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Paralyzed Veterans of America

10 YEARS Anniversary

HEALTHCARE SUMMIT EXPO

AUGUST 28—31, 2022 • DALLAS, TX

PROCEEDINGS

Delivering Excellence, Achieving State-of-the-Art Health Care

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Dear Summit Attendee:

Welcome to Dallas and the 2022 PVA Healthcare Summit and Expo. We are glad to be back for our 10th Summit and Expo. We have put together a diverse program this year to provide learning opportunities at all levels from poster presentations to full day preconference workshops. This year's program includes the latest in research, new technology and best practices in spinal cord injury and disorders (SCI/D), multiple sclerosis (MS) and amyotrophic lateral sclerosis (ALS) care across the continuum. There will also be opportunities on Monday to be the first to see and learn about the newest Bone Health clinical practice guidelines from the Consortium on Spinal Cord Medicine. 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 all of the Summit presentations. 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. Knowledge is power! We challenge you to learn as much as you can over these four days and then take what you learned back to your team and put it to use!

Thank you for attending our 10th annual Healthcare Summit, and for your commitment to providing the best possible care for veterans and other individuals with SCI/D.

Sincerely,

Jeri Muse

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Program Committee Chair

Cheryl L. Vines

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(PC-221) Transfers: Techniques, Technology & Training Tools to Optimize Safety & Independence

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Veterans Health Administration

Littleton, CO

Submitter; Presenter

Laura Rice, MPT, PhD, ATP

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Urbana, IL

Presenter

Lynn Worobey, PhD, DPT, ATP

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Pittsburgh, PA

Submitter; Presenter

Rachel Hibbs, DPT, ATP, NCS

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Pittsburgh, PA

Presenter

Abstract

For people with paralysis, transfers are a key skill required for mobility, participation, and quality of life. For some individuals, transfers are a skill they will master and complete independently. For others, including the majority of individuals following acute injury or illness, transfers are a complex daily task that will require either physical assistance or the use of assistive devices. This course will comprehensively examine transfer skills across a variety of settings in four modules.

During the first module, our team will provide introductory information about transfers. We will discuss foundational information about transfers including a biomechanical understanding of optimized transfer technique to reduce upper extremity loading, techniques to reduce fall risk and use of validated outcome measures to objectively assess transfer quality.

In the second module, participants will have an opportunity to engage in hands-on practice with performance of advanced transfers including to the car, floor, and sports equipment. In addition, participants will have an opportunity to practice safe patient handling techniques that leverage assistive technologies available for home use that can be implemented as part of patient care or family training for lifting, transferring and repositioning acute and medically complex individuals.

During module 3, participants will have an opportunity to apply the knowledge learned during module 2 and work through case studies of challenging transfer situations in various clinical settings (acute care, inpatient rehabilitation, community based recreational programs) and problem solve as a group. We will also discuss special considerations for medically complex patients including wounds, ventilators, contractures, and orthostasis.

Finally, in module 4, participants will be provided with various clinical resources, including standardized outcome measures, consumer focused fact sheets on transfer technique, fall management resources and an open access direct-to-user web-based transfer-training modules. Attendees will leave this session with an understanding of the effects of transfer technique, how it can be assessed, and how to intervene to optimize outcomes.

Learning Objectives

- Determine how training content in basic and advanced transfer techniques can be translated to clinical practice in varied settings
- Utilize outcome measures to assess deficits in technique and opportunities for intervention
- Identify at least 2 assistive devices that can be used for assisted or dependent transfers
- List resources available to clinicians to aid in training users in evidence based techniques

(PC-222) Introduction to Multiple Sclerosis: Diagnosis and Management

Scott Newsome, DO, MSCS, FAAN, FANA

Johns Hopkins University School of Medicine
Baltimore, MD
Presenter

Kathleen Costello, MS, CRNP, MSCN

Can Do Multiple Sclerosis
North Carolina
Presenter

Abstract Body

- This two-hour program will include the following components:
- Overview of the MS disease process
- Discussion of disease demographics and MS risk factors
- Overview of the MS diagnostic criteria and disease phenotypes
- Review available disease modifying treatments for MS – shared decision making, administration, efficacy, and potential side effects/risks
- Discussion of relapse management
- Case based leaning for common and complex MS symptoms: management principles, assessment and comprehensive management
  - Fatigue
  - Cognitive challenges
  - Mood disorders
  - Pain
  - Bowel and bladder issues
- Opportunity for Q&A and discussion

Learning Objectives

- Describe the demographics of MS and the risk factors associated with the development of MS
- Explain the MS phenotypes
- Discuss the rationale for the use of disease modifying treatments
- Describe the principles and importance of symptom management in MS

(PC-223) Cognitive Impairment in Multiple Sclerosis: Impact, Assessment, and Remediation

Kathleen Costello

Can Do Multiple Sclerosis
Avon, CO
Presenter

John Deluca

Kessler Foundation
West Orange, NJ
Presenter

Abstract Body

At least 65 percent of people with multiple sclerosis (MS) experience changes in their cognitive functioning, making it one of the most common symptoms of the disease. Although these changes are seen more often in individuals with progressive disease, they can occur at any point in the disease course, even in people with radiologically-isolated syndrome (RIS – characterized by asymptomatic brain lesions on magnetic resonance imaging (MRI) that are consistent with MS) and with clinically-isolated syndrome (CIS – a first episode of neurologic damage in the central nervous system that may or may not go on to become MS).

The most common cognitive changes – slowed information processing speed and impaired learning and memory, complex attention, perceptual skills, executive skills (organization, problem solving, planning, prioritizing), and word-finding – have a profound impact on function and quality of life. Cognitive changes, along with fatigue, are the primary cause of early departure from the workforce among people with MS. In addition, these changes impact communication, relationships, self-care and medical self-management as well as self-image, self-confidence, and self-esteem. It is incumbent on MS providers of every discipline to be sensitive to, and knowledgeable about, these changes in their patients. For those in the fields of neurology and nursing, familiarity with cognitive screening options is essential, as is the ability to refer patients appropriately to the rehabilitation professionals trained perform comprehensive assessments and cognitive rehabilitation. With appropriate screening, evaluation, and remedial interventions, we can help people manage their cognitive challenges and avoid the vocational, social, and emotional fall-out that these changes can produce.

This half-day program will include the following components:

- Overview of MS and cognitive changes associated with the disease
- Rationale for early and ongoing screening of cognitive function from diagnosis onward in order to recognize and address impairment that impact vocational, social and emotional functioning
- Overview of the cognitive functions commonly impaired in MS, as well as factors that can further compromise cognition (depression, poor sleep, MS fatigue, reduced social and intellectual stimulation), and factors that contribute to cognitive reserve (education, physical activity, intellectual and social stimulation)
- Discussion of validated paper-and-pencil and computerized tools for assessing cognition in MS, including brief cognitive screens (5-10 minutes), brief neuropsychological batteries (15-90 minutes), and full neuropsychological batteries – and the role of rehabilitation professionals (speech/language pathologists, occupational therapists, neuropsychologists) in providing these assessments
- Review of cognitive remediation strategies that have demonstrated efficacy in controlled studies and practical strategies for implementing and personalizing them to the needs of individual patients
- Review of other treatment strategies, including exercise and pharmacological treatments
- Opportunity for Q&A and discussion of case vignettes

Learning Objectives

- Describe basic MS epidemiology and disease course
- Describe common cognitive domains affected by MS and their impact on function
- Explain the rationale for early and ongoing cognitive screening
- Discuss at least 3 commonly used screening tools and/or brief neuropsychological batteries
- Describe at least 3 treatment interventions for cognitive impairment in MS

(PC-224) SCI 101; ALS 101; MS 101: Nuts and Bolts of Understanding and Managing SCI&D from Onset to Getting On.

Paul Gutierrez

VA New Mexico Healthcare System

Albuquerque, NM

Presenter

Huned Patwa

VA Connecticut Health Care System

West Haven, CT

Presenter

Suma Shah

Durham VAMC

Durham, NC

Presenter

Abstract Body

Background and Issues

The mission of the Veterans Affairs Spinal Cord Injury and Disorders (SCI&D) System of Care is to support, promote, and maintain the health, independence, quality of life, and productivity of individuals SCI&D throughout their lives. The VA also endeavors to educate healthcare providers to further that mission.

Purpose

To that aim, this workshop offers a general overview of spinal cord injury and other disorders and a specific review of the unique approaches to the care of individuals with traumatic spinal cord injury (SCI), multiple sclerosis (MS) and amyotrophic lateral sclerosis (ALS). This approach aims to educate providers who often work in silos and may or may not have opportunities to integrate knowledge and behaviors around SCI disorders into care. The similarities and differences between SCI, MS, and ALS will be emphasized, providing a better understanding of the specific care needs of these groups of patients.

Methods

Spinal cord injuries (SCI) typically are the result of accident or trauma. Those with SCI have unique health issues requiring a team approach to care. Understanding spinal cord anatomy and spinal cord syndromes is important in the management of early disease. This session will review the epidemiology, ASIA system of classification, emergency management, initial rehabilitation, expected outcomes from rehabilitation, and management of key symptoms of neurogenic bowel and bladder, autonomic dysreflexia, and spasticity.

Multiple sclerosis (MS) is a chronic, progressive and unpredictable neurologic disorder that affects motor, sensory and cognitive function. MS is characterized by neurological symptoms that relapse and remit due to onoing inflammation as well as progressive neurodegeneration. Medication can limit the disease progression but ultimately there is no cure for MS. This section will highlight the diagnosis of MS, magnetic resonance imaging (MRI) used in diagnosis and disease management, relapses and relapse management, medications for disease management and common symptoms and their management.

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease of motor neurons that eventually leads to paralysis and death within two to five years of diagnosis. This session explores the loss of voluntary muscle activity and it's 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.

Conclusions

Treatment of SCI, MS, and ALS converges at the 25 SCI centers in the VA system. Each disorder has a unique set of management conditions. Providers who have a better understanding of the unique similarities and differences between SCI , MS, and ALS are best equipped to enhance quality of life for these individuals.

Learning Objectives

- Gain a working knowledge of spinal cord injury, multiple sclerosis and amyotrophic lateral sclerosis.
- Recognize the differences and similarities between SCI, MS and ALS and key practice issues.
- Implement best practices in the management of SCI, MS, and ALS.
- Provide enhanced education to patients with SCI, MS, and ALS

(2201) Finding Joy in the Work We Do

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Submitter; Presenter

Abstract Body

There are several studies that note more than 50% of health care workers have one of the signs or symptoms related to burnout. This talk will explore the definitions of burnout out and review definitions of self-awareness and resilience in order to recognize and combat this "occupational phenomenon".

The purpose of the presentation is to provide an understanding of how stress and burnout affect your professional health and wellness and what you can do to protect yourself as well as your personal and work relationships.

Finding a means of a better balance can help as well as reduce the probability of experiencing burnout.

Learning Objectives

- Recognize signs and symptoms of burnout /moral injury/compassion fatigue / emotional collapse.
- Identify factors that lead to burnout and moral injury.
- Provide an understanding of how stress and burnout affect your professional health and wellness.
- Identify ways to create a culture of prevention and wellness.
- Learn what you can do to protect yourself as well as your personal and work relationships
- Define ways to move from moral injury to fulfillment post COVID

(2202) New Frontier in Assessment and Treatment of Sports Related Concussion in Para-Sport

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Abstract Body

Background

During coverage of adaptive sporting events, the investigators identified a lack of established guidelines for Sport-related concussion (SRC) evaluation and management for para-sports athletes. Para-sports athletes are a unique population, and certain conventional methods of evaluating SRC cannot be used. These athletes' underlying disabilities restrict the use of standard balance testing protocols used in able-bodied athletes which require standing. In addition, some

wheelchair athletes have concurrent traumatic brain injuries and may have baseline cognitive deficits associated with their disability. These challenges in assessment could affect the diagnosis of SRC and result in the mismanagement of these athletes. We gathered twenty-two international experts in field of sports related concussion and adaptive sports to address this gap and produced a handbook along with the Concussion Management Program (CMP) for para-sports athletes.

Purpose

Identify areas of potential improvement in a sports related concussion management program in para-sports athletes in a handbook format to provide the most up to date guideline in the assessment and treatment of SRCs in para-sport.

Methods

An invitation went out to twenty-four experts around the world who specialize in adaptive sports medicine and/or sports related concussion. Twenty-two experts accepted this offer to produce the first handbook on concussion management of para-sports athletes.

The editors also developed a Concussion Management Program (CMP) that incorporated the currently available Wheelchair Error Scoring System (WESS) and the Clinical Reaction Time (CRT). The importance of baseline test was found to be extremely critical and emphasized in this handbook.

Two competitive grants were awarded to complete this project: the Veterans Affairs Adaptive Sports Grant and the PVA Education Grant.

Results

The handbook resulted in nine chapters that emphasized the gap, current practice, and the future research that were necessary. Each author was able to identify the most current practice (or lack of) in Para-sport SRC assessment and examination. They also identified limitations to the current system and specific needs for SRC evaluation.

Conclusion

During this project, we identified a significant gap in the assessment and treatment of SRC in para-sports athletes compared to their able body counterparts. We found that the recording of their baseline signs and symptoms and conducting baseline testing are an important part of SRC evaluation in this population as the signs and symptoms of their "normal" status may mimic an SRC. This is also true for their cognitive evaluation as well. The authors also identified several tests that are adapted to evaluate para-sport SRC. The Wheelchair Error Scoring System (WESS) is a seated balance test based on the Balance Error Scoring System (BESS) to evaluate ataxia in able-bodied athletes. The Clinical Reaction Time (CRT) was initially developed for a sled hockey group and was also identified as a consistent assessment tool to be utilized for para-sports athletes. This handbook also presents the first full assessment and treatment tool, the Concussion Management Program for Wheelchair Athletes (CMP), for all clinicians to utilize on the sideline as well as in their clinics.

Learning Objectives

- Present the gap on sports related concussions between the able-bodied athletes and the para-sport athletes
- Demonstrate the importance of baseline testing for wheelchair athletes and how baseline testing results can affect the diagnosis of Sport-related concussion
- Present the Concussion Management Program for para-sports athletes
- Discuss the future area of interest in Sport-related concussion in para-sports athletes

(2203) Implementation of an Adaptive CrossFit Program for Spinal Cord Injury Survivors

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Submitter; Presenter

Abstract Body

Background

Adaptive sports have been shown to have physical and psychosocial benefits for persons with spinal cord injury (SCI) and other disabilities. Adaptive athletes have been integrated into CrossFit programs and adaptive competitions. Specialty training programs have been developed to train coaches on modifications for typical CrossFit style exercises for participants with various disabilities. Implementing a wellness program at CrossFit gyms is feasible and can allow adaptive athletes to integrate into a group wellness program with able-bodied athletes.

Purpose

This presentation will review considerations in implementing an adaptive CrossFit program for participants with SCI. It will discuss the physical, psychological, and social benefits of adaptive sports and weightlifting. It will also cover successes, barriers, and lessons learned in implementing a program. Subjective and objective outcomes on participant function and quality of life (QOL) from current programs in Central Florida will be discussed.

Methods

The information presented is based on the implementation of a CrossFit program developed in the greater Orlando area. We received input from local SCI survivors wanting access to more adaptive sports and recreational activities in the Central Florida area. The program started in 2018 with a single gym location and six participants. Funding was provided by a grant and participants were referred by our outpatient clinic and community networks. The program expanded in 2020, supported by increased interest from more potential adaptive athletes and the award of a second grant. It now includes three gyms and fifteen participants.

Results

Participants at the original gym completed the Short Form 36, World Health Organization Quality of Life–BREF and Spinal Cord Independence Measure Version III. The outcome measures showed some improvement in function and QOL, although the significance was limited by the small sample size. The adaptive athletes anecdotally reported improved ease with day-to-day functional activities as well as psychosocial benefits from community relationships.

The adaptive CrossFit program provided an exercise program for SCI survivors and allowed participants to engage with their community. The program increased awareness about adaptive sports in persons with a disability, coaches, and able-bodied athletes. The program garnered attention from the media and won the Community Benefit Achievement Award from the Florida Hospital Association in 2019.

When the program expanded in 2020, barriers were taken into consideration. Barriers included the gym location residing in an area with a small SCI population, limitations for tetraplegia level injuries, and lengthy outcome measures that did not reflect subjective reports. Two gyms were added in areas with a higher concentration of SCI survivors in Central Florida. We utilized new outcome measures that were shorter, took less time to complete, and could potentially better capture psychosocial benefits and handicap dimensions. We also did more training for coaches and set expectations for tetraplegia level injuries. The 2020 program results will be available in February 2021.

Conclusions

An adaptive CrossFit program is feasible and can provide invaluable benefits to the SCI community. Program accomplishments and barriers should be evaluated on a regular basis to ensure the program is meeting community needs.

Learning Objectives

- Attendees will describe the physical and psychosocial benefits of adaptive sports and recreation programs for spinal cord injury.
- Attendees will discuss considerations to the initiation of an adaptive sports program for spinal cord injury.
- Attendees will list 3 potential barriers to the implementation and growth of an adaptive CrossFit Program.
- Attendees will identify 2 ways to improve recruitment and accessibility of spinal cord survivors into an adaptive CrossFit program.

(2204) Advancement of TeleWound in the VHA SCI/D System of Care

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Abstract Body

Veterans with SCI/D are vulnerable to the development of pressure injuries which, if not treated in a timely manner, can result in long hospitalizations, a decrease in quality of life, and in the worst-case-scenario can be fatal. Wound care can be greatly enhanced using Telehealth.

TeleWound incorporates the use of advanced technology to deliver high quality care at a location convenient for the patient. TeleWound is administered using multiple modalities including Store and Forward Telehealth where images of wounds with metrics are gathered and transferred back to a wound care specialist for review later as well as Clinical Video Telehealth which uses live video for real-time communication with Veterans, either in a distant clinic setting or in their home. Telehealth modalities are complimentary across the health care continuum (initial assessment, treatment, and follow-up).

TeleWound can be implemented in an inpatient, outpatient, or home setting to enhance and validate wound treatments through a variety of modalities including: point-and-shoot photography, 3D wound imaging, and using live video evaluation of wounds with patients located in their home or at distant clinic sites. Utilizing TeleWound can reduce the need for patient travel and can improve access to specialty wound care, decrease overall cost, reduce risk, and enhance quality.

This panel presentation will include a review of best practices in TeleWound and considerations in the establishment and maintenance of a TeleWound program. Additionally, the presentation will include a review and demonstration of some current and emerging technologies that are used in the delivery of TeleWound care. Presenters from multiple VA sites will share their impressions of the utilization of TeleWound and how it has impacted their facilities and their patients. Attendees will also be introduced to the VHA TeleWound Operations Manual Supplement and other resources which provide guidelines on how to set-up and operate a TeleWound program in the VA. Finally, best practices and case studies will be presented and discussed.

The panel will include both clinical and technical experts in TeleWound care.

Best Practices, initial outcomes, and lessons learned from VA sites where Telewound has been implemented will be presented. The results will include: expediting treatment, cost savings, patient and provider satisfaction, and FTE validation. This panel will also speak to TeleWound's contribution to achieving VA goals for Telehealth.

Learning Objectives

- Understand and discuss the history of Telehealth/TeleWound Programs in the VA setting.
- Describe the different Telehealth modalities utilized in TeleWound.
- Describe how to set up a TeleWound program.
- Identify the technological, logistical, and clinical considerations in the establishment of a TeleWound Program.
- Describe benefits of TeleWound

(2205) Body Fat Assessment and Creation of Equation to Estimate it Following Spinal Cord Injury

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Abstract Body

Background

Obesity is at epidemic proportions in the population with spinal cord injury (SCI), subsequently predisposing the population to poor metabolic health outcomes. Traditional models of obesity lack the precision to convey the risk of obesity and metabolic syndrome following SCI.1-3

Purpose

The purpose of this study was to (1) compare percent body fat (%BF) assessment techniques with criterion 4-compartment model (4CM), (2) develop a regression equation that can be used to estimate %BF in a clinical setting, and (3) determine the prevalence of metabolic syndrome using proxy markers of obesity.

Design

cross-sectional study

Methods

Seventy-two individuals with chronic motor complete SCI (age 44.4±11.3 y, 82% male, body mass index [BMI] 27.3±5.9 kg/m2, C5-L1, and time since injury 14.4±11.1 y) completed this IRB-approved cross-section study over three years. %BF was assessed using underwater weighing (UWW), body water with deuterium oxide, dual-energy x-ray (DXA), air displacement plethysmography using BodPod, bioelectrical impedance (BIA), and 9-site skinfold (9SSF).4,5 Fasting glucose, lipids, blood pressure, and current medications and treated conditions were obtained to estimate metabolic syndrome according to a BMI ≥ 22 kg/m2 and 4CM %BF using modified International Diabetes Federation criteria.3 Percent error and Spearman correlations were used to determine the error and association against 4CM %BF. Regression equations were developed with multiple linear regression and Akaike and Bayesian information criterion. Intraclass correlation coefficient (ICC) evaluated the agreement between the 4CM %BF and BMI ≥ 22 kg/m2 estimations of metabolic syndrome. Level of significance<0.05.

Results

Mean ± standard deviation for %BF for 4CM, UWW, DXA, BodPod, 9SSF, and BIA were 42.4±8.6%, 37.3±9.7%, 39.1±9.4%, 33.7±11.4%, 37.8±9.3%, 27.6±8.6%, respectively. The 4CM %BF significantly correlated with UWW (ρ=0.910), DXA (ρ=0.845), BIA (ρ=0.737), BodPod (ρ=0.542), and 9SSF (ρ=0.510) (P<0.0001). When compared against 4CM %BF, percent error was different among DXA (7%), 9SSF (10%), UWW (12%), BodPod (21%), and BIA (35%) (P<0.0001). Seven equations (R2=0.57-0.71, error=5.0-5.7, p<0.0001) were produced with the most clinically relevant equation using age, sex, weight, and abdominal skinfold (R2=0.6, error=5.7, p<0.0001). Forty-three percent had or were undergoing treatment for hypertension, 32% currently had or were previously diagnosed with type 2 diabetes mellitus, 33% current had or were being treated for raised triglycerides, 83% had or were under treatment for low high-density lipoprotein cholesterol, and 60% met criteria for having ≥ 2 of component risk factors for metabolic syndrome. The prevalence of metabolic syndrome using BMI was 55.7% and 4CM was 59.4% with an ICC=0.91.

Conclusions

Body composition assessment techniques used to determine percent body fat provided various agreement with the criterion 4 CM. The regression equation developed against the 4CM %BF may provide a clinically useful estimate of %BF that accurately estimates the prevalence of metabolic syndrome after SCI.

References

1.Farkas GJ, Gater DR. JSCM. 2018;41(4):378-387; 2.Nash MS, et al. TSCIR. 2018;24(4):379-423; 3.Gater DR. JSCM. 2018;42(1): 86–93; 4.Golja P, et al. ANM. 2020;76(3):183-192; 5.Fahs CA, et al. BPEE. 2020;6(3):035017.

Learning Objectives

- Identify the metabolic risk of obesity following a spinal cord injury
- Demonstrate the importance of the 4-compartment model relative to spinal cord injury.
- Compare the 4-compartment model to five measures of body composition assessment.
- Evaluate the prevalence of metabolic syndrome after SCI using the body mass index and the percent body fat from the 4-compartment model.

(2206) Assessment of Cognitive and Psychological Symptoms in Veterans with MS: A Whole Health Approach Part I

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Annex//516

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Presenter

Abstract Body

Multiple sclerosis is a complex chronic disease that affects neurologic, psychological, and cognitive functions. Cognitive and mood symptoms are present in more than half of people with MS and commonly emerge early in the disease course. However, these symptoms often remain undiagnosed, despite having been shown to negatively impact daily functioning and quality of life. MS is a heterogeneous disease and each individual's presentation is unique and may also be impacted by sociocultural factors and comorbidities. Understanding the context in which the disease occurs is critical in promoting assessment approaches that encompass diversity, equity, and inclusion.

Neuropsychological assessment can clarify the nature and extent of cognitive and psychological symptoms. Understanding the factors that underlie these symptoms and their impact on an individual's daily function are critical for tailored symptom management and interventions. This is of particular importance to Veteran care, as recent epidemiologic studies have documented higher MS incidence rates among military personnel compared to the general population. The goal of this presentation is to provide practical guidelines for MS providers (e.g., psychologists, social workers, neurologists, nurses, speech-language pathologists) regarding the detection and assessment of cognitive and psychological symptoms in people with MS. The specific objectives of this presentation are to a) define the scope of cognitive and psychological symptoms in MS; b) review common comorbidities in MS and their impact on cognition and mood; c) describe brief and comprehensive models for assessing cognitive and psychological symptoms within a culturally responsive, VA Whole Health framework; d) highlight various VA and community resources and describe how they can be incorporated into Veteran-centered care. Case examples will be discussed to illustrate the application of tailored assessment approaches. The presentation will have interactive elements and participation from the audience will be encouraged.

*submitting as Part I of a two-part series. The other presentation is designed to be a complementary topic but either can serve as standalone presentations (Treatment of Cognitive and Psychological Symptoms in Veterans with MS: A Whole Health Approach Part II. J. Dalrymple & L. Ruiz)

Learning Objectives

- Describe the prevalence of cognitive and psychological symptoms in people with MS.
- Review common comorbidities and their impact on mood and cognition.
- Describe models for assessing cognitive and psychological symptoms in MS.
- Identify VA and community resources for MS care.

(2207) Treatment of Cognitive and Psychological Symptoms in Veterans with MS: A Whole Health Approach Part II

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Abstract Body

Cognitive symptoms and mood disorders like depression and anxiety are up to three times more prevalent among individuals with multiple sclerosis (MS) relative to the general population, yet are often overlooked or undertreated. These symptoms may be the direct result of MS itself, adjustment-related factors, and/or other comorbidities. There are numerous empirically-based mental health approaches for addressing mood and anxiety symptoms. Moreover, recent research has yielded promising findings regarding the efficacy of cognitive rehabilitation in this population. For Veterans and military personnel, who appear to have higher incidence rates of both MS and mental health conditions, early application of Veteran-centric interventions are paramount.

Adequate management and treatment of cognitive and mood symptoms as part of a multidisciplinary, VA Whole Health care model can significantly improve daily functioning, engagement in broader healthcare services, and overall quality of life for individuals with MS. The goal of this presentation is to provide practical guidelines for MS providers regarding the management and treatment of cognitive and psychological symptoms in Veterans with MS. The specific objectives of this presentation are to a) provide a brief overview of factors that contribute to cognitive and psychological symptoms in Veterans with MS; b) discuss the various roles of providers within the MS care team for addressing complex mental health needs; c) provide an overview of psychotherapeutic and cognitive rehabilitation interventions for Veterans with MS, highlighting how to customize approaches in alignment with the VA's Whole Health care model; d) share lessons learned from providing in-person and telehealth treatment services to a diverse Veteran population. Case examples will be discussed to illustrate the above. The presentation will have interactive elements and participation from the audience will be encouraged.

*Submitting as Part II of a two-part series. The other presentation is designed to be a complementary topic but either can serve as standalone presentations (Assessment of Cognitive and Psychological Symptoms in Veterans with MS: A Whole Health Approach Part I. T. Lee-Wilk & M. Dux)

Learning Objectives

- Provide a brief overview of factors that contribute to cognitive and psychological symptoms in Veterans with multiple sclerosis (MS)
- Discuss the various roles of providers within the MS care team for addressing complex mental health needs
- Provide an overview of psychotherapeutic and cognitive rehabilitation interventions for Veterans with MS, highlighting how to customize approaches in alignment with the VA's Whole Health care model
- Share lessons learned from providing in-person and telehealth treatment services to a diverse Veteran population

(2208) Ethical Considerations While Supporting Excellence in End-of-life Care in ALS

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Abstract Body

Abstract

The purpose of this presentation is to address the complexities and challenges experienced by individuals including the interdisciplinary team working with terminally ill patients. Amyotrophic lateral sclerosis (ALS) is not a curable disease, but it is treatable. The style and quality of end-of-life care differs greatly in ALS; the time to introduce end-of-life care is not clear, and decision making is hindered by logistical barriers challenging VA SCI Centers. Initiating end-of-life discussion is often difficult for many physicians and health care providers depending on their own experience and philosophy. The timing of when to introduce end-of-life discussions with patients and their families is also uncertain (1,4,5).

There is a large degree of inter-patient variability which exists in the rate of ALS progression, with some patients dying or requiring respiratory support within months and others having relatively prolonged survival which is challenging VA SCI Centers. Little evidence is available in the published literature that identifies optimal management approaches for caring for the dying patient with ALS (1,2).

Patient autonomy in end-of-life decisions is the accepted Western paradigm. The ethical basis and legal status of most end-of-life decisions to ALS have been established (1,6). Accepting, foregoing, or withdrawing life-sustaining interventions are actions common for ALS patients. The public and medical debate concerning euthanasia and physician-assisted suicide has prominently featured patients with ALS (7,8). Ethical issues in caring for patients with ALS are sensitive. Many physicians are not comfortable addressing end-of-life issues because of the perceived ethical complexity (8).

