International Literature (MEDLINE) via PubMed. Articles were included if they met the following criteria: 1. adult participants with a diagnosis of MS, 2. included measures of weight and/or body composition, and 3. published 2006-2024. Studies were limited to clinical research and included both observational and randomized trials.

Results: Twenty-two studies met the inclusion criteria. Sixteen of these studies focused on a single measurement technique. Five used only body mass index (BMI); five used only dual-energy x-ray absorptiometry (DXA); two used only magnetic resonance imaging (MRI); one used computed tomography (CT); and the last used only bioelectrical impedance analysis (BIA). The remaining 6 studies paired techniques. Three studies combined BMI with DXA; two combined BIA with DXA; one combined air displacement plethysmography (ADP) with BMI; one combined waist circumference with BMI; and one combined BIA with BMI.

Conclusions: Research in MS does not routinely include the rigorous measures of body composition needed to fully explore how the amount and location of adipose tissue may lead to increased disease activity. DXA can provide both total bone mineral content measures and total body fat percentage estimates, and MRI is considered one of the most comprehensive adiposity measurement tools, distinguishing between types and locations. However, BMI remains the most frequently chosen tool for research on weight and adiposity in this population. Using both MRI and DXA may offer

complimentary results for assessing total fat mass, bone mineral content and density, and distinction between visceral, subcutaneous, and intramuscular fat.

Learning Objectives

- Understand the potential relationship between obesity and MS disability and disease progression.
- Describe current body composition measurement techniques used in MS research.
- Understand the strengths and limitations of using MRI and DXA in MS research.
- Describe the need for increased rigor in obesity reporting and assessment in MS research.

PO2507: MitoQ for Fatigue in Multiple Sclerosis: A Randomized, Placebo-Controlled Trial

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Background: Fatigue is a common and disabling symptom in people with multiple sclerosis (pwMS) that has no effective pharmacologic treatment. The likely role of mitochondrial dysfunction in fatigue and disease pathogenesis was observed in a clinical trial that demonstrated improved fatigue and cytokine profiles in pwMS receiving coenzyme Q10 (CoQ10). MitoQ, an antioxidant and derivative of CoQ10 with stronger mitochondrial affinity, may represent a novel approach to treating fatigue in pwMS.

Purpose: This is a proof-of-concept phase I/II clinical trial that evaluates the safety, tolerability, dose-finding, and efficacy of oral Mitoquinone (MitoQ) in people with multiple sclerosis (pwMS) experiencing fatigue.

Methods: We conducted a double-blind, placebo-controlled, 12-week pilot trial to compare the administration of 20 mg and 40 mg doses of oral MitoQ to placebo. The primary outcome was the effect of treatment on fatigue [measured by the modified fatigue impact scale (MFIS)], and secondary outcomes included effects on disability, depression, cognition, blood cytokines and oxidative stress biomarkers, serum MitoQ levels, and safety and tolerability.

Results: Of the 45 pwMS enrolled, 43 completed the 12-week treatment: 13 received MitoQ 40 mg daily (mean age 52.6 years, median EDSS 3.0), 15 received 20 mg (mean age 55.7 years, median EDSS 4.0), and 15 received placebo (mean age 54.8 years, median EDSS 4.0). We did not detect a significant difference in MFIS change between placebo and combined MitoQ groups (two-sample t-test; $p = 0.52$). The MitoQ group demonstrated an average improvement of 7.0 points after treatment (95% CI: 2.9–11.1 points), while the placebo group improved by 9.1 points (95% CI: 3.6–14.7). There was no difference in MFIS change based on MitoQ dosage (ANOVA; $p = 0.71$).

Conclusions: MitoQ was not associated with improved fatigue in pwMS in this phase I/II pilot trial. Further studies are needed to better evaluate the role of mitochondrial modification in the symptom management of pwMS

Learning Objectives

- mitochondrial
- multiple sclerosis
- fatigue
- quality of life

PO2508: Exploring the Association of Immune Checkpoint Inhibitors and Multiple Sclerosis

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Participant discloses the following relationships:

- TG Therapeutics: I have received an honorarium for serving on the TG Therapeutics advisory board.

Participant has indicated the following discussion of unapproved drug or product uses:
One of the real-world cases I'll present during this meeting involves a patient who was prescribed teriflunomide off-label for primary progressive multiple sclerosis.

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Background: Immune checkpoint inhibitors (ICIs) have revolutionized cancer therapy by improving prognosis but are associated with the risk of autoimmunity or exacerbation of preexisting autoimmune diseases.

Objectives: The aim of this study was to explore the association of ICIs with multiple sclerosis (MS) and/or MS relapses using the FDA Adverse Event Reporting System (FAERS) database, and to compare it with other autoimmune neurological adverse events (AEs).

Methods: We conducted a disproportionality analysis of FAERS data spanning the 4th quarter of 2003 to the 2nd quarter of 2024 using OpenVigil2.1. The ICIs analyzed (grouped together as a single drug class for the purpose of this analysis) included pembrolizumab, nivolumab, cemiplimab, dostarlimab, atezolizumab, durvalumab, avelumab, ipilimumab, and tremelimumab. The AEs examined were 'multiple sclerosis' (and/or 'multiple sclerosis relapse'), 'myasthenia gravis' (and/or 'myasthenia gravis crisis' and/or 'immune-mediated myasthenia gravis'), 'Guillain-Barre syndrome', and 'autoimmune encephalitis'. Analyses were restricted to reports where ICIs were identified as the primary suspect drugs for AEs. A signal was detected when the number of drug-AE reports was ≥3, the proportional reporting ratio (PRR) was ≥2, and the χ^2 value was ≥4. Results were presented as reporting odds ratios (RORs) with corresponding confidence intervals (CIs) for each AE. The ROR represents the odds of a specific AE occurring with the drug of interest compared to the odds of the same AE occurring with all other drugs in the database.