Goals of this presentation are to: 1) improve end-of-life care for patients with ALS and families centered on setting health care goals (three case studies discuss the issues); 2) increase awareness, interest in the ethical debate on the end-of-life care in ALS.

Methods

A psychologist assigned to the VA ALS care will focus on ethical issues and present three case studies that demonstrate the improvement over 3 years with the Veterans Health Administration development of Setting Health Care Goals and the Goals of Care Conversation Talking Map. Two wives will discuss their experience with end-of-life issues they faced. Research has indicated that an interdisciplinary approach to care in ALS is very important and that it includes: psychosocial evaluation and spiritual care; and the establishment of proactive Family member program.

Results

The ALS health care team learned how to transition toward a type of collaboration in which clinical participants identify a patient-centric set of challenges around setting health care goals and then help provide solutions even when this means working outside their traditional area of discipline-based expertise. Methods are presented for practicing role-release to encourage participation of colleagues from other disciplines in helping to address ALS patient end-of-life care challenges.

Conclusion

Due to a compressed timeline of care, it is imperative to have clinicians, patients and family members preparing for the transition of end of life. Research indicates this type of approach is important to enable a more efficient and effective way to address the end-of-life issues associated with ALS.

Learning Objectives

- Identify the psychosocial impact of providing care to terminally ill patients for health care workers and family members
- Identify ethical end of life issues (Advance Directives-Treatment Withdrawal)
- List the six triggers for initiating discussions about end-of-life issues
- Describe 4 areas in the Goals of Care Conversations developed by the Veterans Health Administration

(2209) Moving from Recommendations to Practice: Bone Health Pearls for Physicians Treating Individuals with SCI

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Abstract Body

Background

Two recent consensus documents regarding bone health, bone density testing, and fracture management after SCI/D were produced to drive changes in clinical practice. These documents included the International Society of Clinical Densitometry (ISCD) Position Statement for Bone Density Testing after SCI (Aug 2019), and the Paralyzed Veterans of America (PVA) guideline for Bone Health and Osteoporosis Management after Spinal Cord Injury (2021).

Purpose

The authors will present a sub-set of the PVA and ISCD recommendations specific to physicians', advance practice nurses' and physician assistants' practice for those who manage bone health among individuals with SCI/D. The overarching aim of this workshop is to assist with clinical decision making and increase practitioner comfort with vexing clinical scenarios related bone health and osteoporosis management.

Methods

International panels of interprofessional content experts were convened to identify and answer key clinical questions relevant to the PVA panel or ISCD task force's mission. Systematic reviews of relevant databases were conducted using search terms appropriate to each database Ovid MEDLINE®, EMBASE, CINAHL, and PsycINFO (from 1980 through June 2019). The search terms used related to bone health (e.g., osteoporosis, fracture, bone mineral density), spinal cord injury (e.g., paraplegia, tetraplegia, spinal cord injury/dysfunction), and the topic of inquiry (e.g., assessment, prevalence, treatment, bone density, fracture etc.). We also searched the Cochrane Database of Systematic Reviews®, Google Scholar, and conducted hand searching of relevant reference lists for additional studies, systematic reviews and guidelines in the area of bone health after SCI/D. Relevant data was abstracted into tables and the literature synthesized by subgroups of each panel. Specific recommendations were drafted, and then tabled for review, discussion and voting by the relevant panel

or task force. The strength of the evidence, and the panel's endorsement of the recommendation(s) were determined by each panel, after which an external review was conducted by content experts. The PVA recommendations considered the weight of the evidence and risk of bias. The panel endorsed recommendations specific to the key questions, for dissemination and practice implementation.

Results

The aforementioned processes yielded 4 ISCD positions and 62 PVA recommendations. Presenters will share relevant recommendations from the PVA Bone Health and Osteoporosis Management Guideline - 6 regarding screening for secondary osteoporosis, 4 fracture risk assessment, 2 osteoporosis diagnostic criteria, 10 drug therapy selection and discontinuation, and 20 related to post-fracture care.

Conclusions

Implications of the recommendations pertaining to day-to-day practice will be discussed. Related implications for educating health professionals and future research will be highlighted.

Learning Objectives

Following this moderated spinal cord injury/disease (SCI/D) workshop attendance, the learner will be able to:

1. Describe the rational and screening process for common secondary causes of osteoporosis.
2. Predict fragility fracture risk and diagnose osteoporosis.
3. Select appropriate drug therapy for prevention and treatment of osteoporosis considering therapy efficacy and duration.
4. Apply principles of post fracture management - including physical and psychosocial impairments.

(2210) Predictors of Lower Extremity Fracture-Related Amputation in Patients with Traumatic Spinal Cord Injury

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Abstract Body

Background

Lower extremity fractures are frequent in chronic SCI and result in substantial morbidity and mortality. Lower extremity amputation is one such complication associated with need for equipment modification, loss of function, and mortality. However, little is known about predictors of these fracture-related amputations.

Purpose

Determine predictors of lower extremity fracture-related amputation in traumatic SCI (tSCI)

Methods

A case-control study of Veterans with tSCI treated in Veterans Health Administration (VHA) facilities between FY2005 and FY2015 was conducted. Fracture-amputation dyads were considered for inclusion if medical coding indicated a lower extremity amputation within 365 days following an incident lower extremity fracture. Electronic health record (eHR) review adjudicated each fracture-amputation dyad, confirming cases. The indication for each amputation was recorded. Each case was matched with one control who had an incident lower extremity fracture and no subsequent lower extremity amputation. Demographic, comorbidity, lifestyle, injury and fracture-related information as well as fracture management and complications data were collected by eHR review for cases and controls.

Descriptive statistics were computed. Matched analyses compared clinical data between cases and controls with Exact McNemar's chi-squared test for binomial variables, exact test of table symmetry for categorical variables, and either a paired two-sided t-test or Wilcoxon signed-rank test for continuous variables, as appropriate. Multivariate conditional logistic regression with specified clustered standard errors for individuals contributing multiple fractures was used to determine the association between age, race, motor-complete SCI, diabetes, peripheral vascular disease (PVD), smoking, primary management (non-amputation surgery within 30 days versus non-surgical), and a composite variable of pressure injury and/or infection and the development of lower extremity amputation following fracture.

Results

Forty-four cases from thirty-seven Veterans and forty-four unique controls were identified. The most common indications for amputation were osteomyelitis (36.4%), elective for improved quality of life (29.6%) and pressure injury (18.2%). Cases had longer duration of SCI (28.1+/-14.1 versus 22.9+/-11.5 years; p=.046) and higher incidence of PVD (47.7% versus 4.6%; p<.01), hospital admission (73.2% versus 47.6%; p=.02), fracture nonunion (50.0% versus 20.9%; p=.02), osteomyelitis (47.7% versus 6.8%; p<.01), and pressure injury and/or infection (77.3% versus 54.6%; p=.04). In multivariate conditional logistic regression, diabetes (OR=27.0; 95% CI 2.1-354.9), PVD (OR=37.4; 95% CI 2.8-499.9), and non-surgical management (OR=147.2; 95% CI 5.4-4033.2) were predictors of lower extremity fracture-related amputation.

Conclusions

Early and aggressive strategies to prevent diabetes and PVD in tSCI are needed, as these comorbidities are associated with increased odds of amputation following lower extremity fracture. The strongest predictor of amputation in our study is non-surgical management of the incident fracture, increasing odds of amputation at least five-fold. Corroborative future studies are needed. Physicians and patients should consider the potential increased risk of amputation associated with non-operative management of lower extremity fractures in shared decision-making.

Learning Objectives

- Examine indications for amputation following lower extremity fracture in traumatic spinal cord injury
- Describe demographic, comorbidity, lifestyle, injury and fracture-related characteristics of lower extremity fractures by amputation status
- Identify predictors of amputation following these lower extremity fractures
- Determine the relationship of initial lower extremity fracture management (surgical versus non-surgical) with subsequent amputation

(2211) Toward Preventive Strategies for Inadvertent Lower Extremity Injuries During Wheelchair Use by Veterans with SCI.

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Abstract Body

Background & Veteran Experience

Wheelchairs (WC) provide independence and better quality of life for Veterans with spinal cord injuries (SCI), but can be dangerous for those who cannot detect or correct lower limb (LL) position. Inadvertent displacement of the lower extremities (ILED) from the footplates can result in abrasions, fractures or pressure injuries. Injury incidence

during WC use has been poorly characterized and masked by deficiencies in medical reporting systems, limiting the ability to make well-founded design and policy decisions. This workshop will describe what we know about ILED-related injuries, including types of injury, etiology, prevalence, barriers to reporting, and prevention.

Purpose

Describe injuries caused by ILED, their impact on Veterans with SCI, prevalence in Veterans with SCI; nationwide reporting of such injuries, and how WC design and safety interventions may prevent them.

Design

Retrospective Chart Review and systematic FDA MAUDE database review

Methods:

1. The charts of Veterans in our SCI Center registry using wheelchairs for mobility were reviewed and data extracted on demographics, SCI, and WC data. Chart reviews were completed to identify documented or suspected ILED-related injuries and how they occurred. Deidentified data was managed using REDCap data-capturing software. Descriptive data analyses were performed using Excel.
2. The FDA MAUDE database was systematically reviewed for reports related to injuries from ILED on the footplate were analyzed for injury type, mechanism, and attributed cause.

Results

In 229 Veterans, 20 ILED-related injuries (10%) and 14 suspected injuries (8%) were identified. 90% occurred during PWC use at home indoors. ILED mechanism was contact with an object or person (35%), catching on an object (25%), or unknown (35%). Injury mechanism was foot catching on obstacles (35%), ramming into objects (35%), dragging on ground (5%), being run over (5%), pressure (5%), and unknown (15%). Sample characteristics: 94% male, age 26-93 years, and time since injury from 0.75 to 53 years, 51% paraplegia (51%), and AIS Level A(32%), B (9%), C (12%), D (25%) and MS/AL (18.5%). Most injuries were fractures (55%), followed by abrasions (25%), Contusions (30%), and Pressure Injuries (5%).

In a systematic review of the FDA MAUDE Data base, 29/1075 wheelchair-related injuries were ILED-related. Most reports were by the manufacturer and most common injuries were single fractures, multiple fractures, wounds/cuts/infections, and amputations. The most common mechanism was the foot slipping off the footplate during wheelchair mobility. Manufacturer reports often attributed the injuries to user error.

Conclusions

ILED-related injuries are occurring commonly in the Veteran population studied and further assistive technology solutions and studies of mechanisms of injury are warranted. ILED-related LE injuries and secondary complications come at a high cost to the person with SCI and the healthcare system. Prevalence is was 10-18% in our retrospective chart review. Mechanisms by which people with SCI sustain lower extremity injuries should be analyzed to determine if they are preventable. Wheelchair and adaptive equipment design implementing passive and active safety interventions may help WC users with SCI detect their foot position and avoid obstacles in their paths.

Learning Objectives

- Describe causes of inadvertent lower limb displacements that occur during WC use.
- Describe 3 different patterns of ILED-related injuries identified during wheelchair use.
- Define prevalence of ILED-related lower extremity injuries in a population of Veterans with SCI.
- Discuss how reporting of ILED-related injuries can promote payment for ILED-avoidance supplemental assistive technology.
- Discuss how passive and active safety interventions might help prevent ILED-related injuries during wheelchair use.

(2212) Fall Management Among Wheelchair Users Living with Multiple Sclerosis: Current Research and Practice Strategies

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Abstract Body

Introduction:

Falls are a concern for full time wheelchair and scooter users living with Multiple Sclerosis (MS). Approximately 75% of the population reports at least one fall over a 12 month period[1] associated with common actions such as transferring, reaching, and walking short distances.[2] Approximately 50% of the population has sustained a physical injury as a result of a fall1 and 83% report concerns about falling.[2]

State of the Research:

Few evidenced-based fall prevention programs for wheelchair and scooter users living with MS exist.[3] Rice, et al[4] examined the impact of a single session intervention among 16 wheelchair users living with MS. After completion of the intervention, fall incidence significantly decreased ($p < 0.001$, $dz = 0.26$).

To further target outcomes such as fear of falling and community participation, our team is currently implementing a multi-site trial to evaluate a multifactorial fall prevention program designed for wheelchair and scooter users living with MS. The program aims to reduce fear of falling, fall incidence and improve quality of life and community participation through comprehensive fall management education.[5]

Preliminary data (n =20) shows promise. After exposure to the study intervention, a significant decrease was seen among reports of fear of falling ($p = 0.013$). Significant improvements were also seen related to control over community participation, ($p = 0.002$) and engagement in important activities ($p = 0.02$). Transfer quality also significantly improved ($p = 0.019$). Finally, fall management knowledge significant improved, as measured by the fall prevention and management questionnaire, ($p = 0.006$) and the fall management scale, ($p = 0.042$).

Components of the Program

Program content is informed by factors found to be associated with falls among wheelchair users[6,7] and covers topics including: wheelchair/scooter skills, transfer activities, exercises to improve seated balance, management of environmental factors and symptoms, post fall management, and use and maintenance of assistive technology. A physical or occupational therapist delivers the program, comprised of six, two-hour, weekly sessions with to 2-5 participants. Multiple education strategies are utilized including: didactic presentations utilizing video and pictures to maximize modeling,

action planning, handouts informed by health literacy guidelines, interactive group discussions and practice opportunities.[8-10] Participants also set weekly goals and reflect on the education through journaling.

Session Description

Using our past and ongoing research as a foundation,[4,5,11] this workshop will enhance participants' ability to educate full-time wheelchair and scooter users living with MS about fall prevention/management strategies. The workshop builds participants' interprofessional collaboration skills and ability to apply workshop content in practice through a 3-part session.

Part 1 includes PowerPoint-supported descriptions of fall epidemiology, priority fall prevention/management topics, resources, and evidence-based educational strategies for full-time wheelchair and scooter users. Materials will be drawn from evidenced-based resources and lessoned learned from research and clinical experiences. In Part 2, participants draw from Part 1 content to describe client-centered educational strategies (e.g., modeling, goal setting) for a case subject. In part 3, findings from Part 2 will be presented and barriers and facilitators to effective fall management education will be discussed as a group.

Learning Objectives

- Describe the current research related to fall management among full time wheelchair and scooter users living with MS.
- Describe strategies to educate full-time wheelchair and scooter users living with MS users about fall management strategies
- Identify challenges associated with the delivery of fall management education for full-time wheelchair and scooter users living with SCI or MS in clinical settings
- Describe strategies to address challenges associated with implementation of fall management education.

(2213) Fatigue in ALS: Ask, Assess, and Address

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Abstract Body

Fatigue is the most prevalent secondary symptom in ALS and is also the most suboptimally managed as evidenced by patient surveys (Nicholson, 2017). When left untreated, fatigue can compromise function, interfere with daily activities, and can decrease quality of life for the person with ALS

This session will afford the participant a better understanding of the causes of fatigue in ALS, tools to routinely assess fatigue in the clinic, and interdisciplinary tools to address these symptoms. By the conclusion of the session, participants will be armed with tools to ask, assess, and address fatigue in their clinics in order to make an immediate and meaningful impact on symptom management and quality of life for Veterans with ALS and their families.

A brief overview on the biology of fatigue in ALS will be presented. Readily available tools to quantify fatigue in ALS, both as stand-alone tools or parts of comprehensive routine functional outcome measures will be presented. Non-pharmacologic interventions as well as options for medication management will be reviewed. Limitation of the current literature on fatigue management will be presented as well as opportunities for future work in the field.

By following the three A's of ask, assess, and address related to fatigue management, all ALS interdisciplinary team members can improve their clinical effectiveness and support of this patient population.

Reference

- Nicholson K, Murphy A, McDonnell E, Shapiro J, Simpson E, Glass J, Mitsumoto H, Forshew D, Miller R, Atassi N. Improving symptom management for people with amyotrophic lateral sclerosis. Muscle & nerve. 2017 May.

Learning Objectives

- Explain the likely mechanisms for fatigue in ALS.
- Describe two tools that can be used to quantify fatigue for persons with ALS.
- Explain non-pharmacologic interventions for fatigue in ALS
- Describe the evidence for medication management of fatigue in ALS

(2214) Creating a Confident ALS Caregiver: Promising Outcomes of a Hands-on Training

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Abstract Body

Background

Caregivers of Persons with Amyotrophic Lateral Sclerosis (PALS) play a pivotal role in supporting their loved ones through disease progression. Though critical, this role is physically, mentally, and emotionally taxing. Caregiver psycho-social distress stems from feeling technically underprepared, overwhelmed by the time commitment, and helpless as the disease progresses. Thus, a critical component of providing holistic care to PALS involves caregiver support and empowerment. Despite this recognized need, there is a paucity of in-person caregiver training, with one of many potential barriers being the lack of a caregiver alternate during training time.

Purpose

To evaluate the self-perceived efficacy of a seminar for caregivers of PALS.

Methods

A prospective, quality-improvement, mixed-method study was conducted to evaluate the caregiver experience with a seminar offered by our institution in May 2019. The seminar included educational, hands-on training by clinical specialists as well as whole-health activities to promote caregiver self-care. To minimize barriers to participation, recreational activities for the PALS were concomitantly offered.

Satisfaction surveys were administered to the caregivers at seminar completion. Each consisted of 10 questions (Likert Scales), on topics including: engagement with activities offered, quality of training, and perceived future preparedness.

Zarit Burden Interviews (ZBI) were administered longitudinally (prior to and 6 months following the seminar) to the caregivers participating in the seminar and to a control group (equal size to the study cohort and not participating in the seminar). The ZBI measures caregiver burden (higher score indicates greater burden).

Semi-structured, phone interviews were conducted 6-months following the seminar. A trained interviewer elicited free-form responses from the caregivers on the impact of the seminar and recommendations for future seminars. Thematic analysis of the semi-structured interviews was conducted.

Results

A total of 14 caregivers of 10 PALS participated in the seminar. The mean (range) ALS Functional Rating Score for the 10 PALS was 26.3 (17-36) at baseline and 18.6 (12-35) 6 months post-seminar. Eight PALS were veterans, and eight elected to participate in the concomitantly offered activities.

For all questions in the satisfaction survey, the median caregiver response was “Strongly agree”. For the caregivers who participated in the seminar, average (range) ZBI Score increase from baseline to 6 months post-seminar was 5.2 (1-9). In contrast, the average (range) ZBI Score increase for the control group was 9.5 (8-11).

Thematic semi-structured interview analysis revealed that the seminar: provided an environment conducive to learning, had a strong psychosocial-emotional impact, and instilled a sense of empowerment and preparedness. Recommendations included addressing needs related to external support and increasing opportunities for exchanging personal experiences.

Conclusion

A one-day seminar for caregivers of PALS resulted in improved perceived preparedness for caregiving. The caregivers’ sense of empowerment persisted 6 months after the seminar, despite the clinical deterioration of their PALS over that time, resulting in minimally increased burden when compared to caregivers not participating in the seminar.

The findings of this analysis represent the initial phases of an ongoing effort to identify and improve methods for empowering and improving the quality of life of caregivers of PALS.

Learning Objectives

- describe the challenges caregivers of ALS persons face
- define what a hands-on training for caregivers of ALS persons is
- discuss the benefit of providing hands-on training for caregiver of ALS persons
- List at least 2 self-care modalities for caregivers

(2215) Moving from Recommendations to Practice: Spinal Cord Injury Bone Health Pearls for Therapists

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Abstract Body

Background

Following spinal cord injury (SCI), common therapy interventions include: neuromuscular electric stimulation (NMES), functional electrical stimulation (FES), passive standing, walking, and general physical exercise to improve function. These interventions may influence bone mineral density (BMD) and/or fracture risk.

Purpose

Physical and occupational therapists treating individuals with SCI at risk of developing low bone mass or with established low BMD and elevated fracture risk will review and discuss a subset of the PVA Bone Health and Osteoporosis Management Guideline recommendations.

Methods

A systematic review using Ovid MEDLINE®, EMBASE, CINAHL and PsycINFO (1980-2019) of search terms related to bone health (e.g., osteoporosis, fracture, BMD), SCI and the topic of inquiry (e.g., assessment, prevalence, treatment). The Cochrane Database of Systematic Reviews® and Google Scholar were searched to identify rehabilitation intervention studies that measured BMD as an outcome. Titles/abstracts and then full-text articles were screened based on inclusion/exclusion criteria. To be included, studies required at least 3 participants. Risk of bias was assessed using the modified GRADE (2018). Data extracted included participant characteristics; intervention type and parameters (frequency, duration, etc.); control interventions; bone outcomes assessed and methods used; and study results. Studies were grouped based on prevention (<2 years post SCI) or treatment (≥2 years post SCI) of BMD decline and intervention. Evidence quality and expert opinion were used to develop recommendations. Recommendation strength was determined using the modified GRADE.

Results

Thirty-six studies involving standing, walking, cycling, rowing, general physical exercise/activity-based training, NMES, and FES alone or in combination were selected for evaluation. There is low to very low level evidence that NMES and FES can prevent BMD decline, respectively. For treatment, there is very low to moderate level evidence that NMES and FES can increase BMD, respectively. For NMES/FES, it is important to achieve a muscle contraction using appropriate stimulation parameters and provide 30 minutes of intervention, 3-5 days/week for ≥12 months. To date, research evidence does not support standing, walking, treadmill training, or general physical exercise/activity-based training for preventing or treating BMD loss. The consensus opinion of experts was used to guide principles of post-fracture management.

Conclusions

Stronger evidence exists for FES/NMES than for interventions involving standing, walking, general physical exercise/activity-based training for preventing BMD loss or increasing BMD. Effective NMES/FES interventions require appropriate stimulation parameters and training strategies. At least 12 months of FES/NMES are needed to detect lower extremity BMD change. To date, there is insufficient evidence to promote use of standing, walking, general physical exercise/activity-based therapies for influencing BMD. Research to generate higher quality evidence and determine optimal dosing for NMES and FES to prevent or treat BMD loss is needed. Screening for fracture risk is imperative prior to implementing therapy. There are no T-score or BMD values which are absolute contraindications to the aforementioned interventions. Caution during therapy that requires loading or torsion of the lower extremities is recommended. Increased therapist knowledge regarding therapy interventions to target bone health will improve patient outcomes.

Learning Objectives

- Identify therapy options that may prevent or treat low bone mineral density (BMD) after SCI.
- Assess fracture risk prior to prescribing therapy interventions.
- Differentiate effective neuromuscular electrical stimulation and functional electrical stimulation parameters, from parameters with limited or no effect on BMD.
- Describe therapy recommendations for post-fracture care and return to pre-fracture activity level.

(2216) The Highs and Lows of Blood Pressure Following Spinal Cord Injury: Bench to Bedside Investigations

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Abstract Body

Background

Spinal cord injury (SCI) disrupts the cardiovascular control leading to life-threatening impairments in blood pressure (BP) regulation. The majority of individuals with an SCI above T6 not only suffer from chronic resting hypotension but also from episodes of orthostatic hypotension, a condition where systolic BP can drop below 50mmHg, in response to a postural change. The same individuals are also at high risk of cerebral hemorrhage, seizures and even death as the systolic BP can abruptly rise up to 300 mmHg in response to daily stimuli (e.g. full bladder), termed as autonomic dysreflexia.

Purpose

To discuss PVA's revised Clinical Practice Guidelines for evaluation and management of abnormal BP. And, to test spinal cord stimulation as a proof-of-principle approach for autonomic dysreflexia in an animal model and demonstrate its therapeutic potential in individuals with SCI.

Methods

Pre-clinical: male Wistar rats received a T3 spinal transection and were implanted with a wireless BP telemeter 8-weeks later. Transcutaneous stimulation (TCS) was delivered at T6/7 spinal levels. Beat-by-beat BP and heart rate were recorded at rest as well as during autonomic dysreflexia induced by colorectal distension.

Clinical case 1: a man with chronic SCI (C4 AIS A) received digital anorectal stimulation (DARS) to trigger autonomic dysreflexia in a controlled manner. TCS (30Hz, 2ms pulses) was applied at T6/7 and T12-L1 levels either prior to, and during DARS.

Clinical case 2: a man with Chronic SCI (C5 AIS B), implanted with 16-electrode array (Medtronic) at T11-L1 vertebral levels. Systemic BP, cardiac function (echocardiography) and cerebral blood flow were assessed in supine position and then in response to 60° head-up tilt, with and without epidural stimulation.

Results

Pre-clinical: colorectal distension induced severe autonomic dysreflexia (55 ± 16mmHg rise in systolic BP). However, autonomic dysreflexia was prevented (13 ± 21mmHg rise in systolic BP) if TCS was turned on prior to colorectal distension. Interestingly, elevated BP during the colorectal distension was ameliorated when TCS was initiated during the autonomic dysreflexia episode.

Clinical case 1: DARS resulted in autonomic dysreflexia (27mmHg rise in systolic BP). However, autonomic dysreflexia was prevented when TCS was applied at T6/7 and T12-L1 levels (4.5 and 5.8 mmHg rise in systolic BP respectively). Similarly, TCS applied during an already triggered episode of autonomic dysreflexia mitigated its severity (18mmHg vs 5mmHg).

Clinical case 2: stimulation resolved the orthostatic hypotension and prevented the orthostasis-induced 30% decrease in middle cerebral artery blood flow, improved neurovascular coupling, and resolved orthostatic-induced symptoms. The stimulation also prevented the reduction in cardiac filling during tilt.

Conclusions

Neuroprosthetics present a promising approach for management of BP extremes in individuals with SCI. Mechanistic pre-clinical studies will enhance our understanding of long-term structural and functional changes in neural networks, which will support wider clinical deployment of this promising therapy.

Funding

Rick Hansen Foundation, Canada Foundation for Innovation, International Spinal Research Trust, Praxis Spinal Cord Institute, Craig H. Neilsen Foundation, Canadian Institutes of Health Research, Michael Smith Foundation for Health Research, and Bluma Tischler Postdoctoral Fellowship.

Learning Objectives

- Identify two extreme BP conditions in individuals with SCI.
- Correlate clinical relevance of animal models for treatment of human SCI condition.
- Describe two distinct modes (invasive and noninvasive) of spinal cord stimulation for cardiovascular recovery.
- Discuss PVA's revised Clinical Practice Guidelines for evaluation and management of abnormal BP.

(2217) Tools to Identify Individualized Risk of Unintentional Injuries for People with Spinal Cord Injury.

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Abstract Body

Background

Unintentional injuries are prevalent among people with spinal cord injury (SCI) due to the changes in sensation and motor function, and a pattern of high risk behaviors that include frequent use of prescription medications. We identified risk of unintentional injuries due to falls and those due to events other than falls, finding important differences in risk (Cao et al., 2019). Participants who were ambulatory and relied on another

for assistance were at substantially higher risk of fall related injuries, whereas those who were nonambulatory were at higher risk for non-fall related injuries. Both types of unintentional injuries were highly related to binge drinking, use of multiple prescription medications to treat pain and other SCI related conditions, and to use of medications for a purpose other than what they were intended. Our purpose is to describe the development of individualized risk calculators for fall-related and non-fall related unintentional injuries and to describe the use of these tools in clinical settings.

Design

Risk calculators for unintentional injuries due to falls and those not due to falls were developed based on predictive equations from a study of 4,670 participants. The risk factors utilized included demographic, injury, and modifiable behavioral factors. The calculators generate individualized estimates of the probability of type of unintentional injury within the next 12 months based on individual's characteristics and behaviors, along with the relative probability of unintentional injury compared to others with SCI.

Results

Use of the individualized calculators demonstrates the dramatic difference in risk based on modifiable behaviors. Modifiable risk behaviors include use of prescription medications to treat conditions other than those prescribed, illicit drug use, and the frequency of episodes of heavy drinking as defined by five or more drinks per occasion. Use of prescription medication to treat pain and depression/anxiety are additional risk factors, but risk may relate to the condition and/or the medication. The tools calculate changes in the probability of each type of unintentional injury, based on individualized responses.

Conclusions

The risk of unintentional injuries vary dramatically based on individual characteristics, including ambulatory status, and to a number of modifiable behaviors. The calculators were developed to provide individualized feedback on risk to individuals with SCI for self-management and more detailed feedback to clinicians and investigators. The tools may be particularly useful for clinicians to help the individual see how their behaviors and use the potential misuse of medications affect their risks of unintentional injuries. This will help service providers to make important decisions regarding challenging activities, such as wheelchair transfers, where high risk patterns of behaviors may inform the optimal level of independence.

Reference:

Cao, Y., DiPiro,N., Li, C., Roesler, J., & Krause, J.S. (2019). Behavioral factors and unintentional injuries after spinal cord injury. Archives of Physical Medicine and Rehabilitation. ePub ahead of print. doi: 10.1016

Learning Objectives

- Describe how injury severity and ambulatory status relate to differential risk of unintentional injuries due to falls and those due to all types of unintentional injury.
- Identify three modifiable behaviors related to an elevated risk of unintentional injuries.
- Identify where to find out how to use individualized calculators of risk of unintentional injuries.

(2218) Interdisciplinary Team Approach and Adapted Tai Chi Shadow Boxing Group Enhances Preventative Care Via Telemedicine

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Abstract Body

Background and Issues

Telemedicine is both feasible and accessible. Studies suggest that wellness programs such as Tai Chi decrease risk for falls and promote healthy living. Due to the COVID-19 pandemic, all outpatient skilled physical therapy groups were transitioned to telemedicine in order to minimize the risk/spread of infection to both patients and staff. We began this novel telemedicine approach including our adaptive sport program that incorporates mindfulness with Adaptive Tai Chi, Shadow boxing and plyometric exercise and our interdisciplinary team which has had a positive impact.

Purpose

The purpose of this study is to determine efficacy and feasibility of a whole health approach involving Adaptive Tai Chi and Shadow boxing and our interdisciplinary team (IDT). Which resulted in enhancing preventative care, overall wellness and a decrease in unnecessary hospital visits in patients with spinal cord injury/disorders (SCI/D) or Multiple Sclerosis (MS). Overall goal is to continue practicing with this novel telemedicine approach provide our community a structured platform educate and teach all end users how to implement program using adapted sports and the interdisciplinary team together for best practice.

Methods

25 veterans (Age: _37-78_ 4 Females and 21 males) Diagnosis of SCI/D and MS (SCI: 18 MS:7) Selection process: Single facility convenience sample. Inclusion criteria: Outpatient veterans of the Miami VA hospital, enrolled in our Spinal Cord System of care. Veterans who have completed a Physical or Occupational therapy evaluation to assess functional mobility baseline via virtual platform. Exclusion criteria: Inpatient veterans, veterans that are not enrolled Spinal Cord System of Care. Veterans that are not cleared by therapist or who are not medically stable. All 25+ participants attend biweekly groups of 4-8 participants. Each intervention begins with individual screening which include: COVID-19 questions/general and red/yellow flag questions and vital signs. If cleared, we begin session. If not cleared, proper screening completed for appropriate referral to IDT and immediate alert is sent for emergent issues. Setting of group conducted via virtual platform.

Results

There is a correlation between veterans participating in this novel telemedicine practice with decreasing unnecessary visits at the hospital, enhancing preventative care by using readily available interdisciplinary team via proper screening and quick appropriate referral. This decreased the footprint in the hospital during the pandemic. Novel telemedicine practice has shown no changes in functional mobility baseline, however, despite significant increase in enrollment, ER visits decreased by 70%, and the Global Rating of Change (GRC) score suggests a 100% positive response towards novel telemedicine program.

Conclusions

This novel telemedicine practice directly benefits veteran's general health and mental health via group exercise, preventative care and if required interdisciplinary approach for further evaluation should be considered best practice at this time. This increases safety and decreases hospital footprint during the COVID-19 pandemic Finding the best form of communication via telemedicine can be a challenge and may differ from veteran to veteran specially for the veterans that are not technologically savvy. Further research should be done.

Learning Objectives

- Identify your interdisciplinary members that will be appropriate for this novel telemedicine approach
- Discuss the benefits of virtual groups
- Select appropriate adapted sport to integrate virtually
- List the 4 tools required to begin your own group sessions virtually
- Identify and select appropriate participates to group

(2219) The Role and Evidence for Antioxidant Therapy in the Treatment of Multiple Sclerosis

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Abstract Body

Background

Oxidative stress is increasingly recognized as an important pathophysiology in multiple sclerosis (MS) with important interplay between mitochondria, immune cells, and neurodegeneration affecting all subtypes and stages of multiple sclerosis. Understanding oxidative stress opens the opportunity for therapeutic development of antioxidant strategies to treat MS.

Purpose

To increase understanding of the role of oxidative stress in MS pathophysiology and identify strategies including diet, exercise, and oral therapies that would target oxidative stress therapeutically. In addition to review current evidence for antioxidant strategies in MS focusing on lipoic acid and emerging antioxidants under study in other related neurological and spinal cord injury disorders.

Methods

Platform presentation to review the current literature addressing the purpose as outlined above. Evidence of oxidative stress pathophysiology of MS will be reviewed and the variety of strategies to target oxidative stress with regard to the issues of blood brain barrier penetration will be reviewed. Published study results using lipoic acid in preclinical models of MS (experimental autoimmune encephalomyelitis, EAE) and MS clinical trials will be presented in more detail. Emerging data using the botanical antioxidant, Centella asiatica, in aging and dementia models and in EAE will be shared. An interactive presentation format and opportunity for questions will encourage participation.

Results

The learning objectives will be met through the presentation and question and answer session.

Conclusions

Antioxidant strategies may address oxidative stress in multiple sclerosis and become an important adjunct MS therapy. Development of antioxidant therapies may benefit from advances in other conditions that share oxidative stress pathophysiology.

Learning Objectives

- The learner will demonstrate understanding of the role of oxidative stress in the pathophysiology of multiple sclerosis
- The learner will explain the variety of antioxidant approaches that could address multiple sclerosis pathophysiology
- The learner will describe the evidence of studies of the antioxidant supplement lipoic acid in the treatment of multiple sclerosis
- The learner will identify emerging antioxidants in other disciplines that may translate into useful treatments for MS.

(2220) Patient Initiated Interagency Collaboration: A Shared Approach to Improving Care for Veterans with ALS

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Abstract Body

Background and Issues

Although the etiology is currently unknown, veterans are twice as likely to die from amyotrophic lateral sclerosis (ALS) than the overall population. Given this disparity, veterans with ALS collaborated with the nonprofit, I AM ALS, to create the I AM ALS Veterans Team. The I AM ALS Veterans Team aims to identify veterans' needs and ALS care gaps, connect them with resources, and improve the quality of care they receive. The Veterans Affairs (VA) ALS Executive Team establishes guidelines and expectations for VA ALS care. For this project, the I AM ALS Veterans Team is collaborating with the Veterans Affairs ALS Executive Team to create policies that address the needs of veterans.

Purpose

The purpose of this project was to understand the needs and care gaps involved with VA ALS care, address veterans' needs, and streamline and standardize care more appropriately across clinical locations.

Methods

The I AM ALS Veterans Team advocated for a patient-centered interagency collaboration model whereby distinct roles were set to achieve our objectives. The I AM ALS Veterans Team designed and disseminated a qualitative gap analysis survey, which consisted of 14 items, to understand patient needs and potential gaps in care. Convenience and snowball sampling methods were used to recruit respondents by email, social media, and word of mouth. Using Microsoft Excel, manual qualitative data analysis was performed to assign comments to categories. Content analysis was performed to quantify the categories. The VA ALS Executive Team, in collaboration with the I AM ALS Veterans Team, will use the data from the gap analysis to inform future policies and procedures and improve VA ALS care.

Results

Fifty-one veterans with ALS and caregivers across 37 locations responded to the gap analysis survey. Of the responses, 45.1% of the participants indicated negative experiences, 39.2% were positive, and 15.7% were average. The qualitative data analysis revealed 15 response categories. The categories most often discussed in the respondents' comments included customer service (n = 22), equipment (n = 14), provider competency (n = 11), prosthetics/PT/OT (n = 8), and respite/caregiver support (n = 7). Regarding home and residential care preferences, 35 of the respondents indicated that having homecare with noninvasive ventilation was very important to them; 30 indicated that having homecare with invasive ventilation was

very important to them; 20 indicated that having residential care with noninvasive ventilation was very important to them, and 19 indicated that having residential care with invasive ventilation was very important to them.

Conclusions

The I AM ALS Veterans Team will report the survey feedback to the VA ALS Executive Team to ensure veterans' needs are being heard and addressed. This proposed interagency collaboration model proves useful for veterans with ALS and the VA ALS Executive Team. Veterans will receive better care, and the burden of ascertaining veterans' needs is shared, thereby maximizing impact and resources. The model's broader implications include improving policies and procedures and ameliorating veterans' perceptions about VA care.

Learning Objectives

- List the patient-led teams within the I AM ALS nonprofit framework
- Describe the mission and goals of the I AM ALS Veterans Team
- Describe the purpose and objectives of the VA ALS Executive Team
- Explain what the proposed interagency collaboration project is and why it is needed
- Discern the needs of veterans with ALS based on the gap analysis survey results

(2221) Psychosocial and Health Outcomes Related to Resilience and Depression Among Veterans with Amyotrophic Lateral Sclerosis

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Abstract Body

Individuals with amyotrophic lateral sclerosis (ALS) experience a variety of adverse psychosocial outcomes, like depression. Depression has also been associated with diminished quality of life(QOL), greater distress and premature mortality, indicating an apparent need for research focused on clarifying factors that might buffer against these adverse effects within this clinical population.One way to improve QOL is to manage emotional distress.

Accordingly, we sought to clarify how experiences of resilience might interact with experiences of depression and distress in a sample of Veterans with ALS. We hypothesized most participants would exhibit a pattern of both high resilience and low depression. We also hypothesized high resilience and low depression would be associated with superior health outcomes and less distress.

Objective: To identify patterns of resilience and depression among Veterans with ALS and clarify how those patterns correspond with salient health and psychosocial outcomes.

Design

Cross-sectional study of data collected during routine care at a VA hospital.

Participants: 265 participants: White (91.32%), married (81.51%), men (97.25%). Age of initial ALS diagnosis, ranging from 23 to 89 years of age (M = 64.82 years old, SD = 11.12 years), time since initial ALS diagnosis (M = 1.52 years, SD = 2.72 years; range: 0 to 29.82 years). Nearly two-thirds of participants (62.26%) died over the course of this study, with an average elapsed time between initial diagnosis and mortality of 2.71 years (SD = 2.39 years; range: 0.25-14.43 years).

Main Outcome Measures: PHQ-9, Connor-Davidson Resilience Scale, Distress Thermometer, Satisfaction with Life Scale

Results

Results of two-step cluster analysis, comprised of a "high resilience, low depression" (HRLD) cluster and "low resilience, high depression cluster (LRHD). Majority were classified as belonging to the HRLD cluster (183; 69.06%), while the remaining 82 participants were classified as belonging to the LRHD cluster (30.94%).

There were no significant differences in ALS phenotype ($\chi2[3] = 1.56$, $p > .05$), race ($\chi2[1] = 1.18$, $p > .05$), marital status ($\chi2[1] = 0.08$, $p > .05$), mortality ($\chi2[1] = 0.08$, $p > .05$), or time since diagnosis ($F[1] = 2.90$, $p > .05$) across clusters. Results of logistic regression indicated younger age at initial ALS diagnosis was significantly associated with a higher likelihood of being a member of the LRHD cluster ($\chi2[1] = 7.58$, OR = .97, $p < .01$). Members of the HRLD cluster reported significantly higher life satisfaction ($F[1] = 28.14$, $p < .001$) and lower levels of distress ($F[1] = 33.39$, $p < .001$).

Conclusion

These findings underscore adverse impact of depression and distress among individuals with ALS and the potential role of resilience in mitigating these effects. Our data also indicate that incidence of depression after ALS diagnosis may be lower among Veterans than the general population, due to relatively high levels of baseline resilience. Further prospective research is needed to investigate the mechanisms underlying emotional distress, particularly modifiable psychological factors. This will help to guide the development of evidence-based, ALS-specific psychological interventions designed to reduce emotional distress.

Learning Objectives

- Identify how to empirically discern patterns of various psychosocial constructs (i.e., two-step cluster analysis)
- Learn how those patterns of depression and resiliency may correlate with other salient health and psychosocial outcomes
- List the differences of the ALS phenotypes
- Discuss possible treatment plans for The ALS patient and family member to help lower their distress

(2222) What's in Our Wallet? Managing Pharmacotherapy in the New Frontier

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Abstract Body

Background

The cost of prescription medications places a significant burden on patients, third party payers and healthcare systems. The United States spends more than any other country on medications. Prices for drugs were consistently higher than in European markets. Strategies to lessen the expenditures for prescription drugs include; price controls, negotiated pricing and use of generic medications when available.

Methods

There are multiple medications utilized in conditions such as Multiple Sclerosis, Parkinson's Disease, and Spinal Cord Injury. The VHA's formulary management process provides pharmaceuticals and supplies of the highest quality and best value, while ensuring the portability and standardization of its pharmacy benefit to all eligible Veterans. The VA administered an outpatient drug budget of $5.8 billion in FY2020. This was composed of 150 million prescriptions for 5.1 million unique patients.

Current cost minimization strategies include, limited agents on formularies, tier systems to incentivize patients/prescribers to select the lowest priced agents on the formulary, negotiating arrangements with manufacturers to freeze prices or provide discounts, requiring prior authorization for initiating or switching therapy. The use of generic medications and interchange to these agents from a brand name formulation can help reduce expense. In FY2017 the VA realized a cost saving of $2.5 million because of generic standardization contracts.

When a drug company introduces a new drug, they have an exclusive patent on it. Once drug patents expire, pharmaceutical companies can copy that branded drug, and sell it for significantly less as a generic. The Hatch-Waxman Act of 1984 allowed drug companies to produce generics of off-patent drugs. The FDA enacted standards which employ analytical methods to prove that generics are chemically identical to the original branded drug. Drug research has been faced paced and soon, biologic products such as monoclonal antibodies gained momentum and significantly impacted therapy. In 2010, The Biologicals Price Competition and Innovation Act was created to modify regulation allowing for lower-priced alternatives for biologic agents. Its intent was to open competition among pricey innovator biologics, defining new pathways for development and approval of alternative near-copies, or biosimilars, of reference biological drugs.

Discussion

The therapeutic decision-making process is based on several factors including a person's current disease course, lifestyle and the medication's expected benefits and side effects. It is imperative that the VHA formulary be managed judiciously and the necessary measures be in place for VHA practitioners to enable effective, safe and value-based care to the Veteran population.

(2223) Healthcare for Individuals who Identify as Sexual or Gender Minorities Living with Spinal Cord Injury

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Abstract Body

Background

Information on the healthcare needs and experiences of persons with spinal cord injury and disorders (SCI/D) who identify as lesbian,

gay, bisexual, transgender, queer, or other related identities (LGBTQ+) is lacking in the medical literature. While persons without disabilities who identify as LGBTQ+ face numerous challenges related to their health needs, these are expected to be further complicated for LGBTQ+ individuals with SCI/D due to additional considerations such as bowel and bladder care, sexuality, fertility issues, and psychosocial adjustment. Further, health care providers often lack experience in dealing with the clinical, mental health, and sociocultural issues related to LGBTQ+ identity, especially in the context of delivering SCI/D care.

Purpose

The overall objective of this session is to provide evidence on the mental and physical health needs of individuals with SCI/D within the context of their sexual or gender minority identity as well as educate providers on practical approaches for better engagement with these patients in the clinical setting.

Methods

Our presentation will include (i) a case study of a transgender woman Veteran with SCI and her utilization of inpatient and outpatient services, (ii) findings of a qualitative study on experiences of LGBTQ+ individuals who live with SCI/D, and (iii) a training session designed to increase awareness and improve comfort for SCI/D providers in providing care for LGBTQ+ patients.

Results

A case study will exemplify one individual's healthcare journey and provide insights into the barriers and challenges faced in her history as a transgender Veteran, the complexities of her medical and mental health care needs, her fears and apprehension with accessing care, and the multi-disciplinary approach that we were able to offer to address her significant comorbidities and myriad mental and physical health problems. Research findings exemplify themes derived from semi-structured interviews with persons with SCI/D and providers; these include systemic and institutional barriers such as social exclusion, social stigma, and institutional heterosexualism; individual feelings of micro-aggressions, discrimination, victimization, and abuse; behavioral aspects of preventative care, sexual behavior, and positive and negative health choices; social and community aspects such as family structures, social support, and community integration; psychological health promoting behaviors such as coping strategies; and health and wellness perspectives regarding disability needs, mental health needs, and quality of life. Comfort with providers was an important theme with some discrepant findings between patients and providers on the relevance and importance of disclosing sexual orientation/gender identify related to receiving care.

Conclusions

We will present a training module that we have developed targeted to SCI/D providers regarding unique healthcare needs, barriers to care, systemic and structural problems, and coping strategies in patients who live with SCI/D and identify as LGBTQ+ in order to enhance a welcoming environment and deliver appropriate care to this community.

Learning Objectives

- Describe the importance of integrated multidisciplinary care to address the complex needs of transgender patients who live with SCI.
- Describe the mental and physical health challenges faced by LGBTQ+ patients and unique dual minority issues for those living with SCI/D.
- Identify psychosocial responses and attitudes of LGBTQ+ patients related to accessing the healthcare system.
- Employ strategies during patient encounters to reduce discrimination and provide a safe and welcoming environment for LGBTQ+ patients with SCI/D.

(2224) Advancing Implementation of Guidelines for Suicide Prevention in SCI Care

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Background

Suicidal thoughts, suicide attempts, and deaths by suicide are more common in people with spinal cord injury (SCI) than in the general population. While the inclusion of a section on suicide prevention in recently developed Consortium for Spinal Cord Medicine (CSCM) clinical practice guidelines on Management of Mental Health Disorders, Substance Use Disorders, and Suicide in Adults with Spinal Cord Injury is an important step forward, several barriers may prevent consistent implementation of suicide prevention recommendations in practice.

Design

This interactive session will discuss challenges in implementing the recommended CSCM suicide prevention guidelines in SCI practice, and identify lessons learned and best practices for implementation. It will provide an opportunity to outline next steps to advance suicide prevention implementation in clinical SCI care as well as at the system-wide and regulatory levels.

Methods

We will engage the audience to identify barriers, lessons learned and best practices for implementation related to each of the CSCM recommendations for suicide prevention. Literature for suicide prevention in the SCI population is sparse. Screening interval is arbitrary, effectiveness and optimum frequency in SCI is unclear. Suicidal communication and intent may be confused with the much more common non-specific distress that occurs in response to the injury. Somatic symptoms of depression may be misattributed to SCI-related medical problems. The presence of SCI may influence options for care setting and require balancing the benefits of a more restricted and controllable setting for those identified as high, acute risk with the logistical problems of attending to SCI cares. Suicide prevention education may be perceived as less relevant to interdisciplinary staff other than mental health professionals. There may be concerns about inducing unnecessary anxiety in individuals and loved ones by bringing up suicide risk. Inquiry about gun ownership, as part of lethal means safety counseling, could be perceived as intrusive. Impact of specific co-existing conditions on suicide risk in SCI is not well defined. While participation in community integration and engaging in rewarding activities are potential protective factors, those who are most in need may be less likely to utilize available resources.

Results

Formal assessment of suicidal ideation can be done using a brief, standardized screening tool as part of the routine SCI annual evaluations. Screening for suicide can be done in an approachable, non-stigmatizing manner by incorporating into the overarching evaluation and follow-up process. Interventions for conditions that can address suicide risk (e.g., depression, substance use disorders, traumatic brain injury, chronic pain) should be optimized. Individuals and caregivers should be made aware of available resources including crisis lines and services. Addressing lethal means safety and making gunlocks readily

available in a non-intrusive way is an evidence-based approach for reducing suicide risk. Focused initiatives to augment protective factors in targeted high-risk sub-populations may be especially effective for suicide prevention in SCI practice.

Conclusion

This session will provide practical guidance for implementing best practices for suicide prevention in SCI care. It will identify strategies and next steps to advance suicide prevention implementation at the systemic level.

Learning Objectives

- Review the current evidence-based guidelines for suicide prevention for adults with SCI.
- Identify perceived and encountered barriers in implementing recommended suicide prevention guidelines in practice.
- Summarize practical guidance for implementing best practices for suicide prevention in SCI care.
- Brainstorm strategies and next steps to address SCI-specific knowledge gaps advance suicide prevention implementation at the systemic level.

(2225) Biopsychosocial Factors Associated with Life Satisfaction in Individuals with Long-Term Traumatic Spinal Cord Injury

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Abstract Body

Background

A traumatic spinal cord injury (SCI) frequently results in negative physiological, psychological, and social consequences, which may change as the individual ages. Understanding factors associated with life satisfaction, a core component of subjective well-being and quality of life (QOL), is essential to inform interventions aimed at improving QOL in this aging population. Using a biopsychosocial framework offers a unique conceptualization of the person as a whole and aligns with interdisciplinary healthcare efforts in the VA SCI System of Care. This study aims to fill a gap in the literature by examining biopsychosocial factors associated with life satisfaction in individuals with long-term traumatic SCI.

Design

Cross-sectional analyses.

Methods: Self-report assessment data were collected during the 2018-2019 data collection period of a 45-year longitudinal study. Participants (n = 546) were identified from a Southeastern US specialty hospital and two Midwestern university hospitals. Most participants were male (70.3%), non-Hispanic white (78.5%), had cervical level SCI (50.9%), and were non-ambulatory (76.9%). Participants had a mean age of 57.9 years, 14.7 years of education, and 31.6 years post-injury. Primary study outcomes were (1) global life satisfaction, (2) home life satisfaction, and (3) vocational satisfaction, assessed by the Life Situation Questionnaire-Revised. Three multiple linear regression models examined demographic, SCI, health-related (i.e., chronic health conditions,

urinary tract infections, nonrestorative sleep, pain severity, & interference of pain on functioning), psychological (i.e., depressive & anxiety symptom severity), and social (i.e., instrumental & emotional social support) independent variables in relation to the three satisfaction dependent variables.

Results

Global Life Satisfaction: Taken together, the demographic, SCI, health-related, psychological, and social variables explained 55.1% of the variance in global life satisfaction ($F(17,350)=25.29$, $p\leq.001$; Cohen's $f2=1.23$). Less severe depressive symptoms, greater emotional social support, and greater instrumental social support were significantly associated with greater global life satisfaction, in the context of multiple independent variables (all p's<.006). Home Life Satisfaction: Together, the independent variables explained 50.7% of the variance in home life satisfaction ($F(17,373)=22.58$, $p\leq.001$; Cohen's $f2=1.03$). Being in a relationship, having less severe depressive symptoms, greater emotional social support, and greater instrumental social support were significantly associated with greater home life satisfaction, in the context of multiple independent variables (all p's≤.001). Vocational Satisfaction: Together, the independent variables explained 44.8% of the variance in vocational satisfaction ($F(17,257)=12.26$, $p\leq.001$; Cohen's $f2=.81$). Being non-Hispanic white, having more years of education, being in a relationship, less severe depressive symptoms, and greater emotional social support were significantly associated with greater vocational satisfaction, in the context of multiple independent variables (all p's<.004).

Conclusion

Healthcare providers should be aware of the relationship between demographic factors and these domains of life satisfaction in individuals with long-term traumatic SCI. These results support the need to assess psychological symptoms and available social support as potential modifiable factors related to life satisfaction in this aging population. Improving psychological symptoms and available social support may relate to improved life satisfaction.

Learning Objectives

- Describe the demographic characteristics associated with global, home, and vocational life satisfaction in individuals with long-term traumatic SCI.
- Discuss relationships between physical health factors and global, home, and vocational life satisfaction in individuals with long-term traumatic SCI.
- Discuss relationships between psychological and social factors and global, home, and vocational life satisfaction in individuals with long-term traumatic SCI.
- Apply identified significant relationships to clinical practice to inform care aimed at improved quality of life for individuals with long-term traumatic SCI.

(2226) The Class Effect: Evaluating MS Disease Modifying Therapies in the Same Class

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Abstract Body

Background

Over 20 years ago, interferons were the first, and until recently, the only disease modifying therapy (DMT) class for multiple sclerosis (MS) that had several agents FDA approved in it. Since 2019 an incredible six new DMTs have been FDA approved. What's different about this influx of DMTs is that they almost all join existing agents in a class of the same mechanism of action. The MS community can expect many more of these same in class drugs in the coming years as well.

Purpose

This presentation will define the concept of a "same in class" drug, as well as consider the benefits and drawbacks to having multiple unique options within a single therapeutic drug class. Assessment of the similarities and differences in efficacy, safety, and economic impact will be outlined for the same in class DMTs.

Methods

Learners will be able to identify classes that have or will soon have multiple individual drugs in them including the sphingosine 1 phosphate receptor modulators, fumarate salts, and anti-CD20 antibodies. Attendees will then be able to analyze the differences and similarities in efficacy and safety between drugs in a single class and apply that information to determine when one might be preferred.

Results

This presentation will aid the MS provider to navigate DMT choices in both initiation and switching DMT situations. Learners will attain skills on how to discuss agents within a class with their patients. Pipeline agents emerging within existing drug classes will be introduced and learners will be able to identify what resources can be used to evaluate medications within a class to sustain the analyzation practices learned in the presentation.

Conclusions

Given this rapid increase in sheer number of DMTs and new options within a single class, MS providers are faced with an unprecedented challenge to evaluate nuances between agents when choosing a DMT. This presentation will aid the MS provider to make comprehensive pharmacotherapy evaluations to best fit the needs of the patient.

Learning Objectives

- Define the concept of a "same in class" drug, as well as consider the benefits and drawbacks to having multiple unique options within a single therapeutic drug class.
- Identify MS DMT therapeutic classes that have or will soon have multiple individual drugs in them.
- Analyze the differences and similarities in efficacy and safety between DMTs in a single class and apply that information to determine when one might be preferred.
- Attain skills on how to discuss agents within a class with their patients.
- Utilize resources to evaluate medications within a class

(2227) Harmonizing Imaging Assessments in Veterans with Multiple Sclerosis

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Abstract Body

Background

Magnetic resonance imaging (MRI) is a cornerstone for the diagnosis and monitoring of persons with multiple sclerosis (MS). MRI assists with an early diagnosis allowing timely therapeutic interventions even when clinical criteria are not met yet. MRI also allows monitoring disease progression and assessing treatment efficacy or side effect.

MS is a lifelong disease that starts at young age in most individuals. As a result, affected persons may receive MRIs in different centers during their lifetime. This is particularly applicable to

Veterans who tend to travel and change residency several times during their lifespan. Scans acquired in different centers are difficult to compare as dissimilarities in acquisition protocols may mask or uncover focal lesions, creating false negative or false positive findings.

Objectives

In an attempt to mitigate technical variabilities, a consensus conference has been held in October 2019. In this conference, neurologists, radiologists, MRI technologists, and imaging scientists with expertise in MS from the United States, Canada, and Europe developed a new set of guidelines for imaging the brain and the spinal cord of persons with MS in a uniform and standardized manner. Shortly thereafter, researchers of the MS Center of Excellence embarked in a national project to implement and disseminate those guidelines among all Veteran Affair Healthcare Systems (VAHS).

Results

In the upcoming PVA conference the authors will present: (1) the consensus statements developed by the expert panel; (2) the rationale underlying each recommendation; (3) the applicability of these developed MRI guidelines within the VAHS; and (4) the results of an undergoing National effort to implement these guidelines nationwide.

Conclusions

By refining communication of best practices for MRI use in Veterans with MS we can improve their care. The authors will call on neurologists and radiologists in the VAHS to be aware of this undergoing effort and standardize MRI protocols in accordance with Consensus of International Experts.

Learning Objectives

- To learn about the role of magnetic resonance imaging in multiple sclerosis
- To learn about the challenges in imaging Veterans with multiple sclerosis
- To learn about the importance of standardized imaging protocol
- To learn about a National effort to harmonize imaging protocols for Veterans with multiple sclerosis

(2228) Possibilities in Specialty ALS Care Through Telehealth

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Abstract Body

Background

Multidisciplinary care for the management of amyotrophic lateral sclerosis (ALS) has become the evidence-based standard of care. However, access to specialty multidisciplinary care is

limited. The rapid and complex progression of physical impairment only amplifies access barriers. Telehealth has the ability reduce these hardships for individuals with ALS and their caregivers. The objective of this presentation is to present discipline-specific applications of telehealth for the assessment and management of Veterans with ALS.

Setting

Clinicians from multidisciplinary clinics at the Cincinnati and Washington DC VAMCs have implemented comprehensive teleALS programming to enhance the existing in-person clinics. Support for this programming is partially provided by the Office of Rural Health (ORH).

Disciplines

Multidisciplinary ALS teams typically consist of the following disciplines: neurology (physician, nurse), physical therapy (PT), occupational therapy (OT), speech-language pathology (SLP), respiratory, nutrition, psychology, and social work. Each discipline within the multidisciplinary team can adapt their clinical assessment and intervention to successfully meet many unique needs for Veterans with ALS through telehealth. Most disciplines utilize clinical video teleconferencing (CVT) as a primary platform for telehealth assessment and intervention. Some disciplines, such as respiratory therapy, may require supplemental technology to assess pertinent outcomes remotely.

Discipline-specific Applications

Clinical considerations and adaptations for telehealth will be provided based on the outcomes assessed and clinical interventions necessary. The following clinical applications will be discussed and will utilize case studies as appropriate. Within the teleALS programming, neurologists perform neurological assessment and management using CVT and electronic communications with the patient as well as other team members. PTs assess functional mobility including gait, transfers, and bed mobility via CVT. OTs assess activities of daily living and provide cognitive rehabilitation via CVT. PTs and OTs provide assistive device assessment and prescription via CVT directly into the home as well. SLPs can perform communication assessment and communication aid prescription using CVT. SLPs can also perform a modified swallowing assessment via CVT with a caregiver present. SLPs often work alongside nutritionists to help determine safe nutritional recommendations. Respiratory therapists utilize portable spirometry devices to assess neuromuscular function for respiration. Prescription and management of non-invasive ventilation devices can be done remotely by respiratory therapists as well. Home-based spirometry assessment will be individually demonstrated.