Results: There were 48 reports of MS or MS relapse in association with ICIs. These patients had an average age of 56.1±14.5 years, with 24 female, 18 male, and 6 of unknown gender. The ROR for MS and/or MS relapse was 0.09 (95%CI: 0.068–0.12), whereas the ROR for other autoimmune neurological AEs were 21.05 (95%CI: 19.287–22.974) for myasthenia gravis, 8.075 (95%CI: 6.677–9.766) for Guillain-Barre syndrome, and 29.03 (95%CI: 23.564–35.764) for autoimmune encephalitis.

Conclusions: Our findings do not suggest a significant safety signal for MS or MS relapse with ICIs, unlike myasthenia gravis, Guillain-Barre syndrome, and autoimmune encephalitis, where safety signals were detected. Prospective studies are needed to confirm these results, investigate mechanisms underlying the differential safety profiles of ICIs across autoimmune neurological AEs, and identify predictors of such AEs associated with ICIs.

Learning Objectives

- Evaluate the Association Between ICIs and Multiple Sclerosis.
- Distinguish the differential safety profiles of ICIs for autoimmune conditions.
- discuss the importance of prospective studies to confirm findings and explore mechanisms underlying differential safety profiles of ICIs.
- Understand the use of disproportionality analysis in assessing adverse events.

PO2509: Sleep-Related Breathing Disorders in Para-Athletes Compared with Non-Disabled Athletes: A Systematic Review

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Background: Sleep-related breathing disorders (SRBDs), characterized by repeated interruptions in breathing during sleep, are defined by an apnea–hypopnea index (AHI) of ≥ 5 events per hour. SRBDs are among the most common secondary medical conditions following spinal cord injury (SCI), affecting up to 50% of individuals with paraplegia and 91% of those with tetraplegia. Despite the greater risk among para-athletes with SCI, SRBDs remain under-recognized and understudied.

Purpose: This systematic review aimed to comprehensively review on the frequency, consequences, and treatment outcomes of SRBDs among para-athletes with SCI in comparison with non-disabled athletes.

Methods: This systematic review was registered in PROSPERO (CRD42024556899) and conducted following PRISMA guidelines. Literature search covered seven databases (APA PsycINFO, CINAHL Ultimate, Embase, MEDLINE ALL, SPORTDiscus, Cochrane, and Web of Science) from inception to July 2024. Inclusion criteria specified adult para-athletes or non-disabled athletes who underwent screening for SRBDs. The search, without language restrictions, focused on two key concepts to encompass the full range of materials on athletes and SRBDs. After removing duplicates, two independent reviewers (AG and MA) screened studies by abstract and title, then reviewed full texts for eligibility. Disagreements were resolved by the senior author (JF). Data extraction was completed by AG.

Results: Of 3,120 publications captured, there was only one study focused on SRBDs in para-athletes with SCI. There were 23 publications on SRBDs in non-disabled athletes that met inclusion/exclusion criteria and were included in the review. The frequency of SRBDs varied across different sports: (a) 24% to 86.5% in rugby players (n=4 studies); (b) 8% to 55% in active football players (n=4); (c) 22% to 41% of retired football players (n=4); (d) 6.7% in Brazilian Olympic athletes (n=1); (e) 30% in elite swimmers (n=1); (f) 61% in ice hockey players (n=1); (g) 8% in basketball players (n=1); and (h) 68% in judo players (n=1). In the only study on para-athletes with SCI, 22% of participants had SRBDs.

Six studies identified risk factors for SRBDs in non-disabled athletes, which included: older age, male sex, high body mass index, large neck circumference, and play the lineman position.

Four studies evaluated treatment of SRBDs in non-disabled athletes as follows: (1) Positive airway pressure therapy in golfers improved sleep quality, daytime sleepiness, and golf performance; (2) Mandibular advancement devices

effectively reduced apnea episodes, oxygen desaturation, and snoring in rugby players; (3) Continuous positive airway pressure therapy in judo players improved sleep, reduced fatigue, and enhanced performance.

Four studies documented consequences of untreated SRBDs in non-disabled athletes, including reduced cardiac and vascular function, cognitive impairment, excessive daytime sleepiness, and decreased athletic performance.

Conclusion: The systematic review suggests that SRBDs are frequent among non-disabled athletes, varying by sport. Untreated SRBDs can lead to several undesirable consequences in athletes, including a negative impact on sports performance. Nevertheless, proper treatment of SRBDs can improve their well-being, health and quality of life. Moreover, there was only one study on SBRDs in para-athletes with SCI indicating a major knowledge gap in the current scientific literature.

Learning Objectives

- Review the frequency and impact of sleep-related breathing disorders (SRBDs) across various athlete populations, including para-athletes with spinal cord injuries (SCI).
- Discuss the risk factors, health consequences, and athletic performance implications of SRBDs in athletes and para-athletes.
- Evaluate the effectiveness of various treatment approaches for SRBDs in athletes, highlighting their impact on health, sleep quality, and athletic performance.
- Identify critical knowledge gaps in the literature regarding SRBDs in para-athletes with SCI and explore areas for future research.

PO2510: Linking Wearable Sensor Data to Upper Extremity Function in Cervical Spinal Cord Injury

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Background: Cervical spinal cord injury (CSCI) often impairs upper extremity (UE) function, compromising daily activities, independence, and overall quality of life. A thorough assessment of UE function in individuals with CSCI is crucial for tracking progress and implementing targeted interventions. Although valid and reliable clinical outcome assessments (COAs) such as the Capabilities of Upper Extremity Test (CUE-T) are available to evaluate UE function, they offer only snapshots of performance and require a trained observer, researcher, or clinician. Wearable inertial measurement units (IMUs) offset these limitations by enabling continuous, unobtrusive data capture of real-world arm and hand movements. Moreover, raw data can be converted into metrics that have the potential to serve as digital proxies of UE function, which clinicians could monitor for ongoing insights into progress and therapeutic efficacy.