Conclusion

Telehealth can improve access to specialty multidisciplinary care for Veterans with ALS. Each discipline within the team has unique outcomes to assess and manage. Most discipline-specific assessments and interventions can be adapted to provide accessible and high-quality care through telehealth.

Learning Objectives

- The learner will be able to describe the disciplines and clinical roles common to a multidisciplinary ALS team.
- The learner will be able to describe access barriers and challenges to specialty multidisciplinary ALS care.
- The learner will be able to discuss important clinical considerations when performing assessment and intervention for Veterans with ALS through telehealth.
- The learner will be able to describe ongoing and future utilization of telehealth technologies and programming to improve access for Veterans with neurologic impairments.

(2229) Developing and Validating a Decision Support Tool to Prevent Community Acquired Pressure Injuries in SCI

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Abstract Body

Background

Pressure injuries (PrI) are the second leading cause of hospitalization in people with spinal cord injury (SCI). The majority of PrIs occur in the community, but there is little specific guidance available on community-acquired PrI (CAPrI) prevention. Current PrI prevention clinical guidelines are based on institutional care, and do not directly address risk factors in the community. To date, there are no instruments to guide CAPrI preventive care for persons with SCI. This presentation describes the development and evaluation of a decision support tool to prevent CAPrIs in individuals with SCI for use in the SCI clinic that is grounded in current guidelines and qualitative research.

Research Design

Concept mapping to draft the tool and Delphi method to validate the tool.

Methods

Concept mapping with literature review, current guidelines and qualitative research was used to develop 14 Veteran checklist items (Items) along with 11 associated healthcare provider actions (Actions) on the tool. Delphi surveys were used to validate Items and Actions with a panel of interprofessional SCI provider experts in PrIs (n = 15), Veterans with SCI (n = 4) and caregivers (n = 3). Two Delphi surveys measured agreement on a 4-point Likert scale (strongly agree – strongly disagree) for each Item and Action in terms of: research and existing evidence, measurement framework, item format, level of language, and overall agreement of appropriateness along with open comments. Agreement was set a priori at 75% of responses rated as strongly agree or agree.

Results

Panelists were 60% female, 65% Black, 30% wound care certified with a mean age of 59 years. Two survey rounds were required. Response rate was 95% for Round 1 and 100% for Round 2. Round 1 showed all 14 Items and 11 Actions affirmed for agreement above 75%. Open comments guided Item and Action revisions with Item comments most related to 'language' with suggested revisions and Action comments related to 'completeness' with suggestions additional referrals. Delphi Round 2 included 6 revisions, 3 Items and 3 Actions, all affirmed for agreement above 83%. The final tool includes a 14-item Veteran survey to be programed on an iPad app and a Provider report of recommended actions based on Veteran responses.

Conclusions

A decision support tool was affirmed for face and content validity for usability and acceptability by both patients and providers.

Learning Objectives

- Describe how qualitative results and clinical practice guidelines were mapped to Veteran survey items and associated provider actions.
- Describe the Delphi process and how the Delphi method can be used to determine content validity.
- Discuss how the Delphi results supported the development of a Veteran survey and provider report.
- Describe the actionable steps that can be implemented using the final tool.

(2230) Update on Personalized Pressure Injury Risk Biomarkers: Developing a Blood Test for Recurrent PrI Risk

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Abstract Body

Background

Despite the best standards of care, pressure injury (PrI) prevention remains challenging for many Veterans with spinal cord injury (SCI). The conundrum remains why many suffer from a continuous cycle of recurring PrI and long periods of hospitalization while others stay PrI free. We have previously shown that intramuscular adipose tissue (IMAT) is a critical clinically significant risk factor for PrI development.

Design

Setting: VA Medical Center

Study design: Repeated measures observational study

Follow-up

Blood draw and CT scans

Outcome: Circulatory biomarkers are indicative of persons with spinal cord injury at highest risk for recurrent PrI. Knowing your PrI risk enables individuals living with SCI to be proactive and make choices that positively impact overall health.

Methods

Supine pelvic CT scans were obtained for 39 Veterans with SCI. The gluteal muscle region of interest (ROI) was identified and Hounsfield Unit values used to determine tissue type within the ROI. Circulatory biomarkers were determined from fasting whole blood samples. The primary fatty metabolite biomarkers of interest were FABP4 (fatty acid binding protein 4), predominant in adipose tissue, and FABP3 (fatty acid binding protein 3), predominant in skeletal muscle. Genetic assay was also carried for next generation sequencing (NGS) covering multiple genes associated with fatty metabolism and inflammation.

Results

Repeated measures of muscle composition, showed that IMAT levels vary considerably even between individuals with similar AIS grade or level of injury. While IMAT is stable over time for many individuals, varying by only 0-5%, it can change dramatically for others, even several years post-injury. SCI-adjusted BMI was not correlated with IMAT. Muscle composition showed significant differences between IMAT present in individuals with a PrI history compared to those with no PrI history. Circulatory FABP4 levels were significantly higher for persons with a PrI history. Circulatory FABP3 levels were slightly lower although this difference did not reach statistical significance. Both FABP3 and FABP4 were highly significantly correlated with IMAT ($p<0.0001$). 513 enriched genes that are significantly different between persons with different IMAT levels have been identified. Genes encoding proteins involved in fatty acid metabolism are the primary pathway, with 7 genes that are highly significantly different between the groups ($p<0.01$).

Conclusions

Some people exhibit rapid IMAT accumulation following SCI, while others do not. This project is building on the multi-scalar model of Biomarkers for Early Identification of Pressure Injury Risk (BEIPIR) to enable earlier identification of individuals predisposed to rapid and higher levels of IMAT deposition. Our preliminary findings indicate that some individuals are predisposed to

increased deposition of IMAT following SCI, and resultant increased PrI risk. This can be evaluated using circulatory biomarkers, specifically those related to fatty metabolism. We are also employing these validated biomarkers to develop a point-of-care technology, the PIPChip device to rapidly identify individuals at increased risk of recurrent pressure injury development.

Learning Objectives

- Describe the role of local muscle composition for increased risk of recurrent pressure injuries in persons with SCI.
- Describe the role of circulatory biomarkers for increased risk of recurrent pressure injuries in persons with SCI.
- Describe advances in the development of novel approaches to identify persons at increased risk for recurrent pressure injury development
- Discuss the steps toward development of a blood test kit for PrI risk

(2231) Sexual Health and Fertility in SCI: An Interdisciplinary Approach

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Abstract Body

Background

Sexual functioning is a top concern for people living with spinal cord injuries and dysfunction (SCI/D) yet, is often neglected in clinical care. Providing quality healthcare across the lifespan necessitates assessment and treatment of sexual health needs, delivery of education for both patients and staff, and addressing fertility issues.

Purpose

To create sexual health education and resources within the SCI system of care to create continuity of care, increase comfort level, decrease cost of community care, improve quality of family, relationships and life.

Methods

Educational materials were developed to facilitate discussion between patients and members of the interdisciplinary team (IDT), online and in person trainings were instituted to assist the IDT with acquiring knowledge and skill in working with patients around topics of sexual health. A template was developed to facilitate data collection on veterans needs for sexual health concerns in the inpatient and outpatient settings. Treatment plans incorporating medications, adaptive equipment, and referrals were developed. Education for staff is provided through development of a TMS course and monthly microsoft teams meetings.

Results

357 unique encounters were documented utilizing the sexual health template. 43% of these veteran were interested in sexual health education. 16% were willing to provide data on sexual function but not in need of education and 41% stated they were not interested in sexual health education.

Patients voiced relief that the health care team was available and willing to discuss sexuality and fertility options. Interest in education and treatment planning was not limited to patients with new injuries. Even patients who declined treatment planning were grateful to be queried. They were excited to collaboratively develop individualized treatment plans. Some Veterans living with SCI/D for decades expressed the wish that these topics had been addressed long ago. Multiple disciplines and sites were assessing sexual health in SCI veterans making care more accessible. During COVID-19, telehealth was utilized, and needs were still met.

Education was provided to >100 staff members at the SCI hub and spokes and other SCI centers. This helped them gain knowledge and comfort in the topic while being able to assess needs of our veterans during acute rehab at the center and follow up after discharge with their local SCI providers. The staff educated were part of an interdisciplinary team and not only did medical providers assess but social work, psychology, dietician, physical and occupational therapy did as well.

Conclusions

Addressing sexual health issues is a simple practice shift which yields enormous gains for persons with SCI/D. Providing education and interventions communicates that living well with SCI/D is possible and that physical limitations do not negate a fundamental and important aspect of being human. Assisting patients in connecting with their own sexuality and working toward family building goals are among the best practices in rehabilitation medicine.

Learning Objectives

- Identify one concern for SCI veterans if sexual health is not addressed
- Identify barriers to discussing sexual health in spinal cord injury (SCI)
- Identify a resource for veteran and staff to receive education on sexual health in SCI
- Discuss safety measures and health maintenance in regards to sexual health in SCI.
- Identify one person you can refer to for sexual health education.

(2232) MS Caregivers and Coping During COVID-19 Pandemic - Increasing Caregiver Resiliency Using Telehealth Modalities

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Abstract Body

Background

The current COVID-19 pandemic has added numerous stressors to the already challenged Caregivers of Veterans living with multiple sclerosis (MS). MS Caregivers serve a vital role in caring for and maintaining the Veteran's qualify of life as needs increase and become more severe, affecting many aspects of daily living, including mobility, cognition, and activities of daily living. MS Caregivers have to adapt to unprecedented lifestyle changes and emotional reactions due to the pandemic quarantine. Caregivers may spend less time on self-care activities that were previously available to them prior to the COVID-19 pandemic that helped increase resiliency, coping, and prevent burnout, and less likely to reach out to a support group or individual counseling. Isolation, stress, depression, and general health problems may increase thus compromising Caregiver resiliency.

VA Social Workers and health care providers also faced unprecedented challenges as they adapt to the COVID-19 pandemic to provide access to VA care by substantially increasing clinical appointments by telephone and video telehealth. Social Workers from the Veterans Health Administration (VHA) Multiple Sclerosis Center of Excellence (MSCOE) West and East successfully utilized multiple telehealth modalities to provide evidence-based MS caregiver support and education via telephone and VA Video Connect (VVC) Clinical Video Telehealth (CVT), in a group or individual intervention.

Design/Methods

Social Workers from the Veterans Health Administration (VHA) Multiple Sclerosis Center of Excellence (MSCOE) West and East implemented multiple telehealth modalities during the COVID-19 pandemic to provide evidence-based MS caregiver support and education via telephone and VA Video Connect (VVC) Clinical Video Telehealth (CVT), in a group or individual intervention. Caregiver support groups and individual interventions included adapting evidence-based psychoeducation and supportive counseling, including topics such as updates on COVID-19 pandemic response, stress management, mindfulness, disease-specific knowledge, and coping strategies to reduce caregiver stress and burden. VA Caregiver Program resources, including REACH VA (Resources for Enhancing all Caregivers Health), an evidence-based intervention for VA Caregivers, and community resources were also utilized.

Results /Conclusion

Caregivers welcomed the choices of telephonic and VVC CVT modalities for participating in caregiver support groups and individual appointments. Caregivers who participated in the REACH VA - MS saw increased resiliency and reduced stress and burden anecdotally and through pre/post risk assessments and participant evaluations.

This will be an interactive 90-minute presentation for social workers and health care providers who work with Caregivers of people with MS. A discussion of case studies will be included of caregiver participants who utilized telephonic and VVC CVT.

Resources

Martindale-Adams, J., Nichols, L., and VA REACH MS (Resources for Enhancing All Caregivers' Health – MS) Workgroup:…Kazmierski, M., …Sloan, A., …Spencer, J. (2016). Caregiver Notebook – MS. REACH VA Program. Caregiver Center. Memphis VA Medical Center. U.S. Department of Veterans Affairs.

Bambara, J.K., Turner, A.P., Williams, R.M., Haselkorn, J.K. (2014) Social support and depressive symptoms among caregivers of veterans with multiple sclerosis. Rehabil Psychol. 59(2):230-5. doi: 10.1037/a0036312. Epub 2014 Apr 14.PMID: 24730574

Learning Objectives

- Describe 3 reasons to use VA Video Connect (VVC) Clinical Video Telehealth (CVT) into your practice with Caregivers and Veterans with MS in a group or with individuals.
- Describe 3 ways to increase Caregiver resilience.
- Describe how to become certified as a REACH MS facilitator.
- Describe 2 ways the COVID-19 pandemic has challenged caregiver resiliency

(2233) It Takes a Village: VA MSCOE and NMSS Partnership for Enhanced Coordination of Services for Veterans with MS

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Abstract Body

Background: Of the 22 million Veterans living in the US, only 8 million are enrolled within the Veterans Health Administration and 45% of those enrolled are over age 65. More than 70% of these Veterans receive additional health, support services, and care coordination from the community/

private sector, hence these Veterans access valuable resources outside the Veterans Health Administration. The VA MS Centers of Excellence (MSCOE) supports comprehensive specialty care teams across the Veterans Health Administration who evaluate, treat, and provide ongoing care management to over 24,000 Veterans living with MS in the United States, and over 46,000 Veterans with MS have been identified in the MSCOE Data Repository as having used VHA services since 1999. The VHA system provides much needed services to assist Veterans with MS remain independent in their community by offering support services such as home health aide services, assistance, and family Caregiver support and respite services.

In May 2019, the MS Centers of Excellence and The National MS Society signed a memorandum of agreement to improve care and expand resources for Veterans living with multiple sclerosis and their families. Through this partnership, Veterans with MS are identified who need additional referrals, collaborative case management and resource navigation.

Purpose: VHA MSCOE and The National MS Society developed a formal process for mutual communication and coordinate support and resources for Veterans with MS: 1) VA MSCOE Social Workers provide VHA 101 educational webinars to MS Navigator Program and Benefits front line staff that address unique needs of Veterans with MS and their families, providers, and care partners. 2) To establish a process of case consultations that involve Veterans who contact the MS Navigators with complex resource, support, or benefit needs. 3) Identify Veterans who could benefit from MS Navigator Program and send referrals from VA clinicians.

Methods

1. The MSCOE Social Work Staff developed and provided training presentations (VHA 101) to educate MS Navigators and other Front Line Staff about military and Veteran culture, VA benefits; VHA eligibility, enrollment, and programs; and care navigation.
2. Point of contacts were established for both the MSCOE and NMSS for discussing (HIPAA compliant) cases with Veterans identified as needing assistance to access or navigate VHA services and VA benefits.
3. Case consultations were routinely discussed between MS Navigators and MSCOE Social Work staff.
4. The MS Navigator Referral process from VA clinicians improved and increased.

Results

Over 80 MS Navigators and other Front Line Staff participated in VHA 101 webinars provided by VHA MSCOE Social Work staff. Case consultations between MS Navigators and VHA MSCOE Social Work staff were successfully resolved. Appropriate referrals to MS Navigator Program were identified from VA MSCOE West and East increased.

Conclusion

Preliminary outcomes from educational trainings, individual case consultations, and the referral process have been effective between VHA/MSCOE and The National MS Society MS Navigator Program. Education on how each organization operates and provides care and services for Veterans has enhanced the level of information sharing and referrals, thus improving care.

Learning Objectives

- Develop an understanding of the National MS Navigator program and understand how the program can enhance services for Veterans with MS.
- Identify gaps in services and other psycho-social needs that need community intervention in addition to VA resources.
- Identify ways in which local VA MS staff can collaborate further with their local National MS Society Chapters.
- Be able to review and complete the process of referral to NMSS MS Navigator.

(2234) Introducing CVT+: Using Images to Improve Complex Rehab Technology Outcomes Using Clinical Video Telehealth

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Abstract Body

The wheelchairs used by those who have Spinal Cord Injuries & Disorders (SCI/D) belong to an important subset of wheelchairs known as Complex Rehab Technology (CRT). Successful CRT outcomes require an accurate understanding of the user, their problems, specific products, and effective configurations. Due to the complex nature of their needs, how we configure a CRT product can be just as important as the product to a successful outcome. Because the configuration is so inextricably linked to the outcome, clinicians need to own the configuration of any "SCI/D CRT" they prescribe.

Seating clinicians who provide CRT in the VA's SCI/D System of Care have a unique job that has no private sector equivalent. Because most VA's do not use CRT suppliers for the technology-related component of service delivery, most acquire product expertise and technical skill sets that are not normally associated with their respective disciplines so they can address the needs of their veteran populations. Almost all work in specialty programs at regional centers.

For most, having the veteran return to the clinic for their initial fitting has been a longstanding best practice. Despite the drawbacks, this has ensured they have been able to achieve their clinical outcomes. It has also allowed them to critically assess the effectiveness of the products they prescribe.

However, many individuals live some distance away from their regional center. Some have complex conditions that make travel difficult. As a result, veterans are sometimes admitted for brief inpatient stays for fitting & training. Still others have no means to transport their device home.

VA is the largest provider of telehealth in the country. Despite its potential to reduce the time, expense, and inconvenience associated with traveling to a regional center for CRT-related services, it has been largely underutilized. Why?

Even with advances in technology, limitations in the quality of streaming video can make it next to impossible to discern the level of detail required to make an accurate assessment of the user and the effectiveness of their configuration.

While the ability to share images during a session had the potential to overcome this limitation, none of the VA's approved telehealth applications provided this capability.

Due to the demand on the VA's telehealth infrastructure during the pandemic, however, leadership temporarily allowed mainstream videoconferencing applications to be used. This created the opportunity to incorporate real-time image sharing into wheelchair telehealth sessions. The impact has been dramatic.

This presentation introduces the concept of "CVT+" and demonstrates how sharing images during a session can dramatically improve the effectiveness of telehealth when providing SCI/D CRT related services. This approach not only allowed one VA Regional SCI/D Center to provide virtual services as effectively as in-person intervention, in certain scenarios it proved to be even more-effective.

Learning Objectives

- Identify 2 reasons why clinicians who provide Complex Rehab Technology (CRT) often have difficulty assessing a client's positioning or viewing key aspects of a wheelchair's configuration over streaming video.
- List 3 areas of specialized expertise that must be available to effectively prescribe & provide "SCI/D CRT".

- List 3 reasons why adding the capability to easily capture & share images during a session can dramatically improve the effectiveness of telehealth when providing SCI/D CRT.
- Identify 2 potentially serious issues that are routinely checked during in-person fittings that could easily be missed during a virtual fitting if the clinician bases their assessment solely on visual information.

(2235) Experiences with and Perceptions of the VHA's TeleWound Practice Program Among Veterans With SCI/D

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Abstract Body

Background

Individuals with spinal cord injuries/disorder (SCI/D) often experience chronic wounds such as pressure injuries,1-3 and chronic conditions which may increase wound risks (e.g., diabetes).4 They require frequent encounters with the health care system,5,6 including for wound care, which typically involves lengthy follow-up. However, Veterans with SCI/D often have mobility limitations and/or secondary conditions that create challenges for accessing health care7,8 through traditional brick-and-mortar clinic visits.9 Furthermore, over a third of Veterans with SCI/D reside in rural areas10 which exacerbates travel-related difficulties.

Purpose

To overcome these barriers, the Veterans Health Administration (VA) is championing the TeleWound Practice program (TWP), which incorporates both synchronous and asynchronous telehealth services into wound care delivery. The objective of this analysis was to assess use of, and early experiences with, the TWP among Veterans with SCI/D.

Methods

Utilization data were collected through VA administrative databases and surveys were mailed to Veterans with SCI/D who received TeleWound care across the four VA facilities involved in the initial implementation and evaluation of the TWP. Veterans who did not return the initial survey received a follow-up survey after approximately 6 weeks to facilitate response. Surveys assessed Veteran perceptions of TeleWound care. Data were analyzed using descriptive statistics.

Results

Among Veterans with SCI/D who received TeleWound care from May-November 2020 (n=39), almost all had a pressure injury, and 12/39 (31%) had multiple pressure injuries, documented during their TWP visits; other wounds treated included colostomies, diabetic foot ulcers, and surgical wounds. Veterans were 63 years old on average, lived approximately 70 minutes from a VA, and averaged 14 TWP encounters (range: 1-31). Survey respondents (n=12) were predominantly male (11/12) and lived an average of 99 minutes from a VA. Almost all (11/12) reported receiving wound care only from VA and being satisfied with that care. Most (8/11) reported interest in continuing to use TeleWound care, were able to see and hear their provider clearly by video (10/12), understood how to manage their wound at home after their TeleWound visit, and reported that receiving TeleWound care reduced their need to travel long distances (11/12) and associated travel costs (10/12). The majority (8/12) reported being more motivated to do what is needed to ensure their wound can heal as a result of the TWP, and that being able to see pictures of their wound over time (using telehealth) encouraged them to set healthcare goals.

Conclusions

The TWP is designed to provide remote delivery of wound care and may be particularly beneficial for Veterans with SCI/D. Encouragingly, Veterans with SCI/D who received TeleWound care were largely satisfied with this care, interested in continuing to receive wound TeleWound care, and believed that the TWP helped them overcome barriers to wound care receipt and promoted wound self-management. Additional research is needed to support TWP implementation across the VA SCI/D System of Care and examine impacts of the TWP on wound care access and outcomes among Veterans with SCI/D.

Learning Objectives

- Explain what the TeleWound Practice program is and how it leverages telehealth technology to improve access to wound care for Veterans.
- Discuss efforts to-date to implement the TeleWound Practice program across the Veterans Health Administration (VA), including in the VA Spinal Cord Injuries and Disorders (SCI/D) System of Care, as well as how the TeleWound Practice program could be particularly beneficial for and impactful among Veterans with SCI/D.
- Describe early utilization of TeleWound care among Veterans with SCI/D, including the types of wounds cared for through TeleWound encounters.
- Describe the experiences and perceptions with this innovative program of care delivery among Veterans with SCI/D who have received TeleWound care.

(2236) VA Benefits 101- for the Healthcare Professional

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Presenter

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Abstract Body

A common misconception with not only Veterans but healthcare providers is that the Veterans Administration (VA) is an all-inclusive system. Rather, the VA is comprised of three entities, each of which has its own unique mission and criteria for Veteran access. Each of these departments provide critical services to Veterans, and understanding the application of their specific roles may provide life altering resources for the Veteran as well as their family members.

The Veteran Health Administration (VHA) is the largest integrated health care system in the United States. Not every Veteran qualifies for healthcare benefits but for those that do they will fall into one of eight priority groups based on service connection and income levels. Priority groups will be explained within the presentation.

VA Benefits Administration (VBA) is responsible for benefits such as disability compensation for injuries incurred or aggravated by military service. Pensions are awarded for Veterans with wartime service and in need of financial assistance. VBA also provides death benefits for surviving spouse and family members.

VA National Cemetery Administration (NCA) maintains and provides burial space for Veterans and their eligible family members within their national cemeteries. They also provide headstones, markers, or medallions for those veterans not buried in the national cemeteries.

Veteran Service Officers (VSO's) are embedded within the 24 VA SCI Centers and 72 offices throughout the country. They have a unique perspective because of their expertise in all three departments of the VA. Although VSO's function as subject matter experts for VA Benefits, there are tools available to healthcare professionals to help identify additional entitlements to support their patients.

This presentation will be presented by veteran service officers (VSOs), both of whom are stationed at VA spinal cord centers. The focus will be on providing healthcare professionals of various disciplines tools for identifying elements that may warrant referring a Veteran to a VSO who can provide more specific expertise and guidance. In turn this will help with assisting in their healthcare with the availability of a pension, compensation, or other ancillary benefits. Those ancillary benefits include enrollment, catastrophically disability, aid and attendance, CPRS, service connection conditions, secondary conditions, pensions, auto, housing grants, and death benefits. They will also break down specific benefits and service connection for SCI, MS, and ALS veterans.

These tools are simply meant to help the healthcare professional recognize clues and then refer the veteran to a veteran service officer (VSO) who in turn will provide expertise and guidance.

Learning Objectives

- Be able to identify the requirements of "Veteran" status
- Understand how to support Veterans in accessing VA healthcare services and benefits.
- Be able to explain the fundamentals of compensation, pension, and ancillary benefits.
- Recognize common clues found during chart reviews which can be used to support new and existing claims and those related to death benefits

(2237) Dendritic Spine Dynamics after Injury: an Intravital Structural Study of Pain

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Abstract Body

Background

Neuropathic pain is a serious medical condition in Veterans with SCI. Currently, this type of pain has few or no options for effective, long-term treatment. Understanding how trauma leads to disability is a major challenge toward developing novel therapeutics for managing chronic pain. Our team's research has shown a strong structure-function relationship between abnormal dendritic spines (e.g., synaptic structures in spinal cord pain circuits) and the presence of neuropathic pain. However, technical constraints have limited our

investigation to post-mortem tissue analyses. Dead tissue cannot reveal the dynamic living changes to spinal cord structure associated with injury and pain pathology.

Purpose

Here, we present a powerful intravital imaging technique that can reveal the living, structural properties of pain-related neurons in the spinal cord. We further show how this imaging technology can help us develop and assess novel therapeutics for neuropathic pain.

Methods

In this investigation, we used a randomized, weight-matched, two arm study design (injured versus control) to assess changes in dendritic spine dynamics before and after a pain-inducing nerve injury. Our current focus is within the superficial dorsal horn of the spinal cord, e.g., lamina II, a region associated with pain processing and transmission. In all animals, we implanted a glass "window" over the dorsal spinal cord that allowed us to track synaptic-structural changes in the same neuron over a period of 7 days. We included a total of 9 transgenic animals (n=14 control; n = 5 injured) that expressed a neuron-specific fluorescent reporter that allowed us to intravitally image their spinal cord tissues in real time. We quantified 3 defining characteristics of dendritic spine dynamics throughout the course of injury and pain onset; including: 1) ongoing steady-state fluctuations (i.e., spine length and maximal head diameter), 2) de novo formation and elimination (i.e., including spine turnover activity), and 3) post-injury spine density.

Results

Our primary outcome assessments have been highly informative. We successfully profiled the in vivo dynamics of dendritic spines over time on the same neurons before and after nerve injury-induced pain. As expected, 3- and 7-days after injury, animals exhibited progressive increases in pain sensitivity in response to adverse mechanical and thermal stimuli. Along with pain onset between post-injury days 3 and 7, we observed an overall increase in dendritic spine turnover activity. Interestingly, the temporal progression of pain severity paralleled changes in spine turnover activity. Early after nerve injury, we observed a reduction in thin-shaped spine elimination (as compared with controls) that was followed by an increase in mushroom-shaped spine formation (coinciding and predictive of the presentation of maximal pain).

Conclusion

In summary, our study demonstrates for the first time the ongoing, steady-state changes in dendritic spine dynamics in the dorsal horn associated with nerve injury and pain. This study further demonstrates the potential utility of assessing the real time efficacy and biological action of novel pain therapeutics. Ultimately, the relationship between altered dendritic spine dynamics and neuropathic pain may serve as a structural-based opportunity to investigate mechanisms of pain following injury and disease, including SCI.

Learning Objectives

- Discuss the challenges of developing more effective and durable treatments for pain following nerve injury
- Describe the link between dendritic spine dynamics and pain-neuron hyperexcitability in the spinal cord
- Review how newly emergent intravital imaging technologies can advance SCI and chronic pain research
- Discuss the potential application for real-time imaging technology for novel pain therapeutic development

(2238) Targeting Intra-Axonal RyR and IP3R Mediated Ca2+ Release Reduces Secondary Axonal Degeneration Following SCI

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Abstract Body

Preventing axon loss after traumatic spinal cord injury (SCI) is an important therapeutic goal. Axonal Ca2+ overload is established as a key facilitator of axonal injury following SCI. Previously, we showed that intracellular calcium release through both RyRs and IP3Rs contribute to axonal dieback and axonal loss following an ex vivo laser-induced SCI. Here, we use an intravital imaging approach using two-photon excitation microscopy of implantable spinal cord imaging chambers to assess the role of RyR- and IP3R-mediated Ca2+ release on secondary axonal degeneration following a clinically-relevant in vivo contusion model in real-time. We hypothesize that blocking intracellular Ca2+ release from RyR and IP3R will diminish secondary axonal degeneration following contusive SCI. Briefly, adult, 6-8 week old Advillin-Cre:Ai9 mice that express “floxed” tdTomato in ascending dorsal columns of the spinal cord were imaged using two-photon excitation microscopy. Mice were subjected to a mild, 30 kdyn contusion at T12 and received the RyR blocker Ryanodine (50 µM) or the IP3R blocker 2-aminoethoxydiphenylborane (2-APB; 100 µM) intrathecally 3 hours and 24 hours post-SCI. We found that targeting IP3R mediated intra-axonal Ca2+ release beginning 3 hours after SCI, significantly reduced axonal spheroid formation at 24 hours post-SCI (181.29 ± 51.18 spheroids/ mm2 with 2-APB treatment vs. 378.40 ± 156.14 spheroids/ mm2 with vehicle control; mean ± SD; t=-2.938; p=0.015). Furthermore, quantification of axonal survival at 24 hours post-SCI revealed that delayed 2-APB treatment significantly increased axonal survival (51.19 %; 46.54 2-APB vs. 33.51 %; 29.72 vehicle control; median and 25th percentile; p=0.026). Similarly, inhibition of RyR with ryanodine significantly increased axonal survival at 24 hours post-SCI (49.51 %; 42.78 ryanodine vs. 37.98 %; 30.26 vehicle control; median and 25th percentile; p<0.01). Together, these data reveal a role for RyRs and IP3Rs on axonal degeneration in vivo after SCI and suggest that blocking intracellular Ca2+ release is axoprotective in a clinically relevant contusion model.