Purpose: This study examined the associations between raw sensor metrics (features) and CUE-T scores in individuals with tetraplegia due to CSCI. We hypothesized that several features would emerge as strong correlates of the arm (non-grasping) and hand (dexterous) components of the CUE-T and that the feature profiles would differ between these two task types.

Methods: We enrolled 54 adults with CSCI in a prospective, longitudinal study in adults, of whom 43 provided complete data (mean ± SD: 54.9 ± 18.5 years; 90.7% male; 83.7% incomplete; 81.4% traumatic). Of these, 23 were recruited from an inpatient rehabilitation facility (acute phase), and 20 were community-dwelling Veterans (N = 13) or former inpatients (N = 7) in the chronic injury stage. Each participant wore a wrist-based IMU (ActiGraph GT9X) on their most-used UE while performing CUE-T arm and hand tasks at two time points: baseline and approximately four weeks later. From the raw tri-axial accelerometer and gyroscope data, we derived 208 features (e.g., mean, median, skewness) and then used distance correlations (dCorr) to evaluate associations between these features and corresponding CUE-T arm and hand scores.

Results: At Time 1, 2 features demonstrated strong correlations with the CUE-T hand score (dCorr: 0.50-0.51, $p \leq 0.001$), whereas 104 features were strongly correlated with the CUE-T arm score (0.50-0.70, $p \leq 0.001$). At Time 2, 1 feature showed strong correlations with the CUE-T hand score (0.52, $p \leq 0.001$), whereas 87 features strongly correlated with

the CUE-T arm score (0.50–0.78, p ≤ 0.001). Feature types were distinct for hand and arm conditions. Hand tasks showed only a few significant correlations, while arm tasks exhibited a much broader range of associations.

Conclusions: We provide preliminary results showing that specific IMU features correlate with UE function, highlighting their potential as digital biomarkers for individuals with CSCI. Features were also distinct by arm and hand conditions, aligning with the CUE-T's explicit structure, which disambiguates hand from arm function. Integrating wearable sensors into clinical and community settings may provide clinicians, researchers, and patients with a multidimensional, continuous view of UE recovery over time, informing personalized rehabilitation strategies that can improve independence and quality of life outcomes. Future research should focus on validating sensor-based metrics of UE function for clinical use.

Learning Objectives

- Explain how raw sensor metrics from wearable inertial measurement units (IMUs) could serve as digital biomarkers of upper extremity (UE) function in individuals with cervical spinal cord injury (CSCI).
- Describe how continuous IMU data capture can inform personalized rehabilitation strategies to improve functional outcomes in individuals with CSCI.
- Compare IMU-derived features that correlate with hand function versus those correlated with arm function, emphasizing their relevance to the Capabilities of Upper Extremity Test (CUE-T).
- Identify the potential benefits of integrating IMU data into clinical and community-based contexts, focusing on its potential to enhance health and quality of life outcomes for individuals with CSCI.

PO2511: Diagnostic Optimization of Urinary Tract Infection (UTI) in a Spinal Cord Injury Unit (SCI)

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Background: Diagnosis of UTI is especially challenging after spinal cord injury due to the atypical signs and symptoms of infection attributable to the lack of sensation and bladder management strategy (2,3). The rate of Asymptomatic Bacteriuria (ASB) and multidrug resistant organisms in people with SCI is remarkably high, given how common bladder instrumentation, colonization and antimicrobial administration is common in this patient population (4-,8). UTI in SCI is diagnostically challenging for providers, and proper diagnosis and treatment can be very impactful towards people living with spinal cord injuries. People with SCI are exposed to many courses of antibiotics over the course of their lifetime — some necessarily, some unnecessarily (like antimicrobials for ASB).

Objective: The purpose of the project is to optimize the management of UTI in SCI patients admitted to the Miami VAMC by decreasing the amount of unnecessary urine cultures (UC), unnecessary use of antimicrobials for patients with ASB, and by tailoring antimicrobials in patients with UTI based on the urine culture results.

Methods:

This is a quality improvement project that was implemented in three phases:

1. Initial characterization of urine culture ordering and antimicrobial prescription practices for ASB/UTI in the SCI unit.

2. Implementation of a urine culture order set standardized for the entire facility in the Computerized Patient Record System (CPRS) followed by prescribers training on when to suspect UTI in SCI and when to order a UC.

3. Monitoring the number of UC ordered, the appropriateness of UTI diagnosis and antimicrobial management.

Results and Discussion: Implementation and training occurred in July 2024. The comparison of the pre- and post-implementation phases indicated a decrease in the number of UC ordered from 66 from March-July 2024 to 49 from August-Dec 2024. The adherence to the urine culture order set among Miami VAMC SCI practitioners was 93.8%. Although there was an increased number of cases with UTI in new patients admitted to the SCI unit post intervention (10) vs pre intervention (5), there was also an increased number of interventions to tailor antimicrobials after urine culture results with 80% antimicrobial de-escalation post- intervention vs 60% pre-intervention. These findings suggest that prescribers used culture results to narrow or adjust antimicrobials to the UC sensitivities. Furthermore, there were fewer cases of ASB who received antimicrobials (20% post-intervention vs. 60% pre-intervention) possibly due to the training targeted to SCI providers.

Conclusion: Implementation of a UC OS including prescribers training in UTI at the Miami VAMC SCI unit, reduced the amount of UC ordered and decreased the number of antimicrobials prescribed in ASB.

Learning Objectives

- identify strategies to reduce the amount of unnecessary urine culture orders in the SCI population
- List the indications to order urine cultures in SCI patients
- Recognize when to treat a positive urine culture
- identify appropriate use of antimicrobials and de-escalation when indicated

PO2512: Examination of chronic pain interference in adults with spinal cord injury

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Background: Approximately half to two-thirds of individuals with spinal cord injury (SCI) report the presence of pain (van Gorp et al., 2015). A person's pain experience is not primarily determined by sex, completeness of injury, or level of injury (Dijkers et al., 2009). Instead, the pain experience is associated with a range of biological, psychological, and social factors (Dawu et al., 2019; Kratz et al., 2017). Pain interference, a measure of the extent to which pain limits an individual's activities, provides insight into the subjective experience of pain and the functional impact it has on a person's life. Although chronic pain patients rate non-pharmacological interventions as more effective coping strategies than pharmacological treatments, medications are still one of the most prevalent forms of pain management (Heutink et al., 2011). Given the functional and psychosocial impact of pain interference on daily life, it is important to understand the associated risk, protective factors and behavioral patterns.

Purpose: The aim of this study is to (1) describe the presence of chronic pain interference in daily activities among adults with SCI; and (2) explore the relationship between pain interference, demographic and injury characteristics, coping, health behaviors, subjective experience and environmental factors.

Methods: Participants were 219 adults aged 19-58 with SCI onset before age 19. They were former or current patients within a multi-site North American pediatric hospital system. Participants completed a structured interview in which they reported demographics (age, sex, ethnicity/race), chronic pain (interference, satisfaction, frequency, distress), psychosocial patterns (coping, social integration, physical exercise), and environmental factors (employment, marital status). Injury characteristics (level, severity, age at injury, duration of injury) were gathered from medical records. Primary pain interference outcome was classified as none (no interference) and some pain interference (a little, moderate, a lot, or extreme interference). Data analyses included descriptive statistics, chi-square tests, and Mann-Whitney U tests.

Results: The majority of participants were White (84.5%), male (59.4%), and living with tetraplegia (52.5%). About 58% of participants experienced some level of pain interference within the last year. Regression analyses, Mann-Whitney U, and chi-square tests indicate that pain interference was significantly associated with having daily pain ($p = 0.002$), altered satisfaction from social activities ($p = <0.001$), emotional distress from pain ($p = <0.001$), and poor sleep ($p = 0.008$). Those with no pain interference had higher social integration ($p = 0.004$), engagement in employment-related activities ($p = 0.015$), and active coping behaviors ($p = 0.016$). No significant relationship was found between pain interference and tetraplegia/paraplegia, complete/incomplete injury, frequency of physical exercise, marital status, or acceptance coping.

Conclusions: Results of analyses indicate that having no pain interference is associated with employment activities, social integration, and active coping. More comprehensive assessment of chronic pain and encouraging participation in social and physical activities in the SCI population may contribute to overall improved health and functional outcomes.

Learning Objectives

- Describe the relationship of pain interference with demographic and injury characteristics
- Discuss the impact of behavioral coping strategies and health behaviors on the pain interference
- Assess groups differences in the presence of pain interference and psycho-social-behavioral factors
- Identify clinically relevant factors in the assessment of pain and treatment of pain interference

PO2513: Mammography Experiences of Women Veterans with Spinal Cord Injuries and Disorders

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Background: Mammography screening is critical for early identification of breast cancer. Understanding the experiences of women Veterans with spinal cord injuries and disorders (SCI/D) is the first step to developing strategies to increase screening in this population.

Purpose: As part of the implementation of the Making Advances in Mammography Medical Options (MAMMO) for Veterans Act Section 105: Mammography Accessibility for Paralyzed and Disabled Veterans (Public Law 117-135), we conducted a quality improvement study to identify barriers and facilitators to mammography access and utilization for women Veterans with SCI/D who receive care in VA.

Methods: Between March 2024 and July 2024, we conducted semi-structured telephone interviews with 9 women Veterans with SCI/D who had recently completed a mammogram at a VA or a community care facility. Interview questions were designed to elicit Veteran perspectives surrounding the accessibility of physical infrastructure, care experiences with providers and staff, and other aspects of the patient experience related to breast cancer screening with mammography. Interviews were audio-recorded, transcribed, and checked for accuracy. Data were analyzed using a rapid approach to qualitative data analysis, which involved summarizing each transcript using a template of domains based on study objectives and interview questions. Summaries were then reviewed to identify key points and thematic categories. Using a dashboard developed to monitor mammography screening rates for Veterans with SCI/D, we calculated summary statistics for rates of screening completion for all women Veterans aged 50-74 with SCI/D enrolled in VA healthcare.

Results: The average screening rate for women Veterans with SCI/D was 68.1% which compares to an overall VA screening rate of 66.8%. The mean age of interview participants was 56.6 years. Four participants were rural-residing, and five participants lived in an urban area. Other demographic characteristics have been excluded to protect privacy. We identified four thematic categories to illustrate barriers and facilitators to screening mammography: 1) communication and scheduling; 2) technologist knowledge; 3) social and institutional support; and 4) imaging service space. Specific barriers included staff not asking Veterans mobility-related questions during scheduling, lack of technologist knowledge regarding SCI/D-specific needs, not allowing caregivers to assist with dressing/undressing, mammography equipment that requires standing, and imaging facility spaces not suitable for power wheelchair users. Facilitators included VA-provided transportation to imaging facilities, accessible mammography equipment, presence of caregiver support, and screening discussions with primary care providers.