Learning Objectives

- Discuss mechanisms of secondary axonal degeneration
- Describe intravital microscopy as an important tool to assess dynamic processes of axonal degeneration as these occur in real-time.
- Explain the concept of inside out calcium signaling within axons versus outside-in mechanisms of axonal degeneration
- Describe the use of Cre: Lox recombination to observe axons and axonal Ca2+ dynamics in real-time

(2239) Living with Multiple Sclerosis in the COVID-19 Era: Review and Case Discussion

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Abstract Body

Background

The COVID19 pandemic has created unique challenges for patients with multiple sclerosis (MS) including the choices about immune modulating therapies. It is unclear if patients with MS are more susceptible to COVID19 infections and COVID19-related mortality compared to other populations.

Purpose

The goal of this symposium is to review the background, decision-making process and follow-up for health care providers caring for patients with MS during the COVID19 pandemic.

Methods

We will assess the VA MS Surveillance Registry (MSSR), the National CoVID19 registry and the VA Corporate Data Warehouse (CDW) to identify cases with MS and COVID19. The following variables will be assessed for 2020-21 in this cohort: outpatient and inpatient utilization, admissions to the intensive care unit, infectious symptoms and signs, and mortality. A literature review of the benefits and potential untoward effects of available COVID19 vaccinations will be performed. Finally, the tools within the current electronic medical record system and the new Cerner electronic medical record that our team has help build will be reviewed.

Results

Our team will review the following topics related to cases with MS and COVID19: 1) Morbidity and mortality data from the VA health care system in 2020 for patients with MS and comorbid COVID19 infection; 2) COVID19 vaccination recommendations for patients with MS; 3) MS Disease modifying therapy options and monitoring tools. The last section will be devoted to case presentations of patients with MS and comorbid COVID19 to assess lessons learned and engage the audience in discussion.

Conclusions

Clinical outcomes of MS and COVID19 infection are unique within the military population compared to other population-based cohorts. The critical role of vaccination in the prevention of COVDI9 morbidity and mortality in patients with MS is an important point to understand and transmit. Finally, to maintain safety and efficacy, MS health care providers should be familiar with the powerful tools in the electronic record systems and registries to monitor MS disease modifying therapies over time.

Learning Objectives

- Understand the impact of the CoVID-19 pandemic on MS outcomes
- Be able to define and discuss the efficacy and potential side effects of the approved CoVID-19 vaccines
- Appreciate the tools to follow-up patients with MS taking disease modifying therapies
- Understand psychosocial consequences of the CoVID-19 pandemic on patients with MS and their caregivers

(2240) Aquatic Rehabilitation for SCI Patients with Complex Medical Condition

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Abstract Body

Background and Issues

Aquatic therapy is a valuable therapeutic tool for patients with spinal cord injury (SCI). However, many patients with spinal cord injuries present with various complex comorbidities that could potentially complicate their participation in aquatic therapy. Oftentimes institutions, out of an abundance of caution, restrict access to the aquatic environment for patients with neurological paralysis. Our educational session will describe the medical management of those suffering from paralysis in preparation for aquatic-based therapies, the medical management of complex co-morbidities affecting participation in pool therapy, discuss in detail our policies and procedures, and finally describe an overview of various physical and occupational aquatic treatment options. The benefits of aquatic rehabilitation, as well as the added benefits of the underwater treadmill, will be reviewed in detail in addition to the adaptations that therapists can make when treating both children and adults with spinal cord dysfunction.

Purpose:

1. To demonstrate safety within the aquatic environment for patients with spinal cord injury including those with complex medical comorbidities such as colostomy bags, supra-pubic tubes, indwelling catheters, pressure injuries, tracheostomy tubes, hemodialysis ports, and ventilators.
2. To demonstrate therapeutic benefit of aquatic therapy amongst patients with spinal cord dysfunction
3. To describe specific aquatic interventions and task modifications for adult and pediatric patients with neurological paralysis.
4. To describe policies and procedures in Aquatic based rehabilitation for patients with complex medical conditions

Methods

We evaluated individuals with SCI with at least one of the following co-morbidities and invasive appliances: urinary catheters, trachea tubes, pressure ulcers or colostomy bags through a scientific retrospective chart review. All participants underwent skilled aquatic therapies in one hour sessions.

Results

Lessons Learned: Adult patients with SCI have demonstrated improvements to strength, range of motion, balance and coordination with aquatic therapy interventions. These gains can be translated into functional improvements in activities of daily living including feeding, dressing, bathing, toileting, transfers, and ambulation. Our subjects demonstrated statistically significant improvement in total mobility and self-care of the Spinal Cord Independence Measure version III (SCIM III) and the American Spinal Injury Association Impairment Scale (AIS) motor scores. Some patients increased the distance in their 6 minute walk test (6MWT).

Conclusions

SCI patients with complex co-morbidities can effectively participate in specialized aquatic therapy without complications and achieve clinically significant functional benefits.

Keywords

Aquatic therapy, Hydrotherapy, Spinal cord injury, Rehabilitation, Rehabilitative intervention, gait training, co-morbidities, invasive appliances, spasticity, neurogenic bowel, neurogenic bladder, environment.

(2241) Scuba Diving as a Prospective Recreational Therapy Modality for Individuals with Spinal Cord Injury

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Abstract Body

The unique physical and physiological qualities of underwater diving allow for persons with a range of abilities to participate in scuba diving. In this context, scuba diving can be applied as a modality of therapeutic recreation. Multiple components of scuba diving provide benefits specific to the physical, physiological, and psychosocial conditions experienced by persons living with spinal cord injury (SCI). This presentation will discuss the theory and practice of scuba as a therapeutic modality for persons with SCI. First, we will provide an overview of the theoretical and physiological considerations of diving with a SCI. This section will review both the adverse and favorable considerations for diving with a SCI. Secondly, we will review existing practices/guidelines used to execute adaptive scuba. In doing so, we will use real-world examples from our community partners (Theraputic Scuba Institute, Inc, and Veterans Ocean Adventures) to demonstrate the practice of scuba diving as a mode of therapeutic recreation. We place an emphasis on using multi-media approaches to demonstrate the execution of a dive with an adaptive dive team. This section will also provide resources regarding certifying agencies, equipment modifications, and existing organizations that facilitate adaptive scuba. After attending this presentation, individuals with SCI and their allies will have knowledge on the unique physiology of scuba diving with a SCI. Furthermore, participants will be informed about, and will have vicariously experienced, the practice of scuba diving as recreational therapy for persons with SCI. It is our hope that this presentation will generate community and professional interest in scuba as a therapeutic modality that inspires community research partnerships to further study and establish the therapeutic potential of adaptive scuba.

Learning Objectives

- The learner will be able to recognize the safety considerations and equipment modifications required to scuba dive with a SCI.
- The learner will be able to discuss the potential physical, physiological, and psychosocial benefits of scuba diving with a SCI.
- The learner will be able to identify resources used in the practice of adaptive scuba diving.
- The learner will be able to recognize optimal set and setting for the successful practice of adaptive scuba.

(2242) ALS Using the Past to Predict the Future

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Abstract Body

Amyotrophic lateral sclerosis is a neurodegenerative disease characterized by progressive, painless muscle weakness due to motor neuron death in the brain and spinal cord. Once considered a fairly uniform disease, the presentation of ALS can vary by site of onset, progression of disease and associated clinical findings such as cognitive dysfunction. This heterogeneity makes the diagnosis of ALS a challenge. Although the specific mechanisms underlying neurodegeneration in ALS is unknown, numerous cellular and molecular processes have been implicated. Furthermore, rarer genetic forms of ALS are providing insight on disease mechanisms and leading to potential therapies. The main focus of treatment is symptomatic management to improve quality and duration of life. There are currently two approved therapies to modify disease progression. Advances in clinical trial design will expedite the assessment of new therapies and precision medicine approaches to ALS will allow for targeted therapies. ALS is the neuromuscular disease with the largest number of clinical trials at this time and there is promise that recently completed trials will lead to further approved therapies. It is an exciting time for the field of ALS, and more importantly, those living with this disease, to provide relief suffering with this condition.

Learning Objectives

The Learner will:

1. Be familiar with current diagnostic criteria for ALS
2. Describe common symptoms and signs of ALS
3. Recognize genetic forms of ALS
4. Be familiar with disease modifying and symptomatic treatments for ALS
5. Review the current data on clinical trials for treatment of ALS

(2243) Enhancing Recovery after Spinal Cord Injury with Closed-Loop Vagus Nerve Stimulation

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Abstract Body

We have developed an innovative strategy using brief bursts of closed-loop vagus nerve stimulation (VNS) paired with rehabilitation to improve recovery after a range of neurological injuries. VNS drives phasic activation of neuromodulatory systems which augment synaptic plasticity in motor networks. Our preclinical studies in models of spinal cord injury (SCI), stroke, and nerve damage demonstrate that VNS paired with rehabilitative training significantly enhances synaptic plasticity and facilitates recovery of motor function compared to equivalent rehabilitative training without stimulation. Moreover, data from three clinical trials, including a recently completed Phase 3 pivotal study, demonstrates that VNS paired with rehabilitation is safe and triples recovery of upper limb motor function compared to rehabilitation without VNS. As a result, VNS with rehabilitation has received FDA approval for chronic stroke.

Based on these promising studies, we are expanding the use of this therapy to a first-in-human clinical trial to evaluate the ability of VNS paired with rehabilitation to enhance recovery of upper limb motor function in patients with chronic SCI. Here, we present the initial findings from this ongoing double-blinded, partial crossover clinical study.

Participants with an incomplete cervical spinal cord injury occurring at least one year ago that impaired upper limb use were enrolled and implanted with a VNS device on the left vagus nerve. Participants are randomized 1:1 to receive either active VNS or placebo stimulation during rehabilitative therapy. Beginning two weeks after implantation, all participants undergo six weeks of physical rehabilitation with a licensed therapist. During rehabilitation sessions, the therapist uses a software app to trigger brief bursts of VNS coincident with rehabilitative exercises, as appropriate for group assignment. After the initial six-week blinded portion of the study, outcomes are assessed. Participants then enter the open-label extension, in which all participants undergo an additional six weeks of rehabilitation with active VNS, regardless of initial group assignment. Safety is assessed throughout the course of the study. Functional outcomes measures are assessed prior to therapy, at the end of the blinded portion, and at the end of the open-label portion and include changes in GRASSP score and strength and range of motion of the hand and wrist. The study is registered on ClinicalTrials.gov: NCT04288245.

This therapy received Breakthrough Device designation by the FDA in February 2021. To date, six participants have completed the first phase of the study. No serious adverse events have been reported. Additionally, all participants have received therapy according to the prescribed study design. Together, these preliminary findings suggest that VNS therapy is safe and can be feasibly delivered in individuals with chronic SCI. Moreover, initial analysis shows that individuals that receive active VNS with rehabilitation demonstrate notable improvements in GRASSP score and pinch strength. We expect to have completed at least 15 participants by the end of summer 2022. We will present up-to-date safety data and functional outcome measures at this meeting. Together, these initial findings demonstrate that VNS therapy represents a potentially transformative strategy to enhance recovery of upper limb function in people with SCI.

Learning Objectives

- Define the current applications of VNS to enhance motor and sensory recovery after neurological injury, including SCI, TBI, peripheral nerve injury, and stroke.
- Describe the ongoing trial evaluating the use of VNS paired with rehabilitation as a means to improve recovery of upper limb function after SCI.
- Apply neuroscience and engineering principles to optimize VNS-based targeted plasticity therapies to maximally improve motor and sensory recovery.
- Describe the importance of stimulation timing to VNS-dependent effects.

(2244) Early Utilization of Diaphragm Pacing During the COVID-19 Pandemic for Spinal Cord Injured Patients

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Abstract Body

Objective

Decreasing the burden of mechanical ventilation (MV) for spinal cord injuries (SCI) was never more relevant than during the COVID-19 pandemic. Data has consistently shown diaphragm pacing (DP) can replace MV, decrease wean times, improve respiratory mechanics and decrease hospital costs for SCI patients. This is largest analysis of DP implants during the COVID-19 pandemic.

Purpose and Objectives

One, discuss the effects of limited MV on SCI patients. Two, review the technical aspects of DP. Three, outline protective effects of DP on ventilation and preventing pneumonia. Four, discuss effects of DP on morbidity and mortality.

Methods

This is a retrospective analysis of prospective IRB approved databases of non-randomized interventional experience at a single institution. Subgroup analysis was then limited to traumatic cervical SCI that were implanted laparoscopically with diaphragm electrodes within 30 days of injury.

Results

The database included 197 patients with DP implantations from 1/2020 to 1/2022 for all indications. For the study group of early implanted traumatic cervical SCI, there were 13 (all male) patients with average age at implant 49.3 years (range 17-70). Injury mechanisms included falls (6), MVA (4), GSW (2) and diving (1). Time from injury to DP averaged 11 days (range 3-22). Two patients are deceased and neither weaned from MV (one withdrew care 14 days post injury and one withdrew care after decubitus sepsis in rehabilitation center day 86 post injury). Nine of the remaining 11 patients weaned from MV. Four patients never had a tracheostomy and three additional patients had tracheostomy decannulation. The two who failed to wean had good stimulatable diaphragms at surgery but had significant difficulty with long term care facilities for weaning with no family support. Three of these high risk pulmonary compromised patients survived COVID-19 infections utilizing DP.

Conclusions

Early DP successfully weaned from MV 82% of patients surviving past 90 days. 44% of this group never underwent a tracheostomy. Only 22% of the weaned group of quadriplegics required tracheostomies for secretions. Obstacles to weaning with early DP were not related to DP: patient withdrawal of care and long term care issues. Decreased MV and tracheostomy use allowed earlier and easier placement for rehabilitation. Early DP for SCI once stabilized is a strategy to be employed to decrease MV usage especially when faced with critical needs of MV during future disasters or pandemics.

Learning Objectives

- Discuss the effects of limited resources of mechanical ventilation on Spinal Cord Injured patients
- Review the technical aspects of choosing patients and implanting patients with diaphragm pacing
- Review management of acute respiratory failure in spinal cord injured patients including tracheostomy and temporary or permanent diaphragm pacing
- Outline ways to decrease pneumonia rates in spinal cord injured patients and thereby decrease early morbidity and mortality

(2245) "They Know. They've Lived it." Introducing the New Voices of Experience SCI Video Series

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Abstract Body

Background:

This panel-plus-videos program presents Voices of Experience, a recently released 10-part video series for people with new spinal cord injuries that features people who have been living with spinal cord injuries for years. It was specifically created for distribution on the Spinal Cord Injury (SCI) Model Systems in-hospital TV networks, and is available online at no cost. The series introduces newly-injured patients to a wide-ranging group of subjects and people who share the world they are now entering.

Design

Voices of Experience is designed to talk directly to people with spinal cord injuries about the questions, issues and concerns that are most important to them in the early days and months after their injuries. Each compelling 10-minute video deals with a single question, and offers intensely honest answers from a diverse group of people who know what they're talking about because they've lived it themselves. The series covers personal subjects—dating, sex, fertility, relationships, fears and feelings—that people are often unwilling or uncomfortable about bringing up during group counseling sessions, or even in face-to-face talks with medical professionals.

A focus group of SCI professionals at the Shirley Ryan AbilityLab provided insight and direction regarding the subjects to be covered by the series.

The individuals in the videos were drawn from FacingDisability.com's library of more than 3,500 videos of people coping with SCI. A discussion guide was created by the Shirley Ryan AbilityLab to accompany the series.

Voices of Experience is a joint project of the Shirley Ryan AbilityLab, the Hill Foundation and FacingDisability.com. It was partially funded by a grant from NIDILRR to the Midwest Regional Spinal Cord Injury Care System.

Method

The Voices of Experience presentation will include screenings of two complete videos and a video montage that presents an overview of the entire series. A panel of highly-experienced VA professionals will conduct a wise and lively interactive audience discussion on how members of veterans' SCI healthcare teams can use the videos to help provide insights, hope and motivation for their patients.

Results/Conclusion:

This impactful new video series is valuable resource for all the members of the PVA professional community.

Learning objectives

- Describe and use a new, easily accessible video and Internet resource for SCI patients and clinicians
- Discuss new ways to open conversations about emotionally-laden subjects with SCI patients
- Analyze the value of personal experiences—how do they lead the way?
- Discuss how clinicians can use video interviews to help patients develop new personal insights

(2246) Challenges Faced by Persons with Spinal Cord Injury During the COVID-19 Pandemic: A Consumer-Direct Survey

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Abstract Body

Background

Physio-pathological risks and distinctive health determinants increase vulnerability for infection with Sars-Cov-2 and severe COVID-19 outcome in persons with Spinal Cord Injury (SCI). Stay-at-home orders and social distancing guidelines during the pandemic have had negative repercussions on this population including healthcare disruption, increased morbidity and negative psychosocial effects. In early 2020, when New York (NY) and New Jersey (NJ) became the epicenter of the pandemic, reports from the frontlines recorded severe gaps in the provision of care to people with SCI living in the area. A comprehensive survey of the effects and challenges people with SCI faced, was lacking, limiting the ability to understand and mitigate the effects of COVID-19 and prepare for future disasters. To fill this gap, a group of clinicians and researchers from four SCI Centers in the NY and NJ area, initiated a regional collaboration to share incoming data and to plan systematic investigation of the effects of COVID-19 on people with SCI. As a result, a REDCap survey was created.

Purpose

The survey was designed to gather information relative to four aspects of COVID-19 impact. The first would document the direct health impact of COVID-19 on people with SCI as it related to exposure, vaccination, diagnosis, symptoms, and complications. The second was to record the indirect health impact as it related to changes in access to caregiver services, regular medical care, medications and supplies. The third was to examine the socioeconomic impact as it relates to employment/occupational status and the psychosocial and mental health impact as it relates to substance use, anxiety, depression, coping with isolation, social interactions, peer support, and ability to exercise. Lastly the fourth related to gaining insights to emergency preparedness and the success of the adoption of novel ways to providing healthcare services through telehealth/telemedicine.

Methods

Prospective observational cohort survey study of people with SCI administered from July 2020 through August 2021. The primary dissemination method was via an online link to a survey conducted in a HIPAA-compliant IRB-approved REDCap database hosted by the Icahn School of Medicine at Mount Sinai.

Results

Two hundred and thirty six people with SCI completed the survey. Among participants, confirmed COVID-19 infection was uncommon (3.8%). Thirty percent of participants reported reduced access to medical services, including loss of PT/OT services and 10% reported loss of function. Among participants, 77% reported using telehealth/telemedicine services. Caregiver services were used by >50% of participants prior to the pandemic, of whom 26% reported lost or reduced services. Impaired wheelchair or stairlift maintenance was reported by 38% of participants. Mental health challenges were common: 41% and 27% of participants reported feeling more anxiety and more depression respectively than before the pandemic. Of the 134 respondents who participated after vaccines availability, 57% were vaccinated.

Conclusions

COVID-19 infections were uncommon among respondents. However, substantial impacts of the pandemic were reported, including: disrupted medical services, functional losses, reduced caregiver or home services, impaired wheelchair maintenance, and increased anxiety and depression.

Learning Objectives

- Cites some of the challenges persons with SCI faced during the COVID-19 pandemic
- Describe the direct impact of COVID-19 on the health of persons with SCI
- Explain the psychosocial and mental health burden of COVID-19 in persons with SCI
- List at least three elements that can be adopted to mitigate the effects of future disasters on persons with SCI

(2247) Social Isolation and Loneliness Experiences and Treatment Preferences Among Individuals with Spinal Cord Injuries

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Abstract Body

Background

People with a disability experience significantly higher rates of social isolation and loneliness than those without a disability. In the general population, social isolation and loneliness contribute to high blood pressure, poor sleep, and high cortisol and predict depression, cognitive decline, cardiovascular disease, and premature death. A meta-analysis found that lack of social connectedness heightens health risks as much as smoking 15 cigarettes a day or having an alcohol use disorder and that loneliness and social isolation are twice as harmful to physical and mental health as obesity. Social isolation and loneliness understudied in individuals with spinal cord injuries (SCI). The few existing studies reported that social isolation and loneliness are common in persons with SCI yet are poorly managed and/or treated.

Purpose

To understand social isolation and loneliness experiences from the perspectives of individuals with SCI and to gather insight on their treatment/intervention preferences.

Methods

Descriptive qualitative design using interviews conducted with Veterans with SCI. During a one-on-one telephone call, a brief survey was conducted to collect demographic and injury characteristics followed by in-depth semi-structured interview (n=9). Audio-recorded and transcribed verbatim transcripts were coded and analyzed using Braun and Clarke's (2006) six thematic analysis phases.

Results

The sample was mostly male (~80%), about half had paraplegia and half tetraplegia. Participants identified themes describing experiences with social isolation and loneliness both pre- and post-injury. SCI-specific barriers to desired frequency and quality of social interactions and ideal social connections were identified. Participants described preferences and perceived facilitators to treatments they would find acceptable and helpful to manage social isolation and loneliness, including virtual options and engagement with peers with SCI.

Conclusions

Many individuals with SCI experience social isolation and loneliness but are not often offered nor do they seek treatment. Barriers to social interaction exist for people with SCI due to secondary conditions and challenges with participation, putting individuals with SCI at increased risk for the many physical and mental health risks associated with loneliness and social isolation. To date, there are no published treatment interventions to address social isolation and loneliness in persons with SCI. In other populations, Interventions utilizing peers have strengthened feelings of social connectedness and encouraged help seeking, engagement in, and adherence to recommended early treatment for mental and emotional health concerns. Findings suggest that accessible, possibly peer-based efforts are needed to better identify and respond to social isolation and loneliness in community and healthcare settings.

Learning Objectives

- Describe key themes identified by individuals with SCI about their experiences with social isolation and loneliness.
- Discuss desired frequency and quality of social interactions and ideal social connections among individuals with SCI
- Discuss barriers to social interactions and ideal social connections among individuals with SCI.
- Describe preferences and perceived facilitators to treatments/interventions that individuals with SCI would find acceptable and helpful to manage social isolation and loneliness

(2248) An SCI/D Inpatient Unit's Transition to Include ALS care: When Rehabilitation Meets Palliative Care

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Abstract Body

Background

Spinal Cord Injury/Disorder Centers within the VA system of care have long provided multidisciplinary inpatient and outpatient care for veterans with Spinal Cord Injury and Disorders. This has not always included inpatient care for Amyotrophic Lateral Sclerosis (ALS), in spite of the fact Veterans are almost two times as likely to be diagnosed with ALS compared to the general population (1). In an effort to meet the growing needs of veterans diagnosed with ALS, in 2008, the Department of Veterans Affairs officially changed their benefits criteria to include ALS as a presumptive service connected condition. Since that time, many SCI/D Centers have assisted patients with ALS to obtain durable medical equipment, wheelchair /seating evaluations, and environmental control systems, all of which fall within the expertise of SCI/D Centers. To date, not all SCI/D Centers provide multidisciplinary care to patients with ALS in spite of the growing body of evidence of the benefit of such care. (2, 3, 4, 5, 6) The diverging trajectories of rehabilitation and palliative care may be part of the barrier due to the added challenges and areas of differing expertise.

Our SCI/D unit recently accepted the transfer of a Veteran with ALS to our unit for multidisciplinary care. We will discuss the preparation required, challenges encountered in the transition, ongoing patient care and disease management.

Purpose

The purpose of this presentation is to identify the steps necessary to initiate multidisciplinary care for persons with ALS on an SCI/D unit. A case presentation will be included to illustrate some of the challenges when providing care for a patient with late stage ALS on a unit specialized in SCI/D rehabilitation.

Methods

The multidisciplinary team (MDT) will identify administrative/staffing needs, provide a description of identified team trainings on ALS care, clarify unique symptom management issues and required culture shifts in the care model. Special emphasis on respiration, communication, and psychosocial issues will be discussed.

Results: The MDT will share the benefits of team training prior to initiating care, the shift in patient focused behavioral management goals, impact of psychosocial factors on care and the importance of providing staff support.

Conclusion

The MDT will offer recommendations on how to successfully incorporate multidisciplinary care for ALS into an SCI/D focused center.

Learning Objectives

- Describe communication challenges associated with advanced ALS.
- Explain the difference between rehabilitative and palliative care in ALS.
- Identify 2 staff challenges associated with incorporating ALS care in a multidisciplinary SCI/D Center.
- Describe staff education needs when initiating ALS care.

(2249) Solutions to Address Air Travel issues for Non-Ambulatory Wheelchair Users Based on PVA Funded Research

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Abstract Body

The PVA Research Foundation supported the study of manual and powered wheelchair users to evaluate different boarding devices and to make transfers into and out of airline seats using different transfer techniques and technologies. Pressure measurements of each subject were made sitting in their personal wheelchair and in aircraft seating. Our lab identified significant commercial air travel related issues. These included the steepness of aircraft jetways, the hazards of using boarding devices, the narrow aisleways in commercial aircraft, the difficulties and hazards of transferring to aircraft seating, the hazards of getting a pressure sore while sitting in aircraft seating, the inadequacy of onboard wheelchairs to get to the lavatory, the inadequacy of onboard lavatories and the damage that occurs to manual and powered wheelchairs during air travel. This presentation will review the results of this research outlining all of the issues that were identified. As a result of identifying these issues, Beneficial Designs initiated a standards committee which has identified the features that powered wheelchairs must have to better survive the rigors of commercial travel. The RESNA, Rehabilitation and Assistive Technology Society of North America, Assistive Technology for Air Travel Standards Committee has approved and published a standard defining the specifications for the design of wheelchairs that are less likely to be damaged during air travel. The committee is also drafting procedures for the handling of manual and powered wheelchairs. Air carriers, wheelchair manufacturers and prominent disability organizations are participating in this standards development process. This presentation will review the features that should be selected for air travel when prescribing a manual or powered wheelchair. Some wheelchair manufacturers are already manufacturing powered wheelchairs with many of these features. An overview of how to be aware of each of the identified air travel issues will be reviewed to enable health care providers to assist clients who are non-ambulatory to be more prepared for their next commercial air travel adventure.

Learning Objectives

- Participants will be able to describe how to prepare their powered mobility device for air travel.
- Participants will be able to list the most important design features a powered wheelchair must have to withstand the rigors of air travel.
- Participants will be able to describe how a non-ambulatory passenger can prepare an Air Travel Information card for their present wheelchair to reduce the chance of damage to their wheelchair.

- Participants will be able to advise their clients about how to prepare for and avoid the other hazards associated with air travel so they will not end up in the hospital after flying commercially.
- Participants will understand the difference between the ADA and the Air Carrier Accessibility Act

(2250) Value-Driven Low-Cost High-Performance Personalized Modular SquishINS Cushion for Pressure Relief

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Abstract Body

Background

Value driven engineering in assistive technology can provide high performance with lower cost. The wheelchair cushion plays an essential role in maintaining quality of life, providing sitting stability while decreasing skin breakdown risk and increasing overall sitting tolerance. High quality affordable wheelchair cushions are needed for effective pressure relief for people with limited access to advanced assistive technology.

In response to requests from Veteran end users, we have developed a modular wheelchair cushion using value-driven engineering principles to provide effective personalized high-performance pressure relief at low cost.

*Squish*INS are an innovative concept for modular wheelchair cushions, designed to change shape and distribute applied seating forces evenly. The *Squish*INS cushion modular design allows individual *Squish*INS inserts to be replaced or relocated. Personalized *Squish*INS cushions can be created and adjusted using our patented cushion fitting process.

Design

Setting: VA Medical Center

Study design: Wheelchair cushion development and testing

Outcome: The primary project goal is to minimize the overall cost of personalized high performance wheelchair cushions for Veterans and others.

Methods

*Squish*INS inserts are additively manufactured using modified low-cost desktop Lulzbot printers. Each class of *Squish*INS has varying inner structures which alter stiffness by up to 40%. Mechanical properties are evaluated using ISO 16840-2 benchmarking test protocols; (1) Load/displacement compression testing of individual *Squish*INS over a force range relevant to seating. (2) Creep testing to determine how *Squish*INS respond to loading applied continuously for an hour, (3) Hysteresis testing determines the role of adding and removing seating loads, (4) Overload Recovery

Testing determines the cushion's response to excessive localized pressure. (5) Temperature and humidity under load over time have been tested using a standardized Sitting Microenvironment simulator.