Conclusion: Despite similar mammography completion rates to overall rates in VA, women Veterans with SCI/D report experiences which undermine the principles of patient-centered care and may lead to an avoidance of future screening. To address these challenges, VA is developing and disseminating best practices, for women with SCI/D, to improve communication and accessibility for both VA and community care staff.

Support: This work was supported by the U.S. Department of Veterans Affairs SCI/D System of Care National Program Office and the Office of Rural Health Veterans Rural Health Resource Center-Portland.

Learning Objectives

- Describe how barriers in mammography screening influence the emotional and psychological well-being of women Veterans with SCI/D, including their willingness to seek future screenings.
- Analyze how inaccessible imaging spaces, non-accommodative mammography equipment, and physical infrastructure limitations create unique challenges and potential safety issues for Veterans with SCI/D during breast cancer screenings.

- Evaluate the effects of provider and staff knowledge gaps, including technologist unfamiliarity with SCI/D-specific needs, on the trust and care experiences of women Veterans with SCI/D.
- Identify and discuss strategies to address the physical, emotional, and psychological barriers that women Veterans with SCI/D face in accessing breast cancer screening through mammography.

PO2514: Improvements seen in wheelchair users after using a disability-centered fitness facility for one year

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Background: Wheelchair users (WCUs) often encounter significant barriers to accessing fitness facilities, contributing to high sedentary rates, which negatively impact their physical health and well-being. Conventional fitness facilities are typically inaccessible, hindering WCUs' ability to exercise independently. While some healthcare systems, such as Spinal Cord Injury Model Systems, have integrated accessible fitness options into their services, most fitness centers outside these networks remain ill-equipped for WCUs. Amid the COVID-19 pandemic, the Disability Resources and Education Services (DRES) at the University of Illinois renovated its Health and Wellness Center to enhance accessibility, incorporating lightweight equipment, cushioned surfaces, and open spaces to create an inclusive environment for individuals with mobility limitations.

Purpose: This study aims to evaluate the feasibility of a fitness facility tailored to WCUs for independent exercise. It also seeks to provide preliminary evidence to guide the establishment of future fitness centers designed to meet WCUs' unique needs.

Methods: A mixed-method analysis was conducted using de-identified data from 23 college-aged WCUs who utilized the renovated Health and Wellness Center between 2021 and 2022. Data included max strength (i.e., 1-4m), shoulder mobility, muscle endurance (i.e., pull-ups), and trunk strength (i.e., plank time or modified hanging crunch time), quality of life scores (modified SF-39), and general comments. Paired t-test was used assess changes in max strength, muscle endurance, trunk strength, and quality of life. Wilcoxon signed rank test was used to assess changes in shoulder mobility. Thematic analysis explored user feedback regarding the facility and fitness goals.

Results: Significant improvements were observed in max strength (9.5%), muscle endurance (25.0%), and trunk strength (28.8%) ($p< .05$). However, no significant changes were noted in shoulder mobility or perceived quality of life ($p>.05$). Thematic analysis highlighted motivations among WCUs to enhance adapted athletic skills, improve fitness and healthy weight, and maintain overall functionality. Participants acknowledged the benefits of specialized equipment in facilitating independent fitness improvements. Nevertheless, most users expressed a need for guided exercise plans from trainers or clinicians to optimize their outcomes.

Conclusion: Results demonstrate that accessible fitness facilities can enhance strength and conditioning for WCUs, supporting their capacity for autonomous exercise. However, the lack of significant improvements in quality of life suggests potential confounding factors, including data collection errors and external influences such as the COVID-19 pandemic. Four participants (17%) failed to complete post-intervention quality-of-life surveys, potentially weakening the analysis. Given the multifaceted nature of quality of life, outside factors such as stressors during the pandemic likely played a role. Additionally, while the inclusive fitness center enabled independent exercise, the need for individualized guidance parallels the support readily available to able-bodied individuals in conventional gyms. Greater access to trainers and personalized exercise programs could help WCUs maximize their fitness potential. The development of accessible fitness facilities for autonomous exercise among WCUs appears promising for improving physical health and wellness. Future research should explore strategies to enhance WCUs' access to personalized exercise programs to support long-term fitness and quality-of-life improvement.

Learning Objectives

- Analyze the significance of accessibility in fitness facilities and its impact on the physical health and well-being of wheelchair users.
- Evaluate the outcomes of a disability-centered fitness facility, focusing on changes in strength, endurance, and trunk stability among wheelchair users.
- Identify the motivations and goals of wheelchair users in utilizing a disability-centered fitness facility.
- Propose strategies to enhance fitness for wheelchair users.

PO2515: Addressing potentially inappropriate medication use and polypharmacy in SCI practice

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Background/Purpose: People with spinal cord injury (SCI) have multiple conditions and complications for which medications may be prescribed and are, therefore, vulnerable to the risks of polypharmacy including adverse drug reactions, possible drug interactions, and compliance challenges. SCI-related impact on drug metabolism, distribution, and elimination can further increase potential for drug-related complications. Therefore, it is especially important to consider strategies to reduce polypharmacy and use of potentially inappropriate medication (PIM) in SCI practice.

Methods: We documented medication use for patients followed at our SCI Center as part of their annual examination and analyzed results over a 1-year period. Measures included number of medications, VIONE score, and anticholinergic burden (ACB). We initiated a systematic approach to deprescribing consisting of identifying and considering discontinuing or dose reducing medications when there was risk that outweighed the benefit within the context of patient specific factors or goals. The VIONE (vital, important, optional, not indicated, and every medication has an indication) tool, which has been developed to help identify medications that can potentially be deprescribed. When deprescribing was warranted, VIONE discontinuation reasons were selected in the Computerized Patient Record System (CPRS). Data were electronically stored in a national dashboard. Potentially inappropriate medications (PIMs) were the targets of deprescribing and were identified for many reasons including but not limited to duplication of medications, drug-drug interactions, and medications that are unnecessary for a specific patient.

Results: Medication use was analyzed for 307 patients with SCI In fiscal year (FY) 2024. The average number of medications per person was 12.5. Only 19 patients were on 5 or less medications, 170 had 11-20 medications, while 70 had over 20 medications. The average VIONE score was 4.11 and anticholinergic burden was 2.6. Preliminary results over a 3 month period of entering deprescribing information in the VIONE dashboard indicated that the top 3 deprescribing reasons were patient no longer taking (n = 43), alternate medication was prescribed (n=42), or the medication was not indicated (n=35).

Conclusion: Embedding deprescribing into standard workflow for a clinical pharmacist working in collaboration with SCI providers in an SCI practice facilitated a way for polypharmacy reduction and addressing PIMs.

Learning Objectives

- Identify high-risk medication use and polypharmacy in people with spinal cord injury
- Describe SCI-related changes in drug metabolism, distribution, and elimination that are important to consider when prescribing medications
- Discuss a systematic approach to address potentially inappropriate medication use and polypharmacy in people with SCI
- Utilize lessons learned and best practices to optimize medication use in SCI practice

PO2516: Motor evoked potentials and voluntary activation of upper limb muscles in chronic cervical SCI

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Background: Spinal cord injury (SCI) disturbs corticospinal pathways and impairs corticospinal function; a smaller amplitude motor evoked potential (MEP) to transcranial magnetic stimulation (TMS) after SCI indicates weakened corticospinal excitation of spinal motoneurons and the muscle. With a decreased corticospinal connection, a decrease in the ability to voluntarily activate the affected muscles is expected. However, motoneuron excitation and muscle contraction can be facilitated through CNS pathways other than the corticospinal pathway. A measure of voluntary muscle activation (e.g., maximum voluntary contraction, MVC) and MEP are not necessarily synonymous measures and their similarities and differences could reflect normal and impaired corticospinal drive in people with SCI.

Purpose: To better understand impaired voluntary motor function in chronic SCI, we examined MEPs, MVCs, and manual muscle strengths in multiple upper limb (UL) muscles of individuals with individuals with chronic cervical SCI.

Methods: Six adults (age 31-62 years, 2 female) with chronic cervical SCI (0.5-27 years post injury) and resulting UL weakness participated in this study. MVC and MEP were measured in 11 upper limb muscles while the participant sat in a chair with the studied arm fixed in a preset position (wrist, elbow, and shoulder at ~0°, ~0°, and ~80° and forearm in neutral). MVC was measured as the absolute EMG amplitude recorded from the muscle during two 3-s trials of isometric maximum activation effort. Ten MEPs were averaged at each of 10, 20, and 30% above ECR MEP active motor threshold, and 5 responses were recorded at 100% maximum stimulator output (MSO). MEP was defined as "present" if the average EMG over the MEP latency period was >=200% prestimulus EMG. Voluntary muscle contraction was defined as "present" if MVC was >5mV. Manual muscle tests (MMT) were administered for 7/11 muscles by a licensed therapist.

Results: In all participants, MEP and MVC were present and MMT was >=1 above the level of injury. In two participants with AIS A/B (motor complete) MEP was present but MVC and MMT were absent in the muscle at or just below the level of injury. In the muscles further below the injury, MEP, MVC, and MMT were absent. In four participants with AIS C/D (motor incomplete), agreements among MEP, MVC, and MVT were more variable below the level of injury than those with AIS A/B. Typical disagreement between the two measures was absence of MEP with presence of MVC or MMT. There was a high level of agreement between MVC and MMT across all participants.

Conclusions: Imperfect agreements among MEP, MVC, and MMT suggest differences in neural drive and connectivity reflected in those measures. Presence of MEP indicates the presence of corticospinal connection. In the absence of MEP, muscle activation could be driven through alternate pathways. Presence of MEP or MVC measure indicates that motoneurons innervating that muscle are neurologically accessible and potentially susceptible to plasticity (and thereby neurorehabilitation). Developing further knowledge on the mechanisms and relationship of these measures may help strategize individualized UL neurorehabilitation in the future.

Learning Objectives

- Describe the neurophysiological differences between motor evoked potential (MEP) and voluntary contraction in upper limb muscles.
- Discuss potential differences in the relationship of these measures between complete and incomplete injuries.
- Explore possible explanations for the presence of one measure in the absence of another.
- Discuss how understanding the relationship between neurophysiological and clinical measures could inform practice.

PO2517: Considerable person-to-person variation seen in eating window of Veterans with paraplegia and obesity

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Background: The Veterans we serve with spinal cord injuries (SCIs) have almost double the rates of obesity, nearly 80%, compared to the general rates seen in Veterans overall. Veterans with SCI have subsequent and significant cardiometabolic complications from obesity. The period of the day in which people eat – known as the eating window – plays a critical role in obesity's onset and progression. A longer eating window has detrimental health effects. It contributes to obesity, as people eat more if they spread their food intake over the day. It also contributes to cardiometabolic disease, as eating is not aligned with the body's circadian rhythms and metabolic machinery. While the baseline eating window of the general population is well-known (14-15 hours daily), the eating window of people with SCI is not known, presenting a critical knowledge gap needed to care for our population – and make use of interventions like time restricted eating designed to shrink that daily eating window. This study seeks to determine the baseline eating window of Veterans with SCI, as the crucial first step before investigating promising weight loss interventions

Purpose: We determined the baseline eating window of Veterans with SCI. We hypothesized that the window would be > 14 hours a day, consistent with the eating window of the general population.