Attendees at the 2018 PVA Summit were surveyed. They were asked whether they considered it valuable to be able to personalize each user's wheelchair cushion and whether it would be useful to replace only part of a cushion

Results

3D printing has created *Squish*INS that combine lightness and variable stiffness. (1) ISO 16480-2 standards testing indicates that the modular cushion performs better than, or equivalent to, the most widely prescribed high-performance cushions. microenvironmental testing indicates that the *Squish*INS cushion has low moisture and temperature levels at the user/cushion interface

2018 PVA Summit respondents expressed interest in using a low-cost high-performance cushion for themselves or their clients. Personalization of *Squish*INS cushions and the ability to replace only part of the cushion were considered to be very or extremely useful. It was also considered that many people would benefit from a high-performance wheelchair cushion available at low cost.

Conclusions

Due to high direct cost, many individuals considered to be at mild to moderate risk for tissue breakdown don't get advanced pressure relief cushions until they develop pressure injuries. The unique modular design of the *Squish*INS cushion enables low-cost customization and high performance to provide effective personalized distribution over the cushion surface by adjusting to the user's unique anatomy. *Squish*INS cushions are suitable for all wheelchair users.

Learning Objectives

- Discuss the advantages to Veterans and clinicians of effective personalized high-performance pressure relief cushions.
- Describe the use of value-driven engineering principles in a high performance, low cost wheelchair cushion.
- Discuss the advantages to Veterans and clinicians of a modular cushion, for which parts can be replaced.
- Describe the modular design of the *Squish*INS cushion.

(2251) Feasibility and Safety of a High Intensity Interval Training Based Handcycling Activity in People with SCI

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Abstract Body

Background

With over 50% of veterans with spinal cord injuries (VwSCI) presenting signs and symptoms of cardiovascular (CV) disease, researchers are searching for novel exercise methods to enhance this population's CV health. Unfortunately, exercise recommendations using traditional forms of exercise, like moderate intensity continuous training (MICT), are ineffective at improving this population's CV health. High intensity interval training (HIIT)—exercise that alternates vigorous submaximal burst with periods of active recovery—is an alternative exercise solution for improving the cardiovascular health of VwSCI. However, HIIT should be evaluated for biomechanical safety, especially considering high rates of shoulder overuse injuries in people with spinal cord injuries.

Purpose

Examine the feasibility of a HIIT-based handcycling activity in persons with SCI (PwSCI). Researchers examined the metabolic responses, applied forces at the handle, and acceptance of HIIT compared to MICT at matched workloads.

Methods

16 PwSCI (8 female, 8 male, age=25±7 years) were recruited for this IRB-approved study. Researchers instrumented a recumbent handcycle with a load cell to measure three-dimensional applied forces at the hand crank. A power meter attached to the handcycle measured power output. For all exercises, participants were connected to a heart rate (HR) monitor and open-spirometry to obtain oxygen uptake (VO2) kinetics. Motion capture markers were placed on participants to obtain kinematic data during exercise trials. Participants performed 3 exercise tests: first, an incremental test to exhaustion to determine peak power output (PPO). The second test was a 20-min HIIT session alternating 1-min bursts at 90% PPO with 1-min recovery periods at 10% PPO. Lastly, participants cycled in a MICT session at 45% PPO until total workload matched HIIT session. Following both HIIT and MICT, participants completed acceptance surveys: the Physical Activity Enjoyment Scale (PACES), Barriers Specific Self-Efficacy Survey (BARSE), and the Multidimensional Outcomes Expectation Exercise Survey. Cardiometabolic outcome measures included average metabolic equivalent of task (MET), average HR, and kilocalories burned per minute (kcal/min). Biomechanical outcome measures included mean and peak hand forces and fraction of effective force (FEF), which is tangential force/total force. Based on data normality, paired t-test or Wilcoxon Signed Rank test was used to compare outcome measures across exercises.

Results

Compared to MICT, HIIT required significantly greater average METs and HR to complete. Additionally, HIIT burned more kcal/min than MICT. Mean and peak hand forces were significantly higher during HIIT than MICT; however, there was no difference in FEF between MICT and HIIT trials. No difference existed between HIIT and MICT trials for PACES and BARSE survey. Participants believed that HIIT would lead to better health outcomes than MICT.

Conclusions

HIIT appears to more effectively strain the cardiometabolic system of PwSCI. Force outputs were higher during HIIT; however, mechanical efficiency, represented by FEF, during HIIT was similar to MICT. This may indicate that the upper limbs are loaded similarly during both HIIT and MICT. PwSCI may accept HIIT as an optimal exercise mode over MICT due to enhanced outcome expectations. HIIT shows promise as a viable exercise option for PwSCI.

Learning Objectives

- Identify current barriers to exercise for people with spinal cord injury and how high intensity interval training may provide a viable solution
- Describe how varied exercise intensity affects the cardiorespiratory system and musculoskeletal system of people with spinal cord injury: ideally, exercise optimizes cardiorespiratory strain without causing injury from soft tissue strain

- Recognize how applied forces at the hand can be used as an indication of loading at the proximal joints (i.e., elbows and shoulders)
- Explain how people with spinal cord injury enjoy varied intensity exercises and perceive their self-efficacy and outcome expectations towards long-term exercise adherence

(2252) The Influence of Gender and Shoulder Kinematics on Head-Hip Transfer Technique

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Abstract Body

Background

Level and non-level transfers are essential tasks of daily living for manual wheelchair users (MWCUs). However, transfer tasks may cause excessive upper-limb strain and shoulder pain if performed incorrectly. Clinicians recommend the head-hips (H-H) technique during transfers to increase vertical hip displacement and reduce the risk of shoulder strain. However, minimal data exists regarding the kinematic requirements of self-selected level and non-level transfers. Gender-based differences in shoulder pathology also warrant the examination of gender-specific kinematic techniques during level and non-level transfers.

Purpose

Examine differences in transfer biomechanics as a function of transfer type and gender.

Methods

27 full-time MWCUs (15 female, 12 male, age 23±5 years) participated in this IRB-approved study. Reflective markers were placed on all participants to obtain kinematic data. Participants completed 3 transfer types: level, uphill, and floor-to-table. Each transfer type was performed twice with adequate rest between transfers. VICON motion capture system was used to obtain joint segment angles during each transfer. At the shoulder, peak leading arm flexion/extension and abduction/adduction angles were calculated. Peak flexion/extension angle of the hip and neck—referred to as trunk flexion—and peak vertical hip displacement, relative to the shoulder, were measured. Kinematic data was filtered using MATLAB and statistically analyzed using SPSS. Based on data normality, parametric tests (e.g., independent t-test) and non-parametric tests (e.g., Kruskal-Wallis H, Mann-Whitney U) were used to determine kinematic trends across transfer types and gender. Spearman's correlation was used to analyze relationships between variables.

Results

All analyzed kinematic variables were significantly different across transfer types ($p \leq .01$). Median leading arm shoulder abduction angles for

level, uphill, and floor-to-table transfers were 25.63(19.74), 40.84(17.40), and 64.13(27.16) degrees, respectively. Median leading arm shoulder flexion angles for level, uphill, and floor-to-table transfers were 25.91(16.14), 30.38(17.51), and 53.43(29.19) degrees, respectively. Median trunk angles for level, uphill, and floor-to-table transfers were 65.49(15.64), 59.83(29.19), and 73.46(16.43) degrees, respectively. Median hip displacements for level, uphill, and floor-to-table transfers were 0.11(.03), 0.19(.02), and 0.35(.16) meters, respectively. During floor transfers, leading arm shoulder abduction (r=.45; p=.06) and flexion were moderately correlated with hip displacement (r=.55; p=.02), but not related to trunk flexion. Females engaged in more trunk flexion during level transfers (70.07 vs 62.46 degrees; p=.06) and uphill transfers (65.98 vs 56.32 degrees; p=.03) compared to males.

Conclusion

There are unique kinematic requirements to successfully performing level and non-level transfers. Shoulders may need to excessively abduct and flex to successfully complete floor-to-table transfers. Correlational analysis suggests that increased shoulder abduction and flexion may be a compensatory mechanism to increase vertical hip displacement when less trunk flexion is utilized during a transfer. Compared to males, females engage in better H-H techniques by flexing their trunks more during transfers, which may place them at a reduced risk for shoulder injury. MWCUs should try to reduce the frequency of non-level transfers while also engaging in weekly shoulder strengthening exercise to prevent chronic shoulder pain.

Learning Objectives

- Recognize the importance of level and non-level transfers on quality of life for manual wheelchair users.
- Describe the kinematic requirements for the leading arm and trunk during level and non-level transfers.
- Identify compensatory techniques to the H-H technique, which may place the shoulders at an increased risk for injury.
- Determine how women alter their transfer technique compared to men and the implication of this altered technique on shoulder health.

(2253) Addressing Healthcare Providers' Biases within the SCI/D Population

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Abstract Body

Spinal cord injury and other disorders (SCI/D) often represent a drastic life change for an individual, yet current literature supports that resilience is common among individuals who sustain severe physical injuries, including SCI/Ds (Quale & Schanke, 2010; Monden et al., 2014). Although this life change can be challenging at first, most people show resilience, find ways to adapt, and continue to have a meaningful life post injury (Richards, Kewman, Richardson, & Kennedy, 2010).

In a systematic review looking at resilience in adults with SCI/D (Kronhaber et al., 2018), factors supporting adjustment after SCI/D included optimism, positive self-esteem, strong psychosocial supports, and problem-solving skills. During rehabilitation, as well as follow-up care, support from healthcare providers is often considered

instrumental for resilience after SCI/D (Monden et al., 2014). Individuals with a cohesive support network during SCI rehabilitation also tend to have fewer health-related issues than individuals without this (White, Driver, & Warren, 2010; Monden et al., 2014). Lower levels of support can negatively impact resilience and adaptation, leading to longer hospital stays, lower functional independence, increased secondary health conditions (pressure sores, wounds, UTIs), and higher medical expenses (Richards et al., 2010). Due to the continuing nature of SCI/D care, the relationship between healthcare providers and the individuals they serve is crucial.

While many studies have examined resilience within the SCI/D population, less is known about how healthcare providers perceive resilience in SCI/D patients. The presenters conducted an IRB-approved study of healthcare providers in the SCI/D Service at the Tibor Rubin VA Healthcare System. There are no current measures of perceived resilience in others, therefore we developed a survey of 22 questions (Likert-scale and short answer) based on resilience literature. Eighty-four providers of multiple rehabilitation disciplines participated. Study results illuminate discrepancies between resilience literature and perceptions of resilience from healthcare providers, with most providers holding the belief that individuals with SCI/D experience significant psychological problems and have substantial difficulty adjusting to life.

The presentation will review results of the study and discuss clinical implications, with a focus on how to address healthcare provider's biases within this population in order to improve patient care. Literature on resilience within the SCI/D population and the fundamental role healthcare providers have will be reviewed to provide a framework for why healthcare providers' perceptions of individuals with SCI/D are important. We will discuss potential reasons for the discrepancies between resilience literature and study results. We will also delineate how healthcare providers' perceptions can impact clinical care, with special attention to addressing potential biases as a provider in order to promote positive health outcomes in our patients. Specific suggestions for promoting resilience will be presented within an interdisciplinary rehabilitation framework.

Learning Objectives

- Describe factors that contribute to resilience within the SCI/D population
- Describe how SCI/D patients' relationships with their healthcare providers can impact health outcomes
- Identify 3 reasons that healthcare providers perceptions regarding resilience might be different than what the literature suggests
- Identify clinical approaches to address provider bias and promote resilience in SCI/D patients

(2254) Older Age as a Key Determinant of Outcomes after Traumatic SCI: Myths and Facts

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Abstract Body

Background

An escalation of fall-related spinal cord injury (SCI) has been reported in the worldwide literature. This shift in the epidemiological profile of traumatic SCI reinforces the need for a better understanding of the actual impact of older age on outcomes of traumatic SCI, which could improve treatment protocols and endorse adjustments in the healthcare policies. This presentation will review multiple studies on the potential effects of older age at the time of injury on individuals' survival, on their degree of impairment and disability, on the inflammatory response to SCI, on the oligodendroglial apoptosis and axonal survival after SCI, and on the economic burden of traumatic SCI.

Design

This presentation will integrate and appraise data on the potential impact of older age that were derivate from retrospective cohort studies on clinical outcomes, histopathological and immnohistochemical studies of postmortem spinal tissue, and costing and cost-utility analyses.

Methods

This work includes: (1) data analyses on survival, degree of impairment and disability within the first year after SCI using datasets from large clinical trials; (2) data analyses on cellular inflammatory response (including neutrophils, lymphocytes and macrophages), apoptotic oligodendrocytes, axonal preservation and extent of degeneration using histopathological and immunohistochemical examination of postmortem spinal cord tissue from cases of cervical/high-thoracic SCI and control cases without prior CNS injury or disease; (3) costing analysis on the costs of initial admission at an acute spine trauma center; and (4) cost-utility analysis comparing older and younger individuals regarding their management in the acute care and rehabilitation after SCI.

Results

Mortality rates in the elderly (≥65 years) were significantly greater than those of younger individuals after traumatic SCI. Among survivors, older age was not significantly correlated with the degree of impairment or disability after traumatic SCI. Age at the time of injury did not adversely affect the inflammatory response, oligodendroglial apoptosis and axonal survival after SCI. The initial management of SCI in the elderly is costlier but similarly effective compared with younger adults. Older individuals with SCI had a longer stay in the acute spine trauma center than younger individuals, which led to greater overall hospital costs.

Conclusions

Age at the time of injury does not adversely affect neurologic and functional recovery after traumatic SCI when data analysis is adjusted for potential confounders. Age does not significantly affect inflammatory response, oligodendroglial apoptosis and axonal survival after traumatic SCI. Managing older people with SCI can be initially costlier than younger people. Those results support the notion that older people can potentially have similar benefits of the ongoing translational studies focused on neuroprotective and rehabilitative strategies. Also, improved protocols for management of older people with SCI could have a significant impact on their recovery, which in the long term, could potentially offset the increased healthcare costs during the initial management of the elderly with SCI.

Learning Objectives

- Describe the influence of older age at the time of injury on the survival after traumatic SCI.
- List the effects of older age at the time of injury on the neurological and functional outcomes following traumatic SCI.
- Discuss the effects of older age on secondary injury after traumatic SCI.
- Identify the economic impact of older age at the time of SCI.

(2255) Evidence-based Evolution of a Robotic Wheelchair for Mobility and Accessibility Enhancement: A User-Centered Design Approach

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Abstract Body

Electric Powered Wheelchairs (EPW) are key assistive devices for Veterans with Disabilities (VwD) providing independence and better quality of life. However, existing EPW are limited primarily for indoor use and have difficulties navigating

environmental barriers commonly encountered outdoors. Driving on steep hills and cross-slopes reduces the EPW' stability which may lead to tips and falls. Additionally, architectural barriers such as high curbs and lack of ramps restrict VwD who use EPW from visiting places. The lack of accessibility and environmental barriers often reduces the participation of VwD in their communities, employment opportunities, and in some cases abandonment of their EPW.

This work discusses the common driving challenges experienced by VwD highlighting the design limitations of their EPW and illustrate the design process of a novel mobility enhancement robotic (MEBot) wheelchair, intended to address these limitations. The creation of MEBot followed a user-centered design process in close cooperation with VwD who use EPW. MEBot is a robotic EPW comprised of six independently height-adjustable wheels, a modular base and powered seating functions similar to existing commercial EPW. These technical features provide advanced mobility applications such as active suspension to increase users' stability when navigating uneven terrains and a curb negotiation application to overcome architectural barriers. Two MEBot iterations were developed throughout the design process based upon users' feedback. Its first iteration (MEBot1) allowed users to adjust each wheel's height via switches to navigate over architectural barriers by following a sequence. Its second iteration (MEBot2) offered a more intuitive interface to activate automated mobility applications while the user remained in control of the applications.

Both iterations were evaluated by VwD who own EPW in terms of perceived workload demand to perform driving tasks. Two independent groups of ten participants were recruited to operate MEBot 1.0 or MEBot 2.0 through a driving course that simulated environmental barriers. Each participant received training to operate the assigned MEBot. Participants drove MEBot1 or MEBot2 for three and five trials, respectively. At the end of the study, participants rated both devices using the NASA Total Load Index (NASA-TLX) and provide their perception towards each device. A total of 20 expert power wheelchair users (16 males, 4 females) were recruited with an average age of 56.7±12.9 years and wheelchair driving experience of 14.8±8.2 years. Participants reported higher mental demand ($p=0.01$), effort ($p=0.02$), frustration ($p=0.043$), and overall NASA-TLX score ($p=0.037$) to operate MEBot1 compared to MEBot2. These scores were related to the high cognitive demand to execute the steps of MEBot1's mobility applications and to use its interface. In contrast, participants highlighted the automation of MEBot2's mobility applications and ease of learning of its interface which reduced training time and cognitive demand compared to MEBot1.

The study demonstrated the usability of robotic wheelchairs with standardized outcome measures as evidence-based to improve the safety, mobility, and accessibility of VwD when facing architectural barriers. Also, this work highlighted the importance of user's feedback within the assistive technology design process. The study was approved by the Veterans Affairs Institutional Review Boards.

Learning Objectives

- Describe limitations of EPW when facing environmental barriers
- Explain the capabilities of the mobility enhancement robot (MEBot) wheelchair
- Explain a user-centered design approach towards assistive mobility technology
- Use standardized outcome measures to evaluate usability of assistive mobility technology

(2256) Expanding Your Clinical Tool Kit, Teaching Wheelchair Users Preventative Maintenance

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Abstract Body

Background

The incidence of wheelchair repairs is rising with most recent reports indicating 62% of users requiring repairs. Individuals who experience wheelchair breakdowns are at risk not only for immediate consequences (being injury, being stranded, missing medical appointments, and missing school and or work) but also secondary consequences including rehospitalization and pressure sore development. Regular wheelchair maintenance can be used as a preventive method to reduce the amount of breakdowns that a wheelchair user experiences. This presentation will discuss a randomized control trial (RCT) evaluating the effectiveness of group wheelchair maintenance training. Additionally, it will provide evidence-based structured clinician resources to attendees that can be used to deliver the training in one's own clinical practice.

Design

RCT with an immediate group (IG) and waitlist control group (WLCG) that took place after a 6-month delay of community dwelling manual and power wheelchair (MWC and PWC) users with spinal cord injury.

Methods

The intervention consisted of 2 classes of 6-12 participants taught by 2 clinicians with didactic and hands-on learning. Data were collected at baseline, 1 month, 6 months after training. The Wheelchair Maintenance Questionnaire (WMT-Q) was used as the primary outcome measure to assess Knowledge (policy and practice related wheelchair maintenance), Capacity ("Can you do it?") and Performance ("How often do you do it?").

Results

Following the intervention, participants in both the immediate and WLCG improved in maintenance capacity (MWC and PWC, $p<0.001$) and performance (MWC and PWC, $p<0.001$) with training. Only PWC users improved knowledge of wheelchair maintenance ($p<0.001$). For both WLCGs (MWC and PWC) there was no difference between the 6-month-pre-training time-point and baseline. MWC users who responded to training had lower WMT-Q scores for all domains while for PWC users this was only the case for knowledge.

Conclusions

Structured maintenance training is effective at improving capacity and performance of wheelchair maintenance among power and manual wheelchair users. This training can be delivered successfully in a group setting, which may be a more financially viable option. Attendees will be given information on how to access all materials utilized in the training for application to their own practice (clinician reference manual, captioned PowerPoint slides, educational videos, fact sheets) and access to a direct-to-user web-based training that consumers can access who might not be able to receive in-person training due to barriers (scheduling conflicts, transportation challenges, etc).

Learning Objectives

- Describe 3 baseline deficits of wheelchair users in areas of maintenance
- List 2 positive outcomes of maintenance training
- Identify 3 open-source resources that can be used for consumer education
- Determine how content of the training programs and outcome measures presented could be translated to one's own clinical practice

(P2201) VA Telemedicine: Increased Access for High Risk SCI/D Population During the COVID-19 Pandemic

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Presenter

Abstract Body

Background

The SCI/D population is one of VA's most susceptible populations to the novel corona virus. Virtual care expansion has been critical to VA's ability to maintain health care access for its patients, including the 30% who live in rural regions and in regions highly affected by COVID-19. While VA was an early adopter of telehealth (TH), the vast majority of VA outpatient care continued to be face-to-face visits through February 2020. The primary aim is to determine if using telehealth technologies increase a Veteran's access to care during COVID-19.

Methods

Using VA's Support Service Center (VSSC), Spinal Cord Injury & Disorders (SCI/D) Telehealth Workload for Fiscal Year 2019 and 2020 (October 1, 2019-September 30, 2020). Telehealth visits and number of patient encounters were assessed.

Results

The figures depict the number of inpatient and outpatient in-person visits during pre-COVID-19 (October1, 2019 – March 23, 2020) and COVID-19 (March 24, 2020 – September 30, 2020). During FY20 we were able to see 406 Uniques for a total of 2,647 encounters via VA Video Connect (VVC). The large increase in outpatient visits and encounters was only from March 24, 2020 to September 30, 2020 when the SCI/D COE initiated TH visits. FY20 VVC Unique visits increased by 432% over FY19 VVC (Uniques FY19 = 94, FY20 = 406). In FY20, the number of VVC encounters increased by 1,138% (FY19 = 232, FY20 = 2,639). This is evident by VA's telehealth workload in FY20, 412 Uniques and 2,647 encounters compared to FY19, 120 Uniques and 273 encounters which represent a 970% increase in the VA telehealth workload.

Discussion

The total number of VVC Unique visits and encounters clearly indicate that VA's digital health is increasing Veteran's access to specialty care especially, during the COVID-19 pandemic when Veterans have been staying home and taking precautions against the coronavirus. This is evident by VA's telehealth workload in FY20, which represents a 970% increase in the VA telemedicine workload.

Conclusion

TH improves accessibility, reduces cost, increases geographic accessibility and extend limited resources to justify its applicability and use. It allows multiple specialists, both local and remote to offer patient centered care to a highly variable population with chronic disabilities. Now with COVID-19 necessitating increased precautions for in-person interaction, the services provided using VA's TH are more popular than ever. TH technologies are more available, and Veterans are more familiar with VA Video Connect as an option for care. It is predicted that services like VA video appointments will continue to be widely used, even after the pandemic subsides.

Learning Objectives

- Describe the benefits of using telehealth platforms to conduct patient care.
- Compare the advantages/disadvantages of using telehealth to provide patient care.
- Identify the various telemedicine video platforms.
- Explain why the SCI/D Specialty Care Population is most vulnerable to the impacts of COVID-19.

(P2202) Deconstructing Spasticity after SCI: An Investigation of Spinal H-Reflex Pathology and Novel Treatment

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Abstract Body

Background

Spasticity is a hyperexcitability disorder resulting from damage to the spinal cord or brain (e.g., SCI, TBI, stroke). A clinical sign of spasticity is the amplified H-reflex response (aka knee-jerk spinal stretch reflex). Although conventional anti-spasticity drugs, such as baclofen, provide positive relief of spastic symptoms, they are not curative, only palliative, and may carry significant safety risks with lifetime use. Our research aim is to uncover the mechanisms underlying spasticity and develop mechanism-based treatments that specifically addresses the neurobiology of spasticity.

Our research has identified dendritic spines—micron sized structures located on neurons—as important players in spasticity. Changes to dendritic spines on alpha-motor neurons has been associated with spasticity. In addition to neurons supporting cells, termed glia, within spinal cord react to SCI. Specifically astrocytic glial cells release molecular signals and growth factors that adversely affect neighboring neurons and their synaptic dendritic spine connections. Targeting pathways involved dendritic spine and astrocyte function may improve post-SCI related spasticity.

Purpose

Here, our study aims to clarify the contribution of the Rac1 molecular signaling in astrocytes and motor neurons to spasticity after SCI. We hypothesized that specific disruption of Rac1 (using a transgenic conditional knockout (KO) mouse model) will reduce the presentations of intra-spinal dendritic spine abnormality and spasticity symptoms following SCI.

Methods

In this study, we used our established SCI-spasticity model in control or transgenic animals that lack Rac1 gene expression. Our design included three treatment arms (n = 12 controls; n = 23 wild-type SCI; n = 22 Rac1-KO SCI). All animals were weight matched, randomized to each cohort, and tested behaviorally and with H-reflex EMG recordings until the experimental end point at 3-weeks. At the endpoint, we collected spinal cord tissue for post-mortem histological study of dendritic spine changes on alpha-motor neurons, as well as other markers associated with SCI pathology, e.g., inflammation, reactive sensory afferent plasticity. All data was averaged within groups and compared across treatment arms using appropriate statistical models.

Results

Our final data analysis revealed that dendritic spine remodeling after SCI may stabilize abnormal spinal reflex circuits function, which can only be “unlocked” by targeting appropriate molecular “keys”. We conclude that one such key is the Rac1 molecular pathway. Blocking expression of the Rac1 gene in spinal alpha-motor neurons or astrocytes reduced the presentation of H-reflex hyperexcitability associated with SCI-spasticity. Additionally, alpha-motor neurons from Rac1 KO mice had fewer abnormal dendritic spine profiles.

Conclusion

Our main findings have two implications. First, Rac1 has a role in neurons and astrocytes has a crucial role in post-injury dendritic spine abnormalities, and by extension, in the regulation of synaptic function. Second, therapeutic targeting of Rac1 and its effector molecules may be an opportunity

for new strategies to manage spasticity after SCI. As our team moves forward, we hope to leverage this new information toward development of genetic-based, durable therapies for alleviating the underlying spinal reflex disorders associated with spasticity.

Learning Objectives

- Highlight recent evidence of an astrocytic role in dendritic spine remodeling on motor neuron as a mechanism underlying spasticity after SCI
- Explain the functional link between dendritic spine remodeling and hyperexcitability in the spinal reflex system
- Discuss the anatomical and function effect of astrocytic or neuronal Rac1 knockout in a model of SCI-spasticity
- Review how mechanistic-based information from preclinical studies can inform the development of novel SCI therapeutics

(P2203) Sex as a Key Determinant of the Outcomes of Individuals with Acute Traumatic SCI

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Abstract Body

Introduction

While few pre-clinical studies documented potential neuroprotective effects of estrogen and progesterone, there is no conclusive evidence on sex-related differences in outcomes after traumatic spinal cord injury (SCI). This study examined the potential effects of sex on injury epidemiology, management and outcomes after traumatic C1-L2 SCI.

Design

A series of propensity-score matched cohort studies was performed comparing the subgroups of females in premenopause (age< 40 years), females in perimenopause (41≥age≥50) and females in postmenopause (age>50), with the subgroups of males distributed similar age categories. In each subgroup analyses, females were matched on a 1:1 ratio to males using the propensity score matching on age at SCI onset, Charlson Comorbidity Index, and level and severity of SCI. Data for the studies were selected from the Rick Hansen Spinal Cord Injury Registry (RHSCIR) from April/2014 to September/2019 in Canada. Females were compared with males regarding injury epidemiology (i.e. mechanism of SCI, ethnicity, Glasgow coma score [GCS], Injury Severity Score [ISS]), management (i.e. direct transfer to a spine center, need for mechanical ventilation, use of skeletal traction, administration of Methylprednisone, surgical versus conservative treatment, time from injury to surgical decompression), and outcomes after SCI (i.e. length of stay [LOS] in the acute care and rehabilitation facilities, ASIA motor and sensory subscores, Functional Independence Measure subscores, discharge destination, and frequency of spasticity at discharge).

Results

Of the 7,196 cases included in the RHSCIR, 1,245 females and 4,334 males fulfilled the inclusion/exclusion for this study and were considered during the propensity-score matching process.

Among individuals younger than 40 years, females (n=320) more often were white (p=0. 0268) and had SCI due to falls or transportation-related accidents (p=0.0014) than males (n=320), but both subgroups were comparable regarding GCS and ISS. Both subgroups under 40 had comparable management except for females had more often surgical treatment (p=0.0326). There were no significant differences between females and males under 40 regarding outcomes.

Among individuals between 40 and 50 years of age, females (n=133) were comparable to males (n=133) regarding the other baseline data, management, and outcomes.

Among individuals older than 50 years, females (n=531) had more often fall-related SCIs than males (n=531). Females had shorter LOS in the rehabilitation facilities than males (p=0.0205). However, there were no significant differences between the subgroup of females and the subgroup of males regarding the other baseline data, management, and outcomes.

Conclusion

The results this series of propensity-score matched cohort studies suggest that sex was not a key determinant of the vast majority of clinical, neurological and functional outcomes following traumatic C1-L2 SCI, when data analyses were controlled for major potential confounders. Of note, females older than 50 years had shorter LOS in rehabilitation facilities than their male counterparts in the same age group. Those results support the notion that male and female adults of any age subgroup should be included in future clinical trials on novel therapies for management of acute traumatic SCI, enabling recruitment and allowing broader generalizability of their results.