Methods: We recruited Veterans with chronic SCI (> 1 year from injury), paraplegia (neurologic level of injury T1 – S5), and obesity (BMI ≥ 22 – which is different from obese BMI in the general population), from a single VA SCI and disorders center – including hub and spoke clinics. Veterans tracked their start and stop times of eating and drinking (excluding zero-calorie beverages) over 2 consecutive weeks and self-reported results on paper-based food logs.

Results: In this convenience sample (n = 45) who were predominantly male, Caucasian, and > 65 years old, the average eating duration (eating window) was 10.7 hours over the 2 week period (standard deviation: 2.61 hours). Weekday

windows averaged 10.8 hours and weekend windows averaged 10.5, a statistically significant difference (p=0.036). Eating windows did not vary significantly week to week (p = 0.746). Individual eating windows did vary considerably, however, ranging from 6.1 – 14.8 hours.

Conclusion: In this sample of Veterans with chronic paraplegia and obesity, the baseline eating window was 10.7 hours, with little week to week variation and slight but significant weekday to weekend variation. However, individual windows varied considerably, from approximately 6 – 15 hours. While the eating window is reduced compared to the general population averages, and within the recommended range (< 12 hours) to align eating with natural circadian rhythms, considerable SCI Veteran-to-Veteran variation was noted. Obesity after SCI remains a staggering problem, with cardiometabolic disease among the leading causes of mortality after SCI. Study limitations include a comparably small sample size (though large for SCI research); and self-reports. More research on the nutritional factors affecting Veterans with SCI is still needed. However, this data provides crucial guidance for developing interventions to help Veterans with SCI better manage their metabolic health.

Learning Objectives

- Explain how eating over extended hours (with a longer eating window) contributes to obesity and cardiometabolic disease.
- Identify interventions that target the eating window that can facilitate weight loss.
- Compare the eating window of Veterans with SCI to that of the general population.
- Discuss the implications of person-to-person variation in the eating window of Veterans with SCI on obesity's onset and options for treatment.

PO2518: Apolipoprotein E in the Risk of Developing Degenerative Cervical Myelopathy and Neurological Diseases: A Review

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Background: Apolipoprotein E (ApoE) is a serum lipid transporter protein involved in lipid metabolism, neuroprotection, and cellular repair processes in the nervous system. Variants of the ApoE gene, particularly the ε4 allele have been widely studied as a risk factor for development of neurodegenerative diseases, especially Alzheimer's disease. However, the role of ApoE in the development of other neurological diseases including degenerative cervical myelopathy (DCM) remains understudied.

Purpose: To examine the literature on the association between ApoE genotypes as a risk factor for developing neurological diseases (including DCM) beyond dementias.

Methods: This systematic review was registered with PROSPERO (ID: CRD42024531294). Its search was conducted from inception to May 2024 using six databases: PubMed, Embase, CINAHL, APA PsychInfo, Web of Science and Cochrane. Search terms included: peripheral and/or central nervous system injury and ApoE. This review was performed according to the PRISMA guidelines.

Results: Of the 5117 articles screened, 37 articles were fulfilled the inclusion/exclusion criteria, which were focused on stroke (n=20), traumatic brain injury (TBI) (n=11), cranial or peripheral neuropathy (n=3), cervical spondylotic myelopathy (or DCM) (n=2), and chronic traumatic encephalopathy (CTE) (n=1).

In the field of spinal cord disease, both studies reported that individuals who are ApoE ε4 or ApoE ε2 carriers are at a greater risk for developing DCM.

The findings regarding ApoE as a risk factor for TBI were mixed. While five studies reported a positive association between ApoE ε4 and TBI, other five studies documented no association between ApoE ε4 and TBI. Notably, a single study noted an increased risk for need for decompressive hemicraniectomy among ε4 carriers with TBI.

The studies on different types of stroke showed conflicting findings. Although two studies documented no significant association between ApoE ε4 and the occurrence of ischemic stroke, other two studies reported a positive association between ApoE ε4 and the occurrence of hemorrhagic stroke. Furthermore, six studies showed a positive association

with ApoE ε4 and intracerebral hemorrhage, but four studies reported no such association. While three studies documented no significant association between ApoE ε4 and aneurysmal subarachnoid hemorrhage, five studies showed a positive association between ApoE ε4 (n=4) or ApoE ε2 (n=1) and aneurysmal subarachnoid hemorrhage.

Although one study reported that ApoE ε3 or ApoE ε4 carriers are at greater for nonarteritic anterior ischemic optic neuropathy, there was no significant association between ApoE genotypes and peripheral neuropathies (either familial amyloid polyneuropathy [n=1] or diabetic neuropathy [n=1]).

Lastly, a single study documented that ApoE ε4 is a risk factor for CTE.

Conclusions: The results of our review suggest that individuals who are ApoE ε4 or ApoE ε2 carriers may be at a significantly greater risk for developing DCM. Nevertheless, there were conflicting results on the association between ApoE genotypes and other diseases of the central or peripheral nervous system beyond dementia. Overall, those results indicate a major knowledge gap on this topic and, hence, further research is needed to investigate the role of ApoE genotypes and DCM or other neurological diseases (but dementias).

Learning Objectives

- List the key functions of ApoE in lipid metabolism, neuroprotection, and cellular repair in the nervous system.
- Describe the association between ApoE genotypes and the risk of developing various neurological diseases, including DCM, TBI, and stroke.
- Analyze the conflicting findings in the literature regarding ApoE genotypes and their role as risk factors for non-dementia neurological diseases.
- Idenify the need for further research on the role of ApoE genotypes in DCM and other neurological conditions outside of dementia.

PO2519: Association of Social Determinants of Health in Transverse Myelitis Clinical Outcomes at a Population Level

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Objective: Understand the impact of social determinants of health (SDOH) in the clini-cal outcomes of transverse myelitis (TM).

Background: TM is a rare neurologic condition with a diverse collection of etiologies targeting the spinal cord, manifesting in various neurologic symptoms. Established predictors of poor clinical outcomes include the presence of longitudinal-extensive- TM, severe deficit at onset of symptoms, acute TM, symptoms progression within 24 hours, relapse occurrence, and spinal shock. The impact of SDOH, including socioeconomic status, healthcare access, and quality of care, hasn't been thoroughly investigated.

Design/Methods: This secondary analysis utilized the National Veterans Health Administration (VHA) TM epidemiology cohort and the Agency for Healthcare Research Quality's SDOH Database. Univariate and multivariate models were used to determine the association of the area deprivation index, Gini index of income inequali-ty, median incomes of veterans, Rural-Urban Commuting Area Codes system, Medically Underserved Areas (MUA), and distance in miles to the nearest clinics and hospitals with clinical outcomes (autoimmune neurologist-adjudicated modified Rankin Scale [mRS]). Furthermore, Cox regression models were used to assess the impact of SDOH factors on survival times.

Results: 1,001 patients met the TM criteria, with a median age of 64.2 years [IQR:53.5– 69.9]; 90.7% were male, and 67.8% were white. The median mRS at the time of diag-nosis was 3 [IQR:2-4], and remained 3 [IQR:2-4] at the last follow up. A random deci-sion forest determined that LETM, median incomes, and MUA were associated with poor mRS at diagnosis. Multivariate logistic regression showed that increased mortali-ty was associated with increase of age (OR:1.06, 95%CI:1.04–1.08), and higher mRS score at follow-up (OR:1.94, 95%CI:1.57–2.40), and tobacco use (OR 1.87, 95%CI:1.17–2.99). Further analysis will be conducted to understand the impact of specific SDOH-related factors in clinical outcomes.

Conclusions: Poor outcomes in TM have been associated clinical factors. SDOH also appear to impact TM outcomes; further population-level analyses are needed.

Learning Objectives

- Explain the Pathophysiology of Transverse Myelitis: Understand the diverse causes and neurological symptoms of transverse myelitis, including key predictors of poor outcomes such as longitudinal-extensive-TM and severe initial deficits.
- Analyze the Role of Social Determinants of Health in TM Outcomes: Learn how socioeconomic factors, healthcare access, and quality of care impact the clinical outcomes of transverse myelitis, focusing on specific indicators like the area deprivation index.
- Interpret Epidemiological Data in Neurological Research: Develop the ability to interpret epidemiological data from studies like the National Veterans Health Administration TM cohort, using statistical models to analyze the impact of social determinants.
- Evaluate Research Methodology in the Study of TM and SDOH: Critically assess the research methods used to study the impact of social determinants on transverse myelitis, including the use of complex statistical analyses and databases.

PO2520: Xerostomia in SCI, a James A. Haley VAMC QI project and implications for veteran research.

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Background: Pneumonia is the leading cause of death in SCI, followed by infectious/parasitic disease and heart disease. Periodontal disease has a bidirectional relationship with systemic diseases such as cardiovascular disease and diabetes, and is associated with pneumonia. Human defenses in the oral microbiota include salivary flushing action, salivary immunoglobulins, peroxidases and other enzymes. Xerostomia and salivary gland hypofunction increase risk of tooth decay, periodontal disease, oral infection, dental plaque accumulation and oral candida. Veterans with spinal cord injury are often prescribed medications that may cause xerostomia and face increased barriers to achieving oral health and dental care which can put their health at risk.

Purpose: To determine if xerostomia is being identified in the SCI population at James A. Haley VA Medical Center and identify severity based off the short form Xerostomia inventory. Secondarily to identify patients that would benefit from xerostomia management in the JAVA SCI system.

Methods: Eligible veterans were screened via the electronic medical record (EMR). Xerostomia short form inventory was administered in person or over the phone with data captured electronically. Chart review was subsequently performed to identify whether xerostomia was a present diagnosis in the EMR at or 12 months prior to survey. Veterans who declined the short form xerostomia inventory were not included in data collection. Simple description of the data were performed.

Results: 50 Veterans were surveyed, and their charts reviewed. 37 were inpatient, 13 were outpatient at the time of survey administration. 23/50 Veterans had clinically significant Xerostomia by index score. 3/50 had xerostomia diagnosed in dental notes within preceding 12 months, and 0/50 had xerostomia or equivalent diagnoses in their problem list. 3 of the veterans were diagnosed in dental notes out of the 23 with clinically significant xerostomia on interview.

Conclusions: 46% of veterans included had clinically significant Xerostomia at the time of the interview but only 6% were identified in dental notes within preceding 12 months to have a diagnosis of any severity of xerostomia, and 0% of veterans had a current diagnosis of xerostomia on their problem list. With a focus on identifying and understanding Xerostomia in SCI we will be able to: research its correlation to other diseases in SCI such as pneumonia, diabetes, CAD, periodontal disease, and inflammatory diseases, research interventions and study effects on incidence and course of associated diseases, perform retrospective studies on coincident diseases, target it for treatment and study effects of treatment, and effectively advocate for better oropharyngeal care for our patients in an evidence-based way.

Learning Objectives

- Explain the bidirectional interplay between xerostomia, periodontal disease and systemic diseases in veterans with Spinal cord injury (SCI.)

- Explain the common risk factors for Xerostomia in SCI.
- Identify and manage xerostomia in patients with SCI.
- Explain why capturing Xerostomia and related diagnoses will benefit research, advance clinical care, and reduce barriers to veterans’ access to dental care.

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