Learning Objectives

- List the main similarities between males and females after acute traumatic spinal cord injury regarding their injury characteristics.
- Explain the sex-related discrepancies in the management of individuals after acute traumatic spinal cord injury.
- Discuss the outcomes after traumatic spinal cord injury in terms of individuals' sex.
- Design future clinical studies in the field of traumatic spinal cord injury considering potential sex-related similarities and dissimilarities.

(P2204) The Potential Effects of Concomitant Traumatic Brain Injury on Outcomes after Traumatic Spinal Cord Injury

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Presenter

Abstract Body

Introduction

The frequency of concomitant traumatic brain injury (TBI) in patients with spinal cord injury (SC) was estimated to be 32.5% (Pandrich et al, 2020). While individuals with a dual diagnosis may require longer hospitalization with increased healthcare costs, the effects of concomitant TBI on the survival and recovery post-SCI remain under-studied. This study examined the potential effects of concomitant TBI on the survival and neurological recovery within the first year following acute traumatic SCI.

Design

This retrospective cohort study includes all patients who were enrolled in the Third National Spinal Cord Injury Study (NASCIS-3). TBI was defined as a Glasgow coma score (GCS) below 15 at admission in an acute care facility. The group of individuals with dual diagnosis (SCI+TBI) was compared with the group of individuals with SCI alone regarding survival, and neurological and functional outcomes within the first year post-SCI. Survival was analyzed using Kaplan-Meier curve and log-rank test. Neurological recovery included the NASCIS motor, sensory and pain scores. Functional outcome was determined using Functional Independence Measure (FIM). Data were also analyzed using multiple regression models adjusted for the major potential confounders (i.e. baseline neurological status, age at SCI onset, sex, NASCIS-3 protocol, blood alcohol level at admission, and level and severity of SCI).

Results

There were 76 females and 423 males with mean age of 35.7 years (range, 14 to 92 years) who mostly sustained cervical SCI due to motor vehicle accident followed by falls. Of the 499 cases, there were 413 individuals in the SCI-only group and 86 individuals in the dual-diagnosis group (17.2%; GCS from 10 to 14). Both groups were comparable regarding age (p=0.7101) and sex distribution (p=0.6207). However, the dual-diagnosis group had higher proportion of complete (p=0.0059) and cervical SCI (p=0.0031) than SCI-only group. There was a trend towards a greater frequency of motor vehicle accidents in the dual-diagnosis group (p=0.0597). Likewise, the dual-diagnosis group had a greater proportion of individuals who received 48-hour methylprednisolone regimen than the SCI-only group (p=0.0384).

Survival analysis revealed the dual-diagnosis group did not significantly differ from the SCI-only group regarding survival within the first year after SCI. Among the survivors, the dual-diagnosis group showed significantly lower neurological scores on admission and at 1 year post-SCI, and lower FIM scores at 1 year post-SCI than individuals in the SCI-only group. Using multiple regression analyses, all neurological outcomes (including motor, sensory and pain scores) and functional outcome (as assessed using total FIM score) at 1 year post-SCI were not significantly associated with the concomitant TBI after adjusting for the major potential confounders.

Conclusion

The results of this study suggest that individuals in the dual-diagnosis group had more severe and cervical SCI that resulted in less favorable neurological and functional outcomes than in the SCI-only group. However, the coexistence of TBI and SCI did not appear to intrinsically affect the neurological and functional recovery within the first year after trauma. Furthermore, concomitant TBI did not significantly affect survival within the first year after SCI.

Learning Objectives

- Identify the differences between individuals who sustain acute traumatic SCI alone and those who sustain SCI with concomitant TBI in terms of their injury characteristics.
- Describe the effects of concomitant TBI on the survival individuals within the first year after acute traumatic SCI.
- Explain the influence of concomitant TBI on the neurological recovery of individuals within the first year after acute traumatic SCI.
- Discuss whether concomitant TBI can affect functional recovery of individuals after acute traumatic SCI.

(P2205) An Evaluation of Content Validity of the Caregiver Assisted Transfer Technique Instrument (CATT)

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Abstract Body

Background

Immobility can be detrimental to Veterans with SCI/D, as it increases the potential for health complications such as pressure ulcers, tissue damage, and metabolic and psychological decline. Informal caregivers, who provide caregiving services without financial compensation, are often responsible for mobilizing Veterans who are living in their homes. More than 96% of caregivers provide help with activities of daily living, including tasks that involve assisting with transfers. However, current transfer technologies are not always immediately available, convenient, or intuitive to use, increasing the risk for injury to both caregivers and patients. Recently a new outcome measure, called the Caregiver Assisted Transfer Technique Instrument (CATT) was developed to objectively identify harmful informal caregiver technique during transfers and inform educational and training interventions. The CATT consists of 19 items that evaluate the set-up, lift quality, and results of an assisted transfer.

Purpose

The purpose of this study is to assess the content validity of the CATT via feedback from stakeholders with experience performing assisted wheelchair transfers.

Methods

Fifteen clinicians, ten informal caregivers, and five individuals with SCI/D with at least one year of experience and currently performing at least two transfers per week participated in an online survey via Redcap that evaluated the CATT and its corresponding supplemental materials (educational text descriptions, diagrams, and exemplar video footage of proper techniques). A 5-point Likert-type scale was used to assess the importance of each item, the clarity of an item's wording, and the appropriateness of an item's responses, with 1 corresponding to least agreement and 5 corresponding to most agreement. A yes/no question in each item asked if the supplemental material was useful. Response frequencies were analyzed with descriptive statistics and frequency of response types were found for each question across all items. Qualitative comments were coded by two team members independently, compared and analyzed to identify themes.

Results

In general, items were rated favorably on a five-point Likert scale for their importance (4.47 to 5.00), clarity (4.33 to 4.90), and appropriateness of responses (4.38 to 4.90), and there were few differences in ratings between participants groups. Qualitative analysis revealed seven common themes. Feedback from participants led to the creation of two versions of the CATT: one that addresses manual lifting techniques (CATT-M) and one that addresses transfers performed via lift-based technologies (CATT-L).

Conclusions

Stakeholders had favorable opinions on the CATT's importance, clarity, and appropriateness, suggesting the CATT may be useful in evaluating the quality of assisted wheelchair transfers and educating stakeholders on proper technique. Future work will involve testing the reliability and validity of the CATT during a transfer assessment to ensure that it is a useful tool for transfer training and education.

Learning Objectives

- Describe the issues faced by individuals with spinal cord injury or disease (SCI/D) and informal caregivers when performing assisted transfers
- Explain the purpose of the Caregiver Assisted Transfer Technique Instrument (CATT)
- Assess the content validity of the CATT
- Discuss how the CATT may benefit future caregivers and care recipients based on study findings

(P2206) "Pathologic" Fractures in Spinal Cord Injuries: Insight into International Classification of Diseases, Ninth Revision Coding

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Abstract Body

Background

A fracture due to underlying bone pathology is termed a pathologic fracture; by this definition, osteoporotic fractures are a subset of pathologic fractures. However, there is variability in how providers use the International Classification of Diseases, Ninth Revision (ICD-9) pathologic fracture diagnosis codes in practice. Therefore, it is uncertain whether pathologic fractures of the lower extremity in persons with a Spinal Cord Injury/Disorder (SCID) identified by administrative databases using ICD-9 codes should be included in epidemiological studies of osteoporosis.

Purpose: To determine whether pathologic lower extremity fractures in those with SCID identified in Veterans Health Administration (VHA) administrative databases using ICD-9 codes should be included in epidemiological studies of osteoporosis.

Methods

We examined all Veterans with SCID who had an ICD-9 diagnosis code for a pathologic (733.10, 733.14-16, 733.19) or non-pathologic (820-829) lower extremity fracture between fiscal years 2005-2015 using the VHA Allocation Resource Center and Corporate Data Warehouse. Clinical and SCID-related characteristics were described and compared in pathologic and non-pathologic fractures. A subset of 13 Veterans with pathologic and 52 controls with non-pathologic fracture (1:4) underwent electronic health record (eHR) for fracture etiology. Fracture etiology was compared between pathologic and non-pathologic fractures in these subsets. We further sought expert opinion from orthopedic surgeons, physiatrists and metabolic bone experts who care for these fractures to understand their perspectives on what constitutes a pathologic fracture and narrate our findings.

Results

6,396 Veterans sustained 16,279 lower extremity fractures in the study period, including 314 (1.93%) pathologic fractures in 264 Veterans. Among the 13 eHR-confirmed pathologic fractures, ten (76.9%) were secondary to osteoporosis, two (15.4%) osteomyelitis, and one (7.7%) a “chronic injury process.” The most common pathologic fracture site was the hip (45.5%), followed by the distal femur (30.8%), tibia/fibula (15.4%), calcaneus (7.7%) and talus (7.7%). A similar proportion of osteoporotic fractures (82.4%) occurred among 52 non-pathologic fractures. Our subset of pathologic fractures did not differ significantly from the control group of 52 non-pathologic fractures in patient age (p=.93), race (p=.65), gender (p=.57), or SCID etiology (traumatic versus non-traumatic; p=.46), level (p=.54), extent (p=.11) or duration (p=.11). Of the 19 experts surveyed, only 2 (one orthopedic surgeon, one physiatrist) indicated that they coded osteoporotic fractures as pathological. Eight providers (5 orthopedic surgeons, 3 metabolic bone experts) only use pathologic fracture codes in the setting of malignancy and 7 physiatrists never use these codes.

Conclusions

The majority of pathologic lower extremity fractures by ICD-9 diagnosis codes in SCID are secondary to osteoporosis, comprising approximately 4 out of every 5 lower extremity fractures with these codes. In contrast, the majority of experts do not use the pathologic fracture codes to designate osteoporotic fractures. Pathologic fractures can be considered for inclusion in epidemiologic studies of osteoporosis in SCID based on ICD-9 diagnosis codes when the risk-benefit profile for the specific study design favors capturing all osteoporotic fractures at the expense of some misclassification.

Learning Objectives

- Identify the preexistent bone diseases underlying a pathologic lower extremity fracture by International Classification of Diseases, Ninth Revision (ICD-9) diagnosis coding in spinal cord injury/disorder (SCID)
- Determine the most common fracture sites for pathologic lower extremity fractures in SCID

- Compare clinical and SCID-related characteristics between lower extremity fractures with pathologic versus non-pathologic ICD-9 diagnosis codes
- Compile expert opinion from multiple specialties regarding what constitutes a pathologic lower extremity fracture in SCID

(P2207) Reconciling Opiate Analgesic Prescriptions with Reversal Agents in Outpatient Veterans with Spinal Cord Injury/Disease (SCI/D)

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Presenter

Abstract Body

Background and Issues:

Opiate analgesic therapy is very common in the Veteran spinal cord injury/ disease population. There is a high risk of morbidity and mortality even when it is prescribed appropriately. 2017 VA/DoD Clinical Practice Guidelines for Opioid Therapy for Chronic Pain recommends providers discuss, educate and prescribe naloxone rescue kits with these patients. Likewise, the 2018 Arizona Opioid Prescribing Guidelines also recommend that providers offer naloxone.

Purpose

Opioid safety continues to be an important safety concern in 2021. From 2010-2015, overdose mortality rate among all US Veterans increased from 19.7 to 24.4%, and over 80% of these deaths were characterized as unintentional. This project was undertaken to evaluate how the SAVAHCS SCI/D primary care clinic was adhering to naloxone prescribing guidelines.

Methods

By monitoring opiate renewal requests, a database of SCI/D Veterans treated with opiate analgesics for chronic pain was constructed in an Excel spreadsheet. Once identified, Veteran pharmacy histories were searched for naloxone, and if this was not found, the Veterans were contacted by the PACT team to consider receiving this. Patient education was conducted using face-to-face discussion, telephone calls, and video conferences; VA-produced instructions (both written and YouTube videos) were offered.

Results

We identified that only 69% of Veterans receiving opiate analgesics had naloxone nasal spray prescriptions. Once identified and contacted, every Veteran was educated about the need to have this emergency medication on hand. Though a few Veterans on low opioid doses did not see the need for it, they were agreeable to receiving it, once they understood the importance of the concern.

At the end of the 90-day intervention period, all Veterans receiving opiates received rescue naloxone nasal spray to use as needed, and, if applicable, family members were also trained to administer it.

Conclusions

Detailed medication reconciliation may reveal discrepancies with opioid analgesic medication and reversal agent prescriptions that can affect patient safety. Providers who prescribe opioid analgesic therapy should ensure that their patients have access to a reversal agent and are knowledgeable about its use. Strategies to aid acceptance of a reversal agent included explaining that this is a National recommendation that made sense to us, and that the recommendation did not imply that the Veteran was misusing his or her medication.

Learning Objectives

- Describe/ identify the elements of safe opioid analgesic prescribing.
- Explain the rationale for reversal agents in safe opioid analgesic prescribing.

- Identify strategies to counsel Veterans on accepting a reversal agent.
- Apply new strategies to improve opioid medication reconciliation with reversal agents in an outpatient Veteran population.

(P2208) Leveraging a Novel Imaging Technology to Overcome the Astrocytic Glial Scar after SCI

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Presenter

Abstract Body

Background

Spinal cord injury (SCI) is a debilitating condition that severely impacts Veterans and the broader US population. SCI and its related disorders (SCI/D) continue to evade clinical treatment, and individuals with SCI often require specialized lifetime care. A major challenge in preclinical SCI research is identifying biological factors that underlie dysfunction and designing targeted treatments to restore function. Previous work has shown that astrocytes contribute to glial scar formation at the spinal injury site. Our laboratory has shown that pharmaceutical inhibition of Rac1 can decrease adverse astrocytic response and improve functional recovery in preclinical SCI models. However, these studies were only performed in vitro or in post-mortem settings, which prevented a direct physiological analysis of astrocytic scar development. Here, we will present how our unique intravital imaging methods permit us to measure the impact of post-SCI Rac1 activity on astrocytic scar formation in live spinal cord tissue.

Purpose

In the present study, we hypothesized that Rac1 activity is required for rapid glial scar development after SCI and may contribute to SCI/D. This work reveals a potential opportunity for advancing our effort in the search for novel interventions and more effective clinical treatment strategies for post-SCI disorders.

Methods

In transgenic mice with astrocytes expressing a fluorescent reporter, and a normal Rac1 or conditional Rac1 knockout (Rac1 KO) phenotype, we implanted a “glass window” over a spinal cord transection injury. We then used a two-photon microscope to image the developing glial scar over time (repeatedly for up to 2 weeks) and analyzed the proliferation and migration of astrocytes into the spinal injury site. For 3D analyses, we used a virtual reality headset (Oculus Rift S) along with our custom-written software environment to analyze the native 3D glial scar structure. These in-depth longitudinal analyses of the glial scar in vivo revealed both linear and volumetric changes of the scar tissue. Behavioral studies were also performed to assess functional recovery after SCI. We used established statistical methods to compare all datasets across the two transgenic groups (control vs Rac1 KO).

Results

Our in vivo morphological observations demonstrate that the lack of Rac1 in astrocytes reduced the speed of glial scar formation: astrocytes decrease migration or proliferation into the injured region, as compared with controls. Post-mortem analyses confirm our in vivo observations. Taken together, our study provides a more specific and physiologically relevant understanding of the temporal dynamics of astrocyte behavior in glial scar formation after SCI. As expected, baseline locomotor studies demonstrate no difference

between transgenic animal groups without SCI. With SCI, however, behavioral evidence suggests improved ambulation and reduced baseline pain in Rac1 KO.

Conclusion

Our study is the first to investigate the in vivo, real-time dynamics of Rac1-regulated astrocytic glial scar formation after SCI. Our project also demonstrates the powerful utility of our novel two-photon imaging technology for studying and addressing SCI. Together, this study complements and extends our team's preclinical SCI research space, which seeks to identify and validate novel treatments for SCI/D.

Learning Objectives

- Explain the effect of Rac1 on astrocyte glial scar formation after SCI
- Describe two beneficial or detrimental roles for astrocytes in SCI
- Review the potential clinical implications of the main findings regarding Rac1-regulation of the post-injury glial scar
- Discuss the application of intravital imaging for developing novel therapeutics for SCI

(P2209) Using New Technology and The Interdisciplinary Team Approach for Limb Salvage

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Abstract Body

On February 12, 2020 the Spinal Cord Injury (SCI) unit at the Miami VA received a patient (we will call him Mr. T) with a chronic wound on the right lower extremity. Mr. T has had this chronic wound at site of complex reconstruction of trauma wound from Vietnam Sept 1969. According to the veteran this wound has never completely closed. Aside from the wound, MR. T is a 69 y/o male with multiple comorbidities which include paraplegia, diabetes and peripheral vascular disease.

The lower extremity non healing wound had gradually increased in size over the last six months. He was deemed not to be a candidate for revascularization with recommendation for below the knee amputation. The patient came to Miami for a second opinion. On arrival the right lateral lower extremity wound was measured at 6.5 X 5.5 X 0.5. The wound had 25% slough, 5% crunchy bone exposed, 70% granulation, moderate amount of serous drainage, irregular edges and scar tissue on periwound with tenderness to touch. The right foot was noted to have pitting edema with inability palpate pedal pulses.

The patient underwent multiple consults including Infectious Disease, Psychology, Nutrition and Pain Clinic. On February, 19,2020 Vascular Surgery performed an open right common femoral endarterectomy, right common iliac stent, right superficial femoral artery stent x2, and right superficial femoral artery balloon angioplasty.

Mr. T also underwent a right fibular ostectomy and bone biopsy on February 28, 2020 for the treatment of right tibiofibular chronic osteomyelitis.

The initial wound care treatment was aimed at maintaining the wound clean and helping decrease the edema. At this time the SCI wound care team lead by Dr. Zachow had recently used a new technology product with another patient which delivered great results and the decision was made to try the product on Mr. T's wound.

The product was Skin TE by Polarity. SkinTE is a human cellular and tissue-based product derived from a patient's own skin intended for the repair, reconstruction, and replacement of skin tissue.

The harvest of the cells was done by surgery department. On April 13, 2020 an elliptical piece of skin was excised and sent to the lab where it was processed and then re-applied to patient's wound to aid in wound healing.

The tissue was received and planted on April 21,020 by the SCI wound care team. The process included; MIST treatment, mild wound bed debridement with a curette in preparation for placement of the autologous graft (Skin TE). After the product was applied to the wound, followed by a silicone drape provided by the company within the package. Then we protected the periwound and immediate edges with hydrocolloid, black sponge cut to size was placed on the wound bed and secured with the clear drape. We connected this to a VAC at 75mmHg. The vac was left in place for 7 days.

As of today January 22, 2021, the treatment has been a success in salvaging the limb with wound measurement is 0.3X0.2 X 0.1.

Learning Objectives

- Understand the importance of interdisciplinary team approach for wound healing.
- Describe the importance of adding autologous skin grafts to the wound care team toolbox.
- List other wound care therapy that can be used in conjunction with skin grafts.
- Apply the knowledge acquired to make informed decisions about new technology products for wound care.

(P2210) Increasing Adapted Sports Awareness in the Community Through Sports Residency Program Collaboration

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Abstract Body

Background and Issues:

Adapted sports is a sub-specialty that is not part of standardized physical therapy curriculums across the country. Despite the lack of exposure, the impact adapted sports has cannot be ignored. The focus is usually on just what it does to the athlete, but the impact has far reaching effects to all those around the athlete, such as families, caregivers and even the providers that care for them. Studies suggest that an interdisciplinary approach provides optimal patient outcomes. The importance of the interdisciplinary approach has not been fully explored, as it has been shown to decrease the risk of injuries and improve the continuum of care for each athlete. The lack of awareness for both adapted sports and the interdisciplinary approach

in the community have a potential negative impact on the athletes that participate in community sporting events.

Purpose

The purpose of this important collaboration is to increase awareness and give more awareness to adaptive sports in the hopes that more local sporting events will provide more opportunities for adapted sports. To educate our providers, elite sports residents in the community about safety, proper sitting and positioning, and Paralympic opportunities.

Methods

Bridging the gap between veterans and the community was a priority for the VA Adapted Sports Team. The adapted sports program at the Miami VA was already well established, and the interdisciplinary approach was already being used to maximize both safety and results. The challenge was getting the program into the community. In order to begin our mission, we discussed our vision with the director of the University of Miami Physical Therapy Sports Residency program. Thanks to his full support we were invited to become adjunct faculty for the residency program and an adapted sports module was created. This module educates the program residents about adapted sports and hands on learning with our team in The National Veteran Wheelchair Games.

Results

Incorporating an interdisciplinary team approach in adapted sport clinics and the adapted sports module for residents of the University of Miami Physical Therapy Sports Residency program has proven to have a positive impact in our community. Pre and post questionnaires indicate all residents increased their knowledge on adapted sports. Overall there was an increase in adapted sport participation locally and nationally, with community partners providing specialized care in order to decrease preventable injuries.

Conclusion

Our interdisciplinary team approach and full collaboration with the University of Miami Physical Therapy Sports Residency Program has and continues to bridge the gap in our community. This has increased awareness to adapted sports, and the nuances of working with the veteran population. Further research is required as we have transitioned to a virtual platform secondary to the COVID pandemic.

Learning Objectives

- List the 3 benefits of community awareness
- Discuss how to establish collaborative support from our community partners
- Identify who should be part of your adapted sports interdisciplinary team
- Explain the impact of this approach on health and sport injuries

(P2211) Development of a Wearable Device-Based Energy Expenditure Prediction Model for Manual Wheelchair Users

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Abstract Body

Background

Due to altered body composition and sedentary lifestyle, manual wheelchair users (MWUs)s have lower total daily energy expenditure (TDEE) when compared to ambulatory individuals. With lower TDEE and the use of wheelchair as primary mobility device, energy expenditure (EE) prediction models developed for able-bodied population may not be applicable to MWUs. Traditional EE prediction methods, such as self-reported questionnaires, basal metabolic rate-based models have limited accuracy when assessing free-living EE. Using wearable devices to assess EE has recently become a popular method for its rapid development and cost reduction. Several existing wearable devices-based EE prediction models were built upon relatively small sample sizes. Some models also used the manufacturer's proprietary outputs, making them not generalizable to other commercial wearable devices.

Purpose

To develop a raw acceleration signal-based EE prediction model for MWUs using random forest (RF) technique with 88 MWUs and evaluate the model performance against criterion metabolic measurements via cross-validation.

Methods

A total of 88 participants' data from two previous studies was used. In both studies, participants were fitted with a K4b2 metabolic cart to measure criterion EE, and an ActiGraph GT9X wearable accelerometer to collect upper extremity kinematic data. A series of activities of daily living (ADLs) was performed in lab settings. While in the second study, participants also performed ADLs in their home settings with the same device setup. Steady-state activity data was extracted to generate 115 raw acceleration-based features after data cleaning. Three additional demographic features were also added to the dataset. A correlation-based feature selection protocol with a threshold of 0.9 was used to produce the final feature set. An RF model was then trained and evaluated with the leave-one-out cross-validation strategy.

Results

The RF model achieved a mean square error of 0.706 kcal/min, a mean absolute error of 0.439 kcal/min, a mean absolute percentage error of 21.3%, and a mean difference of – 0.006 kcal/min. The top 3 features ranked by mean importance are Vector Magnitude (VM) standard deviation, VM mean, and VM 10th percentile. The intercept of the linear regression between the predicted EE and gold standard EE fell within its 5% equivalence region, while the slope fell outside its 5% equivalence region.

Conclusion

The RF model showed good overall accuracy in predicting EE on our dataset. The model had the lowest error in light activities, while it slightly overestimated EE in sedentary activities and underestimated EE in moderate-to-vigorous activities. This model could potentially be applied to commercial accelerometer-based wearable devices. Future work could look into how the model would perform when predicting TDEE under free-living conditions.

Learning Objectives

- Describe the procedure of developing a random forest model
- Analyze random forest model performance with key model characteristics
- Assess the generalizability of a energy expenditure prediction model
- Apply wearable devices in studies to collect kinematic data

(P2212) Healthy Aging from the Perspective of Adults Aging with SCI: A Qualitative Study

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Abstract Body

Background

Adults with SCI encounter many barriers to successful aging. These include the physical and social contexts where they live. These factors and how they interact with underlying impairments and activity limitations have received limited examination.

Purpose

This qualitative study uses the perspective of adults with SCI to identify the types of resources/factors that influence an individual's understanding of health aging, and which enhance and hinder the aging process.

Methods

This study is part of a larger mixed-methods project, including quantitative surveys and either focus groups or in-depth individual interviews to understand the diverse perspectives of individuals aging with SCI in rural and urban settings. Eligibility criteria included age 45+, living with SCI for at least five years, and living in Midwestern United States communities. The data presented in this study draws from the focus groups or interviews conducted with 23 participants, from August-September 2020. Eleven individuals participated in one of three focus groups and 12 individuals were interviewed individually. Focus groups averaged 60 minutes and interviews 50 minutes. Focus groups consisted of all men. Interviews were evenly split between men and women. Seven participants lived in rural areas and 16 in urban or suburban settings. Eleven participants had paraplegia and 12 tetraplegia, including both complete and incomplete injuries. Researchers used Braun and Clarke's reflexive thematic approach to data analysis, focusing on participants descriptions and experiences to identify the resources that enabled healthy aging, and which influenced attitudes about it. Findings were reviewed, and the accuracy of the interpretations examined by the entire research team.

Results

Three overarching themes were identified as relevant to enhancing healthy aging. The first theme was the built environment, with the sub-themes accessibility of and mobility of home environment and accessibility and mobility of neighborhood environment. The second theme was social resources, with the sub-themes personal support systems, broader social networks and connections, access to personal caregivers, and access and support of institutional systems and programs which provide access to physical resources, participation, and community. Finally, the third theme was personal resources which included the sub-themes individual attitudes about health and aging, individual characteristics which enhance or hinder resilience, time since injury and prior self-image, and socio-economic level. These themes and sub-themes classify the types of resources participants had (or did not have) available to them and provide a coherent story about the differential role and influence of these resources over the lives of our participants.

Conclusions

The ICF defines disability as the result of the interaction of impairment, personal, and environmental factors. In particular, both personal factors (e.g., attitudes, age, race) and environmental factors (e.g., social networks, accessibility of environment) influence their ability to conduct activities of daily living and participate in society. This study highlights the specific factors or resources that appear more salient to individuals aging with SCI and how the importance of these resources varied between participants.

Learning Objectives

- Understand how adults with SCI injury view the aging process.
- Identify aspects of the social and physical environments that facilitate or hinder healthy aging for adults aging with SCI.
- Describe the social and physical environment and personal characteristics and how they manifest as resources in the lives of adults aging with SCI.
- Understand the difference between innate resilience and resilience provided by social institutions and structures and why emphasizing the former places an unfair expectation on people with disabilities.

(P2213) ExciFlex: An Effective Low-Cost Wireless Electroceutical Bandage for Wound Therapy

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Abstract Body

Background

Many Veterans experience chronic wounds which don't heal for extended periods, causing significant pain and reducing the quality of life. These chronic wounds are also almost all colonized with biofilm. The removal of a wound biofilm is very difficult, not least because biofilms are intrinsically resistant to antibiotics, which are showing reduced efficacy in the face of multi-resistant bacteria.

Currently, chronic wound therapy requires frequent dressing changes which disturb, dry and cool the wound bed, disrupting the healing process Frequent clinical sessions also incur significant human and economic costs for the Veteran population.

Electrotherapy is well established as a biophysical treatment modality for healing chronic wounds, which also has the potential to impact biofilm.

We have developed and systematically tested 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. We previously identified effective electroceutical paradigms to enhance healing and decrease wound infection in a small animal model. The exciflex bandage can be worn for up to one week, delivering electroceutical therapy around the clock, which promotes healing.

Methods

Translational development and testing of exciflex has been carried out using a preclinical large animal model of chronic infected wounds of a clinically relevant size (6cm diameter). Electroceutical therapy was applied at a 10% duty cycle, i.e. for 6 minutes every hour. Bandage changes and wound monitoring, including assessments of wound temperature, perfusion and biofilm, were carried out at time points relevant to the wound healing pathway until the wounds were healed.

Results

Treatment with exciflex reduced wound size by 82% at 10 days of treatment, this represents a 20% improvement over standard-of-care treated wounds at the same timepoint. All wounds treated using exciflex were fully healed within 35 days of therapy, with 80% fully healed by 28 days. Furthermore, our results indicate that wound infection and biofilm were significantly decreased in actively treated wounds ($p<0.001$).

Conclusions

The exciflex bandage delivers reliable electroceutical therapy, minimizing unnecessary dressing changes and wound bed disruption, improving healing outcomes and increasing patient safety. Prior work provides the base for an upcoming first-in-man trial. The BRAVE study will provide an essential translational step toward the use of the exciflex electroceutical bandage by a broad population of individuals 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 impact of sustained electrotherapy on healing of chronic wounds.
- Describe the potential impact of sustained electrotherapy on infection in chronic wounds.

(P2214) Development and Implementation of an Evidence-Based Guideline for SCI Patients Requiring Colonoscopy

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Presenter

Abstract Body

Abstract

Background: Colorectal cancer is one of the leading causes of preventable cancer death in the United States. Spinal cord injury/disorder (SCI/D) patients present with unique challenges for maximizing bowel prep and successful attainment of screening and therapeutic colonoscopy procedures. Current practice for bowel prep regimen does not take into consideration the specific needs of the SCI/D population resulting in significant patient dissatisfaction.

Purpose

The PICOT question that guided this project was in adult patients with spinal cord injuries/disorders requiring colonoscopy (P), how does the development and implementation of evidence-based guideline for the care of the spinal cord injury/disorder patient requiring colonoscopy (I) compared to usual practice (C) affect the rate of first attempt successful colonoscopy procedure completion (O) within eight weeks (T).

Evidence

SCI/D patients resulting neurogenic bowel increases difficulty with standard bowel prep tolerance. Quality bowel preparation is required for successful colonoscopy with inadequate bowel preparations present in 20-25% of all colonoscopies (Johnson et al., 2014). Evidence supports a clinical guideline for bowel preparation adapted to the needs of the SCI/D population.

Methods

Development and implementation of an SCI/D bowel prep guideline enhanced clinical decision support and evidence-based tools for improved bowel prep with initial attempt. Frequencies and percentages were calculated for means passed/failed. The percentages were calculated using a descriptive analysis. The Intellectus Statistics software was used to calculate descriptive statistics on pass or fail.

Results: The rate of first-time colonoscopies for patients with SCI/D with the guideline improved by over 214% over pre-guideline time.

Conclusion

The evidenced-based guideline reinforced clinical practice for the SCI/D population related to their unique requirements. Clinically significant improvement was noted in successful bowel prep completion, first attempt colonoscopy completion, improved access to the endoscopy suite, and reduced length of stay. All combined improved both patient and provider satisfaction with the evidence-based practice change.

Learning Objectives

- Use the guideline to order the proper bowel regimen for a colonoscopy
- Identify two ways to provide the proper bowel regimen for a colonoscopy
- Explain why it is important for a spinal cord patient to get a colonoscopy
- Understand the strengths and weakness of bowel prepping for a colonoscopy

(P2215) Can Activity Based Therapy with Electrical Stimulation Help Patients with ALS maintain function?

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Abstract Body

Background

Amyotrophic Lateral Sclerosis (ALS) is a rapidly progressive neurodegenerative disease that ultimately is fatal. Current interventions treat symptoms of the disease and delay progression, however, there is no cure. Physical therapy has been proven to help patients maintain their strength and improve quality of life (Bello-Haas V.D., 2018). Long-term PT for patients with ALS is limited to palliative interventions, adaptive device prescription, and caregiver training. Activity Based Rehabilitation (ABR) involves massed repetition of functional movements and exercises to promote neural retraining. Though not a standard practice for patients with ALS, ABR has been demonstrated to improve muscle strength and condition in populations including SCI and MS. This case study seeks to explore the safety, tolerability, and initial efficacy of ABR in combination with functional electrical stimulation (FES) in a patient with ALS.

Problem statement

Pt is a 45-year old female one year post ALS diagnosis. She requires a power wheelchair for mobility and maximal assistance to stand. The patient stopped ambulating small distances with a rolling walker (RW) within her home a few months prior due to a fall. She presents to clinic to explore aggressive ABR for remediation of her gait and strength deficits.

Methods

Patient enrolled in a 4 month plan of care with 2-hours of land-based and 1-hour of aquatic ABR per week. Treatment interventions included functional electrical stimulation (FES) biking, transcutaneous spinal cord stimulation (TSCS) with strengthening exercises, supported standing and gait training. Gait training included body weight support (BWS) massed repetition stepping in a robotic gait trainer as well as over ground training with and without BWS. Patient was assessed at regular intervals with the 6-Minute Walk Test (6MWT), 10-Meter Walk Test (10MWT), Spinal Cord Independence Measures (SCIM), the BERG Balance test, Manual Muscle Testing, and the Modified Functional Reach test (MFR). Patient tolerated all interventions without issue. Modifications were made to prevent over fatigue of one muscle group during treatment sessions by alternating exercises between the upper extremity (UE), lower extremity (LE), core muscles, and sitting/standing positions.

Data analysis

From admission to discharge, the patient dramatically improved her walking endurance, as measured by the 6MWT (10ft to 302ft), and speed, as measured by the 10MWT (.16m/s to .35m/s). Changes on both these tests exceed the minimal clinically important difference values for patients with incomplete SCI. Patient recovered strength in (B) LE, specifically the hip flexors and toe flexors. She did lose strength in (B) quadriceps, but maintained strength in all other muscle groups and improved mobility at home. The patient's caregiver reported improved ability to perform safe stand pivot transfers at home.

Significance and conclusion

This case study demonstrates that ABR, including FES and aggressive gait training, was a safe option for this patient with ALS. In addition to being safe, the interventions improved the patient's walking ability and helped her maintain lower extremity strength. ABR represents a promising option for patients with ALS to maintain and potentially improve motor function and deserves further research.

Learning Objectives

- Understand the safe application of activity based therapy for individual sisted gait in patients with ALS

(P2216) Women Veterans' Experiences with Receipt and Use of Mobility Assistive Technology

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Abstract Body

Background

Women veterans are an important part of the veteran community. There has been a significant growth in the number of women veterans who receive healthcare from the VA as well as women who require mobility devices due to disabilities and impairments. Little is known about needs of women veterans in terms of the design, fit, and comfort of the mobility assistive technology (AT).

Purpose

The purpose of this study was to conduct a needs assessment to learn about women veterans' needs, priorities, preferences, and experiences with mobility AT. Devices studied included wheelchairs, scooters, walkers, canes, prosthetics, and orthotics.

Methods

Women veterans receiving care from the Veterans Health Administration who received mobility AT in the last 5 years participated in an online survey. The survey included questions regarding demographics, training, ability to participate in various activities, and three validated questionnaires that focused on functional mobility, user satisfaction, and psychosocial impact of assistive devices.

Results

403 women veterans participated in the online survey. Preliminary results show a majority of respondents were 50-69 years of age (64%) and identified as white race (59%). The three most frequent disabilities women reported were multiple sclerosis (MS), osteoarthritis, and spinal cord injury (SCI) (16%; 7%; 5%). The primary AT most commonly used were canes, walkers, and manual or power wheelchairs. (25%; 21%; 19%). Wheelchairs were also the most commonly used primary devices among women veterans with MS or SCI (36%). Seventy-one percent of the respondents received training on their mobility device. Activities for which their mobility device did not meet their needs included housework, leisure, and social activities (20%; 20%; 17%).

Conclusion

A significant number of women veteran respondents (27%) did not or were unsure if they received training on their mobility AT, and approximately 1 out of 5 indicated that their devices did not meet some of their needs. Results from the study will be shared with key national VA stakeholders in women's health, prosthetics, safety, and rehabilitation to develop possible solutions for these gaps with the goal of improving women veterans' experiences and function related to mobility AT.

Learning Objectives

- Recognize demographics of women veterans with disabilities such as Spinal Cory Injury (SCI) and Multiple Sclerosis (MS) who use mobility assistive technology
- List the types of mobility assistive technology used by women veterans with disabilities such as SCI
- Determine women veterans' access, needs, priorities, preferences, and experiences with mobility assistive technology
- Identify strategies to address gaps in knowledge pertaining to women veterans' needs with mobility assistive technology

(P2217) Interaction Between SCI and BMI to the Probability of Developing a Diagnosis of NAFLD

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Abstract Body

Background

Obesity is a known risk factor for non-alcoholic fatty liver disease (NAFLD). The prevalence of obesity and comorbid conditions is high in the population with spinal cord injury (SCI), and because of metabolic changes that occur after SCI, conventional body mass index (BMI) thresholds likely underestimate clinical obesity in this population.

Purpose

To determine the effect of SCI status on the functional form of the relationship between BMI and the risk of developing NAFLD, and therefore assess whether SCI-specific mapping of BMI to risk of developing obesity-related comorbidities such as NAFLD is needed.

Methods

This is a longitudinal cohort study of patients within the Veterans Health Administration (VHA) with a diagnosis of chronic SCI since at least FY 2005-2007. This cohort was compared to a control group from a random sample of 100,000 patients. Control group were matched with SCI patients (using 2:1 ratio) on sex, race, ethnicity, Charlson Comorbidity Index, BMI, and geographic clinic location. Primary outcome was development of NAFLD, based on ICD codes. The relationship between BMI and development of NAFLD at any time was assessed with a propensity score matched Cox regression model, and NAFLD development at 10-years with a propensity score matched logistic model. The positive predictive value (PPV) of developing NAFLD at 10 years was calculated for BMI thresholds between 19-45 kg/m2.

Results

Between FY 2005-2007 there were 14,890 individuals with SCI that met inclusion criteria, so 29,780 Non-SCI individuals were selected from the control group. Both cohorts had a median BMI of 27 kg/m2 and the mean age was similar (58 years, Non-SCI; 57 years, SCI). The SCI and Non-SCI groups were mostly male (96.9% and 97.8%, respectively), white (70.4% and 72.6%, respectively), and non-Hispanic (87.9% and 89.4%, respectively). The median Charlson Comorbidity Index was 2 in both groups, and the geographical distribution of the patients was similar.

Overall, 9.2% in the SCI group and 7.3% in the Non-SCI group developed NAFLD during the study period. A logistic model assessing the relationship between BMI and the probability of developing a diagnosis of NAFLD demonstrated that the probability of developing disease increased as BMI increased in both cohorts. The probability was significantly higher in the SCI cohort at each BMI threshold, and increased at a higher rate compared to Non-SCI cohort as BMI increased from 19 to 45 kg/m2. The PPV for NAFLD was higher in the SCI group for any given BMI threshold from 19 kg/m2 to BMI 45 kg/m2.

Conclusions

The probability of developing NAFLD increases with increasing BMI, beginning at BMI as low as 19 kg/m2, for individuals with and without SCI. However, the association of SCI and BMI is not additive; SCI patients with higher BMI having the highest probability of developing a diagnosis of NAFLD. This suggests a need to investigate the quality of accepted BMI risk zones in assessing risk for metabolic disease, especially in the population with SCI.

Learning Objectives

- To recognize the prevalence of NAFLD in veterans with SCI
- To understand the relationship between obesity and NAFLD
- To understand the interaction of SCI status with BMI in predictive risk for developing a diagnosis of NAFLD
- To recognize the clinical limitations of BMI thresholds in assessing metabolic risk in individuals with SCI

(P2218) Individualized Turning Times for Spinal Cord Injury and Disorders Veteran Population

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Abstract Body

The Spinal Cord Injury and Disorders (SCI/D) Center at the Rocky Mountain Regional VA Medical Center (RMR VAMC) in Aurora, Colorado is a part of the SCI/D systems of care for the Veterans Health Administration. When the center was newly established, standards of practice for other hospital inpatient units were adopted, including the universal standard of turning patients in bed every two hours for those at increased risk for pressure injuries (PI). However, turning every two hours can be disruptive to sleep and cause sleep loss, especially for a long rehabilitative admission. Sleep loss refers to the shorter duration of the average adult basal sleep needed of 7-8 hours of sleep per night. Sleep loss can be a prevalent problem with symptoms that include daytime sleepiness, depressed mood or poor memory and concentration as well as serious health problems with chronic sleep deprivation.

When a Veteran admits to this SCI/D inpatient unit, discharge goals are set, which include obtaining function at their highest level, preparing and adapting to everyday life challenges. Goals also include skin protection, increased skin tolerance and pressure injury prevention (PIP), since PI is the most common complication for patients with SCI. Turning every two hours for PIP can be a contributor to sleep loss. With SCI/D nurse experts in the care for veterans with SCI/D, a nurse driven evidence-based practice quality improvement project was created and approved by the RMRVAMC research team to change to individualize turning times based on skin tolerance to pressure, while improving sleep and continuing to provide adequate PIP.

The National Pressure Injury Advisory Panel (NPIAP) 2019 Clinical Guidelines states that those with increased PI risk should be on an individualized turning schedule. In addition to the PI risk score, other factors to consider when advancing turn times are the individual's physical, cognitive and psychological condition, and type of support surface in use. Skin assessments are important to evaluate the skin's status and response to pressure. Skin assessments serve as an indicator and should be used to guide preventative care and repositioning frequency.

While increasing turn times, the goal is to also keep the hospital acquired pressure injury (HAPI) rate at or below current level. When the project was implemented, ten veterans participated. Nine out of ten veterans reported improved sleep. All ten veterans discharged home with a turning time that was individualized for them and there was not a hospital acquired pressure injury (HAPI) occurrence.

Learning Objectives

- By the end of the presentation the participant will be able to identify one benefit of increased turning time intervals.
- By the end of the presentation, the participant will be able to identify 2 sleep deprivation symptoms.
- By the end of the presentation, the participant will be able to identify two discharge goals for this SCI/D population.
- By the end of the presentation, the participant will what PIP is abbreviated for.

(P2219) Determining the Role of Interleukin-1 Beta in Spinal Cord Injury Pain

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Presenter

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Abstract Body

Background

An estimated 42,000 of the individuals living with spinal cord injury (SCI) are Veterans, which adds a significant health care burden to organizations providing their care as SCI results in numerous long-term complications. Neuropathic pain is frequently experienced below the level of injury and is often rated amongst the most significant patient complaints. Below-level neuropathic pain is resistant to current medical treatment, due in part to limited treatment options. Opioids remain a mainstay as a primary treatment regimen for SCI – induced pain, despite the ongoing opioid epidemic and numerous adverse events that complicate prognosis for recovery. Development of non-opioid therapies are needed to reduce SCI-induced pain and improve the quality of life of Veterans with SCI.

Purpose

Our goal is to understand the underlying mechanisms responsible for the development of SCI-induced below level pain and to identify novel, non-opioid, therapeutic targets. Our previous work suggests that in our mouse model of thoracic SCI, increased input from nociceptors below the level of injury and peripheral inflammation are involved in pain development. The clinical literature also indicates that circulating levels of pro-inflammatory cytokines, including interleukin 1-beta (IL-1b), are elevated in individuals with SCI. Therefore, we hypothesized that IL-1b plays an important role in the development of SCI-induced chronic pain and that by neutralizing IL-1b, we could attenuate the development of chronic pain and improve recovery of function.

Methods

We measured locomotor function (Basso Mouse Scale), spontaneous pain behavior (Mouse Grimace Scale), and neuropathy (intraepidermal nerve fiber density (IENFD)) over time following thoracic SCI in mice. We also performed whole transcriptome RNA sequencing on the dorsal root ganglia (DRG) and spinal cord (SC), immunofluorescence staining in the DRG, SC, and skin, and calcium imaging in dissociated DRG neurons. Finally, we administered an IL-1b neutralizing antibody (nAb) at the time of injury to determine if we could ameliorate the consequences of SCI.

Results

We found that SCI results in significantly decreased locomotor function, increased spontaneous chronic pain behavior beginning 5 weeks post-injury, and decreased IENFD beginning 2 weeks post-injury. We found an increased expression of Ilb mRNA in the SC, and increased expression of mRNA responsible for encoding its receptor, Il1r1, in below-level SC and DRG, and in hindpaw cutaneous fibers all within 24hrs post-injury. Additionally, dissociated neurons from SCI mice, but not naïve mice, taken 24hrs and 14 days after injury responded to application of IL-1b. Administration of IL-1b nAb prevented the SCI-induced increase in IL1-R1 in the SC, improved locomotor recovery, and prevented the development of spontaneous chronic pain.

Conclusions

Our data suggest that the mechanisms responsible for the development of SCI pain, such as IL-1b signaling, start early after injury and that failure to intervene with these early onset changes may lead to the development of chronic pain and poor prognosis for recovery. Further, IL-1b could be a novel, non-opioid, therapy that could be used to attenuate SCI-induced inflammation and subsequent development of chronic below-level pain.

Learning Objectives

- Recognize the problems with current treatments for spinal cord injury-induced chronic pain.
- Describe how inflammation plays a role in the development of spinal cord injury pain.
- Explain how spontaneous pain behavior is assessed in spinally injured mice.
- Discuss the translatability of pre-clinical spinal cord injury research.

(P2220) Assessing the Utility of "Repurposed" Romidepsin for Managing Spasticity after SCI: A Preclinical Study

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Presenter

Abstract Body

Background

Spasticity is a clinical symptom of hyperexcitability within the spinal stretch reflex system (or H-reflex), which presents as a velocity-dependent increase in tonic stretch reflexes with exaggerated tendon jerks. Individuals living with spasticity may have

difficulty engaging in physical rehabilitation, experience concomitant muscle-joint pain, and experience negative quality-of-life issues. Over the past decade, we have documented a common structural motif of Rac1-PAK1 regulated dendritic spine morphology associated with hyperexcitability disorders, including spasticity.

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 correlates of chronic pain.

Methods

To test the efficacy of off-label use of romidepsin for addressing spasticity, we performed a mild contusion SCI using the Infinite Horizon (IH) impactor device to recreate the spasticity condition in mice expressing fluorescent YFP (Thy1-YFP). Romidepsin or vehicle was administered as three intraperitoneal (IP) injections four weeks after SCI (n = 10 vehicle, n = 10 romidepsin) or Sham surgeries (n =.7 vehicle, n = 7 romidepsin) Blinded observers performed all physiological and behavioral assessments for spasticity and locomotor function. To confirm drug bioavailability, we measured the levels of drug-response in spinal cord tissue using routine histological methods. We used 3D dendritic spine analyses to determine the effect of targeting PAK1 with romidepsin to reverse the structural correlate of spasticity on alpha-motor neurons in the spinal cord reflex system. These molecular and structural assessments will be correlated with physiological measures of spasticity, e.g., H-reflex EMG recordings. A positive romidepsin drug-response in tissue and reduced dendritic spine dysgenesis that correlates with reduced spasticity outcome will support our hypothesis regarding the efficacy of targeting PAK1 activity after SCI.

Results

Our analysis showed that treatment with romidepsin results in a marked reduction of PAK1 activity and a reduction in the presentation of H-reflex hyperexcitability associated with spasticity after SCI (as compared with control, vehicle treated animals). Additionally, we observed no differences in locomotor function or other adverse effects in animals treated with romidepsin. This suggests that acute treatment with romidepsin does not have a negative impact on locomotor recovery and may have utility with treating spasticity. Other histological assessments will be presented showing the effect of romidepsin drug treatment on other correlated of spasticity, as well as any effects on the neuro-inflammatory response.

Conclusions

Our main findings indicate that romidepsin is a promising therapeutic treatment for the acute management of spasticity following SCI without impeding locomotor recovery. Our team continues to explore the therapeutic potential of off-label romidepsin use in the treatment of spasticity and other SCI related disorders.

Learning Objectives

- Highlight the effect of romidepsin on the reduction of H-reflex hyperexcitability
- Explain the functional link between dendritic spine remodeling and hyperexcitability in the spinal reflex system
- Describe the mechanism of reducing PAK1 activity on dendritic spine morphology and spasticity after SCI
- Discuss the importance of preclinical investigation of romidepsin as a potential therapeutic drug for the treatment of spasticity resulting from SCI

(P2221) Remote Ischemic Preconditioning Improves Post-Operative Outcomes Following Surgical Decompression of Degenerative Cervical Myelopathy

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Presenter

Abstract Body

Background

Degenerative cervical myelopathy (DCM) is the most common cause of spinal cord impairment in the world. Although surgical decompression (DEC), is generally effective as a first line treatment approach for this condition, there are serious challenges which remain. Importantly, most patients with DCM suffer from residual neurological deficits following DEC and 10% develop perioperative neurological decline despite excellent management. Recent work from my lab using our clinically relevant DCM model has provided clear evidence that ischemia reperfusion injury (IRI) complicates DEC, but importantly the molecular mechanisms of DEC-associated IRI and clinically relevant targets for treatment remain elusive. Remote ischemic preconditioning (RIPC) is a non-invasive intervention that uses transient ischemia of a limb to systemically protect the host from ischemic insult for up to 24-hours and has been used in other clinical contexts, including cardiovascular surgery, to mitigate IR injury. To date, the mechanism of RIPC is incompletely understood. However, studies have demonstrated that it enhances ischemic tolerance through the inactivation of the janus kinase-2 (JAK2)-signal transducer and activation of the transcription 3 (STAT3) pathway, and further mechanistic studies have shown this inactivation to be dependent on peroxisome proliferator activated receptor gamma (PPARγ).

Purpose

In this study, we want to determine whether RIPC prior to DEC will enhance neurological recovery through the amelioration of DEC-induced IRI.

Methods

DCM was induced in mice and at 12-weeks they either underwent: 1) RIPC prior to DEC; or 2) DEC alone (n = 50, respectively). Acute (24h post-DEC) and chronic (5wk post-DEC) cohorts were subjected to molecular and Catwalk gait analysis.

Results

Acutely, RIPC resulted in a significant decrease of nearly all proinflammatory markers relative to DEC alone ($p < 0.05$) and markedly reduced astrogliosis. Chronically, RIPC animals significantly outperformed both DEC and DCM groups in nearly all gait metrics and returned to pre-DCM baselines ($p < 0.05$). RNA-seq revealed that RIPC negated the change of thousands of DEC-associated genes and combined with Western blotting and immunohistochemistry, we show that RIPC upregulates PPARγ, an inhibitor of STAT3, which dramatically reduces STAT3 phosphorylation and astrogliosis.

Conclusions

In conclusion, RIPC when performed prior to DEC, reduces neuroinflammation and astrogliosis, and ultimately confers robust long-term neurological recovery relative to DEC alone.

Learning Objectives

- Describe the concept of IRI, and how this occurs following surgical decompression of DCM
- Explain the mechanisms that are responsible for the protective effects of RIPC
- Identify the next steps in the clinical translation of RIPC

- Identify the impact of RIPC on the lives of patients and veterans suffering from traumatic and non-traumatic spinal cord injury

(P2222) Adapt the Runway: A Bronx VA SCI/D Adaptive Clothing Experience

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Abstract Body

Background and Issues:

In recent years we came to realize that the majority of our SCI/D Veterans were not aware of accessible clothing options and did not have the knowledge of do-it-yourself strategies to make their clothing more functional.

Purpose:

To educate our SCI/D Interdisciplinary Team and the SCI, MS, and ALS Veteran population about adaptive clothing options that would help Veterans express their self-identity, increase their independence and reduce caregiver burden.

Method

We researched options available on the market and reached out to adaptive clothing companies. We discovered many adaptations that were concealed within typical attire including: Velcro, magnetic zippers/buttons, elastic waistbands, and seamless pants. We also learned of functional designs to accommodate seated clients to create functional fashion.

On 9/30/21 the SCI/D Department at the James J. Peters VA Medical Center hosted an Adaptive Fashion Show to showcase these functional fashion options to our patient population. The Adaptive Fashion show was also recorded in order to be later shared across the VA network. We were able to do this with the generosity of several sponsors. In total, we had 19 Veterans with disabilities model the clothing from the adaptive clothing companies who contributed to the show.

There are 3 parts to the show that were recorded:

The first part showcases a variety of ready to purchase adaptive clothing already on the market.

The second part of the video is tips and hacks to make clothing that veterans own work better for them, shown by one of our occupational therapists.

The last part of the video provides a brief introduction on the VA clothing allowance benefit.

Results/Conclusion

As an interdisciplinary team that works with Veterans with disabilities we felt this was an important topic that could directly impact quality of life for our Veterans and their caregivers. By bringing awareness and starting a discussion around adaptive fashion we helped introduce our Veterans to ideas and solutions that could affect their overall health and well-being. What we came to appreciate from this experience was how much clothing plays a role in our daily lives . The favorable changes in mood, confidence, and sense

of self-worth reported by the veteran models was visibly apparent throughout the process and an experience they continue to share with friends, family, and peers.

In conclusion, we are planning to share our experience with the VA SCI/D Network, via a recorded video, to help educate and spread awareness as we saw how impactful it was for our veterans.

Learning Objectives

- Identify readily available adaptive clothing on the market
- Utilize techniques to adapt clothing Veterans already own
- Demonstrate Ways to functionally express themselves through fashion and improve their quality of life
- Compile options to reduce caregiver burden and increase independence

(P2223) Vascular Disease Risk Factors in Multiple Sclerosis

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Presenter

Abstract Body

Background

Vascular Disease Risk Factors (VDRF), such as hyperlipidemia, hypertension, obesity, diabetes, and heart disease, appear to significantly increase the risk of disability progression in MS, however the underlying mechanisms are not well understood.

Purpose

To determine if the presence of VDRF affects the disease progression and brain phosphate metabolism in people with MS.

Methods

This is a 3-year prospective, observational, single-site, study with two arms (MS subjects with and without VDRF). We collect 7T MRI brain data at baseline, 12, 24 and 36 months (V1, V2, V3 and V4 visits, respectively) and clinical and biomarkers data every 6 months. Outcome measures include changes in: 1) high energy phosphate metabolites in cerebral gray matter assessed by 31P 7T MR imaging (MRSI) and 2) brain parenchymal volume, 3) clinical impairment, disability, and quality of life.

Results

We preformed cross-sectional and longitudinal analyses of MRI data (52 V1 and 37 V3 subjects). Mean age/gender was 54.6 years with 71% female) (+VDRF, N=29, mean age 56.3 years, 83% female) and – VDRF, N=23, mean age 52.4 years; 57% female) at baseline. We analyzed a volume of interest in the occipital region for changes in phosphate metabolites (V1 and V3) using 7T MRSI. We observed decrease in Adenosine triphosphate (ATP) to total phosphate signal ratio in +VDRF subjects by 3.3% ($P<0.05$) compared with – VDRF. +VDRF subjects showed a larger reduction in parenchymal volume fraction (0.01544, $P=0.025$) over time (between V1 and V3) compared to -VDRF (0.00423). No significant group differences in temporal changes in phosphate metabolites are seen. Additional analyses are underway.

Conclusion

This is the first study to assess brain metabolism and volume in MS patients with and without VDRF. +VDRF MS subjects have significantly reduced brain ATP compared with – VDRF. ATP depletion may reflect mitochondrial dysfunction and contribute to MS disease progression as suggested by the increased brain atrophy in those with VDRF.

Learning Objectives

- Report whether Veterans with MS with VDRF in comparison with those without VDRF have decreased cerebral blood flow and volume detected by MRI and high energy phosphate metabolites in cerebral gray matter assessed by 31P magnetic resonance spectroscopic imaging (MRSI).
- Describe the differences of clinical impairment, disability and quality of life between Veterans with MS and VDRF than those without VDRF.
- Identify brain atrophy progression in Veterans with MS and VDRF and those without VDRF.
- Recognize different demographics between Veterans with MS and VDRF and those without VDRF.

(P2224) Early Onset Nociceptor Sensitization and Peripheral Inflammation in Mice With Traumatic Spinal Cord Injury

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Abstract Body

Background

Spinal cord injury (SCI) is a complex syndrome that has profound effects on patient well-being, including the development of medically-resistant chronic pain. The mechanisms underlying SCI pain have been the subject of thorough investigation but remain poorly understood. While the majority of pre-clinical research has focused on changes occurring within and surrounding the site of injury in the spinal cord, there is now a consensus that alterations within the peripheral nervous system, namely sensitization of nociceptors, contribute to the development and maintenance of chronic SCI pain. Understanding the role that the peripheral nervous system plays is key for identifying novel therapeutic targets to attenuate SCI pain and significantly improve the quality of life of individuals with SCI.

Purpose

It is not known how SCI contributes to functional changes in individual nociceptors acutely following injury. The goal of this project was to quantify electrophysiological and molecular changes in peripheral tissues located below the level of injury in a mouse model of SCI.

Methods

Mice were subjected to thoracic SCI and sacrificed 24hrs or 7 days later. Electrophysiological recordings were preformed using our unique ex vivo skin/nerve/dorsal root ganglia/ spinal cord preparation, which leaves the peripheral nervous system intact. Primary afferent response properties were then characterized in the presence and absence of mechanical and thermal stimulation of the skin. Spontaneous activity (SA) and afterdischarge (AD) was also recorded. In a separate cohort of mice, hindpaw thickness was assessed to track the development of edema, and skin was collected to measure levels of calcitonin gene-related peptide (CGRP), substance P, and nerve growth factor.

Results

We found that SCI increased mechanical and thermal responding, as well as the incidence of SA and AD, in below-level C-fiber nociceptors 24hrs following injury. Interestingly, the distribution of nociceptors that exhibit SA and AD are not identical, and the development of SA was observed more frequently in nociceptors with low heat thresholds, while AD was found more frequently in nociceptors with high heat thresholds. We also found that SCI resulted in hindpaw edema and elevated cutaneous CGRP concentration.

Conclusions

These results demonstrate that SCI causes the development of peripheral inflammation that may contribute to nociceptor sensitization the emergence and persistence of chronic SCI pain.

Learning Objectives

- Explain characteristics and functional properties of peripheral nociceptive neurons
- Describe the effects of spinal cord injury on spontaneous nociceptor function
- Describe the effect of spinal cord injury on elicited nociceptor function
- Identify peripheral inflammatory processes following spinal cord injury
- Discuss the relationship between spinal cord injury, alterations in nociceptor function, and development of peripheral inflammation

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